Environmental and Social Impact Assessment

100 MW Solar PV Plant by Navoi in Uzbekistan

Nur Navoi Solar FE LLC

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COMMERCIAL IN CONFIDENCE

Quality information

Prepared by	Checked by	Verified by	Approved by
Greg McAlister Associate Director, Environment and Planning	Dr Brian Cuthbert Associate Director, Ecology & Impact Assessment	Iain Bell Regional Director, Environment & Planning	Iain Bell Regional Director, Environment & Planning

Prepared for:

Nur Navoi Solar FE LLC

Prepared by:

AECOM Limited
1 Tanfield
Edinburgh EH3 5DA
United Kingdom

T: +44 (131) 347 1100
www.aecom.com

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1. EXECUTIVE SUMMARY

1.1 Introduction to the Project

Nur Navoi Solar FE LLC is planning the construction of large solar power station in the Navoi region of Uzbekistan. The new solar power station will produce a maximum of 100MW of electricity, enough to supply approximately 35,607 households[1], and will form an important part of for the local and national power supply. It is important for Nur Navoi Solar to understand how the new solar power station could affect the environment and local communities and they asked independent specialists to undertake an Environmental and Social Impact Assessment (ESIA) of the new solar park. This Non-Technical Summary (NTS) presents the key findings of the Environmental and Social Impact Assessment for the solar park, both positive and negative. The ESIA considers the construction and operation of the solar park, transformers and an overhead power line connection to the national grid.

The aim of the ESIA involved an assessment of the existing environment; review of the relevant legislation; stakeholder engagement including public participation and consultation; identification of potential environment impacts during the pre-construction, construction, operation and decommissioning phases of the Project; and development of an appropriate management framework for the mitigation of negative effects associated with the proposed Project.

Based on the ESIA findings, the following conclusions have been reached and recommendations made.

- The Solar Park will produce local, clean energy which will reduce Uzbekistan's use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and release carbon dioxide into the air, making a significant contribution to changes in the global climate. The Project contributes directly to Uzbekistan's low carbon pathway strategies.
- Positive impacts of the proposed Project are expected due to the financial contribution the project will make to the regional and national economy during construction and operation. It is also hoped that the project will increase local employment and training during construction and operation.
- The Solar Park has the potential to cause some level of negative environmental and social impact on one tenant farmer who uses the land to graze his goats. Nur Navoi Solar provided support to enable this individual to gain access to alternative grazing land. The land issue is resolved following the allocation and acceptance by Farmer B of alternative land.
- The majority of potential environmental impacts are considered to be minor and will be reduced through by the use of simple management controls that will be applied during the construction and operation of the Solar Park.

A description of the Solar Park, the potential impacts of construction and operation, as well as description of the mitigation plans is provided in the following chapters.

1.1.1 The Project Developer

Nur Navoi Solar FE LLC (the "Developer") is a wholly owned by Masdar, a global leader in renewable energy and sustainable urban development. Over the past decade, Masdar have pioneered commercially viable solutions in clean energy, sustainable real estate and clean technology in the UAE and around the world. Masdar has its headquarters in Abu Dhabi.

The Government of the Republic of Uzbekistan attaches great importance to the development of renewable energy projects. The country has very many days of strong sunshine which make it suitable for the development of large-scale commercial solar plants. The development of the Solar Park is in-line with the national Economic Development Vision 2030. This project will be developed as a joint venture with the government of Uzbekistan under the International Finance Corporation's (IFC) Scaling Solar program. The IFC is expected to agree to support the project in the autumn of 2020.The anticipated lifespan of the Project is approximately 25 years; however, the Developer may repower the project to extend its operational life. Following Project decommissioning the site will be reinstated back to the current land use (grazing land).

[1] Based on an average household size of 5.25 and per capita electricity consumption of 1,488.98kWh per annum. From: WorldData.info (2020). Energy consumption in Uzbekistan. Data accessed at: https://www.worlddata.info/asia/uzbekistan/energy-consumption.php

1.1.2 Project Location

The proposed project site is located in the Navoi region, approximately 35 kilometres east of Navoi City, 16.2 kilometres west of Navoi International Airport, and 2.5 kilometres to the west of Uzumzor settlement. The village of Uzumzor has about 600 inhabitants. There is also a small group of residential property, with about 100 inhabitants, about 2.2 km to the south.

The Solar Park will occupy about 268 hectares (2.6 km^2) of land and will be enclosed by a 2.5metre - high fence. The Solar Park will be connected to an existing 220 kV overhead line that runs along the southeast boundary of the proposed site. Any interconnections to the grid will be constructed within the proposed boundary.

The site is very open and is generally flat. The land is currently used for rough grazing of livestock, mainly sheep and goats. Previous attempts to cultivate arable crops on the site failed due to a combination of poor soil quality and lack of water. Irrigation ditches were built but the last attempt at arable cultivation were abandoned about 5 years ago. The irrigation ditches are now in poor condition.

The site is adjacent to a secondary road that connects with a national highway (M37). The site will be accessed via a short length of existing secondary road.

The natural drainage of the site is slightly inclined towards the west and this will not be changed by the construction of the Solar Park. The site area is bordered on the west and east by two drainage channels. The intended purpose of these drainage channels was to capture and direct unused irrigation water back to the Zarafshan River.

1.1.3 Overview of Solar Photovoltaic (PV) Technology

The Solar Park will convert the sun's energy into electricity using a series of solar panels. The Solar Park will comprise about 300,000 photovoltaic (PV) panels that will be connected in groups or strings to produce the required output. The panels convert solar radiation into electricity through the photovoltaic effect in a silent and clean process that has no moving parts.

The solar panels are thin and will be mounted on frames that will follow the sun during the day. These sun-tracking systems are more expensive than fixed modules but can increase the yield of electricity by up to 20 %.

Solar panels are very efficient at collecting the sun's energy and have a performance ratio of 77 % to 86 %. The efficiency of the panels does reduce over time but they should have a useful life of 25 to 30 years.

The strings of solar panels are then connected to the inverters. The output from a solar panel is direct current (DC) electricity. Inverters convert the DC electricity into AC electricity to allow export to the local grid.

The output from the inverters requires a further step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage.

The grid connection: This is where the electricity is exported into the grid network. The inverters will be connected to a project substation. This substation will have the required grid interface switchgear such as circuit breakers for the protection and isolation of the power plant, as well as metering equipment. The PV modules and the inverters are all subject to certification, and the units chosen by Nur Navoi Solar will conform to standards set by the International Electrotechnical Commission.

1.1.4 Overview of Project Construction and Commissioning Activities

The completion of the Solar Park will have four stages:

a) The pre-construction phase will include land surveys to finalise the position of the transmission line, micro-siting of the solar-PV arrays, substation and roads; final design review (with reference to ESIA recommendations); planning for storm water drainage and containment, undertaking site preparation, manufacturing-procurement of items and transporting the required components and construction equipment to site.

b) The construction phase will begin with include the internal roads and upgrading external access roads (including the clearance of any vegetation); establishment of the construction compound; construction of the solar arrays, substation and other associated ancillary

infrastructure (i.e. the inverters and substation); and the overhead power line connecting the solar plant substation to the national electricity grid.

c) Once the equipment has been installed and commissioned the Solar Park will start commercial operation. During the commissioning period the construction compound will be removed from site. Those areas that were temporarily disturbed during construction will be restored and all wastes will be removed from site. All wastes will be disposed in compliance with Uzbek regulation.

d) The Solar Park is expected to have a lifespan of about 25 years. At that time the Solar Park infrastructure would either be decommissioned or upgraded (if a new license is granted). Upgrading the Park would require the replacement of the old PV modules for new ones (a process called “repowering”). Should the Park be decommissioned then all of the equipment will be removed from the site and the area will be returned, as far as possible, back to the normal state of the environment.

Nur Navoi Solar plan to start construction towards the end of 2020. The construction period is expected to be about 15 months. However, these dates may change due to the impact of the Coronavirus pandemic and the severity of the winter.

1.1.5 Project Staffing

The construction workforce is expected to consist of a combination of nationals and expatriate workers, with the majority being locals preferentially sourced from the surrounding towns and villages. However, the Coronavirus pandemic may change this.

The number of local people that might be employed during construction is not yet known. It is hoped that several hundred Uzbek nationals could be employed. Those individuals employed locally will receive appropriate training before starting work on the project. This includes health and safety, and, where required, job specific or vocational training.

1.2 Project Alternatives

As part of the development process, Nur Navoi considered a number of alternatives to the development of the Solar Park. This section describes the reasoning behind the site selection process and the decision to take this Project site forward as the preferred development option.

1.2.1 Uzbekistan’s Green Economy Strategy

At the national level, Uzbekistan has enacted a strategy for transition to a green economy in the period of 2019-2030. This was approved and implements an Action Strategy for five priority areas of development between2017 and 2021. The priority areas focus on the implementation of measures in various sectors of economy, including electricity, heat, oil and gas, renewable energy, construction and transportation. The Solar Park would meet the objectives of the Green Economy Strategy.

1.2.2 Without the Project

Uzbekistan is one of the few countries which are fully self-sufficient in energy resources. It is the second largest of the Caspian gas producers (after Turkmenistan) and its abundant natural gas resources are used both for domestic consumption and export.[2]

Oil and natural gas comprise 97% of the country's energy balance. Primary energy shares consist of 86.3% gas, 1.9% hydro, 2.5% coal and peat, and 9.3% crude oil.

Uzbekistan is the largest electricity producer in Central Asia. Total national electricity capacity is 12.6 GW (as of 2007), of which 88.5% is provided by thermal power plants and 11.5% by hydropower plants.

100% of the population have access to electricity, but electrical supply to rural areas is unreliable and of low quality. There are often power blackouts that last many hours per day. Renovating the power transmission networks is one of the energy sectors priorities.

[2] IEA (2009): World Energy Outlook.

A 'without project alternative' would place ongoing reliance on generating additional power from fossil fuel sources and would fail to address Uzbekistan's Green Economy Strategy. A 'With Project Alternative' is therefore recommended.

1.2.3 Site Selection

In identifying a suitable site for solar energy developments, various elements need to be considered. These include factors such as:

- Solar resource.
- Environmental designations.
- Residential properties.
- Potential access.
- Grid connection.

The site was presented to potential bidders as part of the Scaling Solar program, a joint cooperation between the Government of Uzbekistan and IFC and as a result there was no opportunity for Nur Navoi to influence site selection.

As far as possible, various project alternatives in terms of site for the Solar Park, the technology that might be used, and grid connection options were assessed. The study found that although the 'without Solar Park alternative would maintain the status quo, which means that the current use of the site (livestock grazing) continues. In addition, the site has good solar resource, has generally flat profile and ease of access, and has few environmental or social risks. The most efficient technology was chosen based on the specific conditions on-site.

1.2.4 Review of Site Considerations

The project site alternatives were screened as part of the Scaling Solar program based on availability of suitable land, access to the grid network, solar irradiation and project appraisal following the Lenders' requirements regarding environmental and social aspects.

Although the site was not subjected to a full assessment of alternatives process by Nur Navoi, it is considered that the site selection process carried out by Scaling Solar was appropriate and the site location meets the above criteria.

1.3 Legal and Policy Framework

1.3.1 Uzbekistan's Green Economy Strategy

Uzbekistan's strategy for transition to a green economy in the period of 2019-2030 was approved by the Resolution of the President of the Republic of Uzbekistan dated 04.10.2019 No. PP-4477 (the "Resolution"). This Resolution was adopted to ensure fulfilment of obligations under the Paris Agreement on climate change signed by Uzbekistan on April 19, 2017, as well as the implementation of the Action Strategy for five priority areas of development of the Republic of Uzbekistan in 2017-2021.

1.3.2 Requirements of the National EIA Procedure

There are specific requirements as to the content, development procedure and examination of Environment Impact Assessment (EIA) documents. These are governed by the following legislative acts of the Republic of Uzbekistan:

1) Law of the Republic of Uzbekistan No 754-XII dated 09.12.1992 "On Environment Protection";

2) Law of the Republic of Uzbekistan No 73-II dated 25.05.2000 "On Environmental Impact Audit";

3) Regulation "On State Ecological Expertise in the Republic of Uzbekistan", approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No 491 dated 31.12.2001.

A series of EIA documents are required to be developed for designed facilities in accordance with the given requirements:

The Project is required to take all reasonable measures in accordance with these laws and standards in order to minimize any potential violations of general balance of environment, including, but not limited

to, land surface, subsoils, air, lakes, rivers, flora and fauna, crops and other natural resources. The hierarchy of protection is determined in the following order: life protection, environmental protection and property protection.

1.3.3 International Best Practice Guidelines

International lenders who are signatories to the Equator Principles (EPs) require projects that they finance to meet international standards. Beyond Uzbek legal requirements, the following international guidelines, regulations and policies will be followed and applied to the Project development and implementation:

- IFC Performance Standards (IFC, 2012).
- Environmental, Health & Safety (EHS) General Guidelines, including wastewater and ambient water quality, waste management and hazardous materials management, noise management, occupational health and safety, and construction and decommissioning guidelines (IFC, 2007a).
- EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007b).
- Asian Development Bank (ADB) Safeguard Policy Statement (ADB, 2009).

These are all specific policies, procedures, strategies and regulations designed for promoting sustainable development. These procedures include a detailed environmental review process prior to final approval of financing for the Project, detailed environmental guidelines, detailed health and safety requirements, procedures for social impact assessment and public consultation and information disclosure and many other issues, associated with project construction, operation and decommissioning. Many of the mitigation measures described in the ESIA are based on these requirements.

1.4 Environmental and Social Assessment Methodology

An initial assessment of impacts was carried out as part of the ESIA. A number of criteria were used to determine whether or not a potential impact of the Solar Park could be considered ‘significant’. Wherever possible, a quantitative assessment of the impacts was undertaken. Where this was not possible, a qualitative assessment of impacts was made by technical specialist, based on existing information available for the site and the surrounding study area, and their experience with other solar PV developments.

The technical specialist who undertook the ESIA study used a number of steps as follows:

- Baseline study: The collection of relevant information on the current status of the environment. This study provides a baseline against which change due to the development is measured.
- Impact prediction and Assessment: Impact prediction involves forecasting the likely changes in the environment that will occur as a result of the development. Impact Assessment requires interpretation of the importance or significance of the impacts to provide a conclusion or recommendation to the decision-makers who will impose conditions that must be satisfied before the Solar Park can be built.
- Assessment of cumulative impacts: This assessment will identify those combined impacts which may arise from other existing or planned developments in the area.
- Mitigation: Mitigation involves taking measures to reduce or remove environmental impacts.
- Assessment of residual impacts. This will be the impacts remaining following the application of mitigation measures.
- Monitoring: Follow up monitoring has been described in ESIA Report and includes the monitoring of impacts once the mitigations have been put in place.

1.5 Stakeholder Engagement Programme

As part of the ESIA study, AECOM carried out a stakeholder engagement programme which is documented in more detail in the ESIA Report and Stakeholder Engagement Plan (SEP). The SEP identifies the different groups or individuals that might be affected or concerned about the new Solar Park and describes how the project team will consult with each group or individual.

The aim of the consultation meetings or discussions was to:

- Build and maintain stakeholder relationships;
- Gather information on the local environmental and social issues;
- Disclose Project information (including any access restrictions, employment and procurement opportunities, and community health and safety issues);
- Provide stakeholders the opportunity to provide feedback to Nur Navoi; and
- Manage grievances through the Grievance Mechanism.

The SEP (and the engagement programme) will be updated with the Project moving to the construction stage, as well as upon commencing the operations.

1.5.1 Previous Stakeholder Engagement Activities: Scoping and ESIA Phases

The first official round of stakeholder engagement activities (from an E&S perspective) took place in Navoi (city) and in Uzumzor on the 5th and 6th of March 2019. Further stakeholder engagement took place in March 2020 as part of the Preliminary ESIA. The stakeholder's comments and the outcomes of the meetings are described in more detail in the ESIA and SEP.

1.5.2 Future Stakeholder Engagement Activities

The future planned engagement methods are divided into the following categories:

- Information notices: Used to inform the identified stakeholders and the general population of the SEP activities and the project development process;
- Sharing information and consulting with local stakeholders: Used to provide information to stakeholders or to engage in a two-way dialogue by which information is shared with the stakeholders and these in turn can express their views and concerns about the project, and
- Community Grievance Mechanism: System to receive and facilitate resolution of the stakeholder's concerns and grievances about project-related issues.

The draft SEP will be updated to account for ongoing engagement during construction and operational phases.

1.6 Summary of Baseline Conditions

Specific local conditions have been described from a combination of desk-based review and site survey. The preliminary site reconnaissance was carried out by the Typsa E&S Scoping team on the 30 October 2018 followed up by detailed ground investigations in January 2019. A further E&S visit took place in March 2019. Further primary baseline data was collected by the AECOM ESIA team during March 2020 as part of the Preliminary ESIA studies and these were used to fill any knowledge gaps for the baseline section of the ESIA report. A final site visit was undertaken in June 2020 prior to the completion of the detailed ESIA study. A summary of the key environment and social aspects of the project are provided below.

1.6.1 Physical characteristics

1.6.1.1 Climate and Meteorology

The average annual precipitation for 2010-2017, according to weather stations[3] varies from 74.0 mm to 284.2 mm per year. The annual amount of precipitation for several years (2010-2017) within the irrigated area varies from 97.0 mm to 284.2 mm. Most of the precipitation (70-90%) occurs in the winter and spring. In summer rainfall is rarely observed. Average annual air temperature in the area of Navoi city equals to 15.87 ℃. The coldest month is January (average temperature is 2.77℃), the hottest one is July (average temperature is 28.78 ℃). Absolute minimal air temperatures in a cold period of a year reach – 17.4℃. Absolute maximum value is observed during the period of time from May to August and is more than 40℃ (43.8 ℃ in 2007).

1.6.1.2 Geology and Soils

The solar plant will be located on an extensive plain that forms part of the terrace of the Zarafshan river, about 20 to 25 meters above the flood plain of the river. The terrace is mainly made up of sandy gravel

[3] Data from nearest weather station: Samarkand, Uzbekistan (146.0 KM).

to a depth of (8.8 meters on the PV plant site), though a superficial sandy silt layer has been detected on the surface. The ground is intensely salty, and the high salt enrichment makes the area unsuitable for arable farming. No groundwater was identified in surveys carried out to a depth of 8.8 meters. The Khokimyiat suggests groundwater is encountered at 80 m below ground level. It can therefore be concluded that no groundwater would be encountered during construction works which would take place to around 3 m depth.

1.6.1.3 Hydrology and hydrogeology

The water bodies close to the proposed project site are:

- Zarafshan River – ~5km North of the proposed site
- Skurkulshoe Reservoir – ~25km North of the proposed site
- Navoi Canal – ~9km South East of the proposed site.

Two man-made canals form the eastern and western boundary of the site. Based on information gathered during consultation, the canals are for drainage purposes only (i.e. they collect water from upstream agricultural fields at the south), there are no other additions (e.g. treated or untreated industrial, domestic or other streams) and there are no downstream users of the canal.

A full hydrologic and hydraulic study[4] was carried out by TYPSA and according to the available data there is no flooding risk in the site of the project related to extreme flows of the Zarafshan River.

1.6.1.4 Utilities

In addition to the water channels, a drinking water pipeline has been identified which passes through the site between point E670306.120, N4441744.923 and point E669656.784, N4442165.868 for around 780m. The pipeline is buried at a depth of 1 meter and is 255mm in diameter. The maximum working pressure is 4 bar. The registered name is Drinking Water Pipeline Tashrabot-Xozara. Discussion with the Khokimyiat confirmed that the pipe is a water pipe constructed around 2015 or 2016. The pipeline is owned and operated by Qiziltepa District Branch “Navoiy Suv Ta’moti” LLC, a legal entity of state-owned utility “Uzsuvta’minoti”JSC. An additional survey was completed by AECOM which confirmed the route of the pipe. The water pipeline is operational. No other pipeline exists on the Project site.

1.6.1.5 Air Quality

Current sources of air pollution in the vicinity of the Project site include the burning of fuels in surrounding communities and vehicular traffic along neighbouring roads. No stationary emitting sources were identified in the surrounding areas of the proposed site. The closest emitting sources were the vehicles using the M37 road. The operational coal fired power station is 28km to the east of the Project. The main source of air pollution will be dust during construction works and the receptors will be the two farms identified as well as the settlement of Uzumor, 2km to the east.

Dust conditions were low (not discernible) at the proposed site on the days of the site visits. The likelihood of dust storms is low as reported by the Environmental Department during the consultation meetings.

1.6.1.6 Noise, Vibration and Light

Current noise in the vicinity of the Project site comes from agricultural and domestic activities, as well as traffic using the M37 road to the south of the site. Natural noise sources include noise from birds and insects. There were no significant sources of vibration noted during the site visits. The area is generally not illuminated at night.

1.6.2 Landscape and Visual

The area around the Solar Park is generally flat and, with the exception of the overhead power lines, the majority of the engineering structures will be low to the ground. The assessment considered the potential visual impact of the development on people who might see it from local settlements, higher ground, or from the road passing the site.

[4] Typsa (2019). Scaling Solar Uzbekistan: Hydrology and Hydraulic Report. Ref. SP5331-RP-HE-HydrologyReport-00-D02

The region is semi-arid and the site is predominantly covered by scrub grassland. Local settlements are small, comprising villages and isolated farmhouses, connected by the M37 highway and an informal network of smaller tracks. The settlements are surrounded by agricultural land. The largest nearby settlement, the village of Uzumzor, is 2.8 km east of the Project. Land surrounding the village is irrigated agricultural farmland and rough grazing. Existing electrical infrastructure including three overhead lines are located immediately east of the Site. No specific mitigation has been proposed.

1.6.3 Biodiversity

The Project Site is dry steppe but is surrounded by irrigation canals and watercourses which have the potential to attract a wide range of species. The closest lake is approximately 20 km to the southwest of the Solar Park.

1.6.3.1 Protected Areas

There are several Key Biodiversity Areas (KBAs) within 50km buffer surrounding the project site. The closest of which is the Tudakul and Kumazar Reservoirs located 20km to the southwest of the project site.

- Tudakul and Kuymazar Reservoirs – ~20km SW of the proposed site
- Kagan Fish Farm – ~45km SW of the proposed site (adjoined to Tudakul KBA)
- Dzheiran Ecocentre – ~45km SW of the proposed site (adjoined to Tudakul KBA and Kagan Fish Farm KBA).
- Karnabchul Steppe – ~50km SE of the proposed site.
- Vardanzi IBA – ~45km W of the proposed site.
- Sarmish Nature Park – ~60km NE of the proposed site

Given the distance from the Protected Sites to the Solar Park it is considered that only the species using the Tudakul and Kuymazar Reservoirs may potentially be impacted by the Solar Park. It is considered that this impact would be a result of species listed in the KBA using habitats on site for breeding or feeding. No such species were encountered during the survey work completed to date. Other sites are considered to be too far from the Solar Park to experience any impact.

1.6.3.2 Habitats

The March 2020 AECOM surveys confirmed that the area in and around the proposed Project site is a wormwood steppe (*Artemisia*). Wormwood steppe is commonplace within the arid zones of Uzbekistan. Other plant species recorded within wormwood steppe include isirik (*Peganum harmala*), broad-leaved grasses (e.g. *Poa* spp.), occasional thistles (*Asteraceae*) and occasional tulip (*Tulipa buhseana*). The wormwood steppe within and adjacent to the site is subject to over-grazing by sheep and goats and is significantly degraded. There are other areas of modified habitat where attempts were made to cultivate crops. Further surveys took place in June 2020 and did not identify any plant species listed on the Uzbekistan Red List or invasive non-native species. The local habitat is considered to be degraded Natural Habitat.

The wet irrigation ditches which border the proposed Project site support the growth of the common reed (*Phragmites australis*).

The proposed Project site and adjacent areas do not fall into Critical Habitat category and are not assessed to be important habitats.

1.6.3.3 Birds

Uzbekistan has a total of 352 bird species with 19 listed as globally threatened. 297 species are migratory with 55 resident species. No species are listed as being native to Uzbekistan

One bird species that is considered to Critically Endangered has been identified during desk-based research – Sociable lapwing *Vanellus gregarious*. The Tallymerjan area on the Uzbekistan/Turkmenistan border (approx. 140km south of the project area) has been highlighted as a key stopover site for the eastern flyway, with all birds monitored on the eastern flyway using this site as

a stopover site during their migration. It is possible that these birds fly over the proposed project site and could use the area surrounding the Project as stopover sites during migration.

The following species of concern were identified from desk-based review:

- Sociable lapwing – *Vanellus gregarious*
- Steppe Eagle - *Aquila nipalensis*
- Saker Falcon - *Falco cherrug*
- Houbara Bustard - *Chlamydotis macqueenii*

Survey Results for migratory birds

A single species of conservation concern was observed during the March 2020 field surveys: steppe eagle (*Aquila nipalensis*) [IUCN Endangered]. A total of eleven Steppe eagle were observed flying in a northerly direction over and immediately adjacent to the eastern boundary of the proposed Project site on 3rd March. These birds are migrating on a broad front as the proposed project site is not located on a major bottle neck or geographical feature that would concentrate migrating species.

Migratory species recorded during the field surveys, which may also breed within the proposed project area, are desert wheatear (*Oenanthe desertii*) and isabelline wheatear (*Oenanthe isabellina*). These species are not of global conservation concern.

Survey Results for Resident and Over-wintering Species

No resident species of global conservation concern were observed during the field surveys.

Terrestrial Mammals

The following mammal species were confirmed to be present within the proposed project site during the June 2020 field visit (none of which are included within the Red Data Book [RDB] of Uzbekistan):

- Yellow ground squirrel (*Spermophilus fulvus*) [IUCN Least Concern] – observed within the proposed project site. The burrow density was estimated at 2-4 holes per hectare. This species was also recorded adjacent to the proposed Project site, to the south of the M37 carriageway, during the March 2020 field visit.
- Large jerboa (*Allactaga major*) [IUCN Least Concern] – a record of a single animal observed within the proposed project site
- Northern Mole Vole (*Ellobius talpinus*) [IUCN Least Concern] – active burrows/digging by this species were observed;
- Long-eared hedgehog (*Hemiechinus auritus*) [IUCN Least Concern] – recent field signs (digging) indicative of this species were observed within the proposed site and a hedgehog skin was observed adjacent to the site;

The following mammal species were considered likely to have occurred within the proposed project site, but no recent field signs were observed during the June 2020 field visit (neither species are included on the Uzbekistan Red List):

- Large gerbil (*Rhombomys opimus*) [IUCN Least Concern] – disused burrows were observed within the proposed project site that were considered likely to be associated with this species;
- Libyan jird (*Meriones libycus*) [IUCN Least Concern] - disused burrows were observed within the proposed project site that were considered likely to be associated with this species.

During the June 2020 field visit there were anecdotal reports provided during an interview with the local shepherd of the following mammal species: Red fox (*Vulpes vulpes*), Jackal (*Canis aureus*), Steppe cat (*Felis lybica ornata*) and Badger (*Meles meles*). Reed cat (*Felis chaus*) was also reported as rarely present within the site, however the habitat within the proposed project is site is unsuitable for this species. All of the aforementioned species are IUCN Least Concern and none are included on the Uzbekistan Red List.

Bats

Common pipistrelle (*Pipistrellus pipistrellus*) [IUCN Least Concern] was recorded foraging/commuting within the proposed project site and this species is considered likely to be utilizing the farm buildings within the project site for roosting.

Reptiles

During the field survey, two reptile species were found: Central Asian tortoise (*Testudo horsfieldii*) and Sunwatcher toad-headed agama (*Phrynocephalus helioscopus*).

The June 2020 surveys estimated approximately 1-3 residential holes per hectare within the proposed project site. The occurrence of Central Asian Tortoise [IUCN Vulnerable] does not trigger critical habitat in terms of IFC Performance Standard 6 (PS6); it is not listed as CR or EN on the IUCN Red List, nor is a restricted range species or endemic to Uzbekistan. Further surveys and destructive searches were carried out in October 2020 in areas to be cleared. A total of 5 individuals were recorded in a 15ha area giving a lower density of 0.2 per ha.

The June 2020 field surveys were carried out during the active season for most reptiles. Two reptile species were observed within the proposed project site: steppe agama (*Trapelus sanguinolentus*) [IUCN Least Concern] was observed at approximately 2-3 per 100m transect and rapid racerunner (*Eremias velox*) [IUCN Least Concern] was recorded at approx. 5 per 100m transect.

No snakes were recorded during the June 2020 field surveys, although field signs (tracks) were observed at several rodent/tortoise burrows. An interview with the local shepherd suggested that the following snake species may occur within the site:

- Tatar sand boa (*Eryx tataricus*) [IUCN not yet assessed];
- Gamma snake (*Boiga trigonata*) [IUCN Least Concern, RDB of Uzbekistan];
- Sand racer (*Psammophis lineolatus*) [IUCN not yet assessed];
- Saw-scaled viper (Echis carinatus) [IUCN not yet assessed].

1.6.4 Archaeology and Cultural Heritage

The Site is located immediately north of part of the Silk Roads trading route between Bukhara and Samarkand, which broadly followed the course of the M37 road.

Prior to the construction of large-scale irrigation canals in the 20th century, the sedentary population cultivated fertile land close to the river or oases at Bukhara, c.60km to the west and Samarkand, c.175km to the east. Historically, intermediate areas of desert and semi-desert, such as the Site, were used by pastoral nomads.

The Project site itself does not contain any internationally recognized or legally protected cultural heritage areas. Immediately south of the Project, the M37 road broadly follows the course of the Silk Roads, a Tentative List World Heritage Site (Ref. 5500). About 5km northeast of the Project site is the village of Hazora, site of the Malono Orif Deggaroni Mosque and Complex, associated with the mentor of the founder of the Sufi Naqshband order and the site of pilgrimages.

Archaeological or cultural sites recorded close to the Project are summarised below.

The **11th century Deggaron Mosque** (Navoi Region State Register Architectural Monument No. 44) is one of the one of the earliest preserved Islamic religious buildings, which may have been converted into a mosque from a Zoroastrian temple. The **Deggaron Complex** (State Register Architectural Monument No. 45) includes the *khanaka* (monastery/inn) and mausoleum of Shaykh Malono Orif Deggaroni (1313–1376) which has recently been restored. Deggaroni was a mentor of Bohauddin Naqshband (1318–1389), the founder of what would become one of the largest Sufi orders. The complex is a pilgrimage site and includes a museum, garden, wells, a cooking and dining area and a chillahona (prayer area).

The **Sardoba Malik (Royal Well)**, an underground well under a domed structure, is located on the south side of the M37 highway immediately south of the caravanserai (State Registered Archaeological Monument, Navoi Region No. 42). It was built in the 11th to 12th century, supplied by the underground Narpai canal and irrigation channels from the Zaravshan River.

The **Rabati Malik (Royal Fortress) Caravanserai**, a State Registered Architectural Monument (Navoi Region No. 43) and Tentative WHS List site (Ref.: 5308), is located c. 12 km east of the Project, north of the M37 highway. Built in the late 11th century, and reconstructed in the 12th century, it was a palatial residence and headquarters of the Karakhanids. Following the Mongol invasions in the 13th century, it gradually became a roadside caravanserai on the main road from Samarkand to Bukhara. The caravanserai remained in use until the 18th century. The main facade was largely demolished in the 1940s and 1950s. With the exception of the 18m high portal, the caravanserai flanking walls were demolished by the earthquake of 1968.

In the 17th century, a fortress was built in the village of Deggaron (Hazora). Parts of the remains of the fortress wall survive.

A review of the known archaeology and history of the wider Project area indicates that there is low potential for the presence of Palaeolithic, Mesolithic and Neolithic material. Throughout the later prehistoric, antique and medieval periods, it is likely that this semi-arid desert area was populated by mobile herders. There is some potential for the presence of stray finds (casual losses), travellers' campsites and for burial mounds (*kurgan*).

Any terrestrial archaeological remains within the Project Area are likely to comprise:

- Fragments of pottery or other material identified on bare ground.
- Surface scatters identified in areas of disturbed ground or excavated soils from groundworks.
- Buried features, which may have moderate depth and complexity.

An inspection was carried at site by the Navoi Region Cultural Heritage Department experts under the Ministry of Culture on 30 Sep 2020 and confirmed that no cultural heritage objects available within the project site. This positive conclusion was issued as formal letter to Project Company.

1.6.5 Socio-economic Conditions

The proposed Solar Park is located in the Navoi Region, the largest of Uzbekistan's 12 regions (111.09 km^2), situated in the central north/northwest of the country. The Project is located about 30 km west from the town of Navoi, the administrative capital in the Navoi District (also called Karmana). Navoi District is one of the eight districts forming the Navoi Region. It lies south of the region and is directly bordering the districts of Kyzyltepa, Navbakhor, Kanimekh, Khatyrchi, and Nurata. Navoi District is also adjacent to the region of Samarkand and within it, to Pakhtachi District.

The closest residential areas identified around the Project are the village of Uzumzor (2.6 km east from the site boundary), and a small residential cluster (2.2 km south from the site boundary). The area is characterised by desert conditions, with irrigated land and the Zarafshan river located approximately 4.3 km north from the site.

During the meeting organised with local institutional stakeholders, the representative from the local Council of Uzumzor reported that the local economy, relies mostly on agricultural activities, in particular cotton and wheat. Further research and site visits will confirm this information and will need to further investigate the weight of the industrial sector and its composition.

Preliminary work has identified that land in the Solar Park was predominantly used for grazing. The visit has also revealed the existence of two farms within the Project area: referred to Farm A and Farm B. The existing records indicated that the farmers (lessors) have returned certain land plots back in 2018 (i.e. ceased the lease agreement), although it is understood that Farmer B was still using the original land without a contract or agreement from the administration. Following consultation with the State Cadaster in March 2020 the Government completed the process of acquiring the land for the Project. The two lessors of these farms surrendered their lease of the land identified for the Project. Farm B leaseholder has now been provided with alternative land. No farming or grazing should be taking place on the project site.

1.6.6 Transportation and Access

It is currently expected that the Solar PV components will be transported to site over land from a manufacturing plant in China, via Kazakhstan. There is a second option to transport goods by rail; all goods would be sent from the Xi'an Xinzhu Railway Port. After reloading at Altynkol Station, the train reaches Chukursay station in Tashkent, where materials are then transferred to the Project site by road.

1.7 Impact Assessment

Following the identification of the main environmental and social baseline features, the likely impacts have been predicted. In all cases an assessment was carried out which measured the extent of the impact as a deviation from the baseline conditions. The significance of each impact was categorised and for significant impacts, further mitigation measures have been proposed.

1.7.1 Geology and Soils

The main impact on soils during construction will be the potential for soil contamination from spills and leaks and increase in vulnerability to erosion. Soil compaction and the loss of the limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during higher periods of rainfall, when vehicle traffic is likely to cause the greatest damage. As noted above, surface water is likely to pond on site rather than discharging to the irrigation canals.

Where roads are un-surfaced, rutting and gully erosion eventually make the roads impassable so that vehicles drive off the track and the area affected by erosion continually widens. To mitigate this impact, tracks will be constructed and vehicles will be prohibited from driving off-road,

Soil compaction and loss of limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during the rainy seasons, when vehicle traffic is likely to cause the greatest damage.

The following types of construction activity could lead to potential soil compaction or erosion depending on the level of rainfall experienced at that time:

- Vehicle traffic along dirt tracks used during construction of on- and off-site roads, power lines, control centre and solar panels.
- Off-road vehicle traffic will damage vegetation.
- Any vegetation and some soil will be removed for the control centre, solar panel foundations, transmission towers, and both on- and off-site roads.
- The use of heavy equipment if used outside designated roads.
- Soil erosion from increased water run-off.

The importance of soils in the Solar Park is assessed as Low and as a result it is expected that development can take place on site without impacting on other off-site users. Whilst it is recognised that soils will be most vulnerable during periods of higher rainfall, the similar soil conditions in the wider local and regional area does not require any more detailed consideration of on-site resources. The magnitude of the effect is predicted to be Low, given that there is potential for construction activities to notably change the soil resource, particularly during rainy season but impacts are deemed to be highly localised. As a result, the significance of the impact is assessed as Low.

During operation the impact on geology and soils is deemed to be negligible as very little maintenance work is scheduled to take place and at a significantly lower scale that during construction.

1.7.2 Hydrology and Hydrogeology

There are two permanent surface water bodies on the eastern and western boundaries of the Project site. These are both man-made canals intercepting run-off from agricultural areas. The Zarafshan River provides the main source of irrigation across the region.

Surface water may be subject to reduction in quality due to chemical spills should proper mitigation not be implemented. The irrigation canals adjacent to the site currently provide drinking water for livestock and are used to supply irrigation water for smallholder vegetable farming for local farmers.

Water supply during construction and operation will be obtained from the public water pipe crossing the site. No surface or groundwater will be used.

Water requirements for construction and potable water for workforce, is estimated as 3,600 m^3 and 10,658 m^3, respectively.

Water requirements during operation and maintenance will be largely focused on panel cleaning. Wet cleaning requires 0.275 l/m^2 of panel. For 131.5MW_{DC}, the total area is 660,000 m^2, and hence Total water requirement is 181.5 tonnes of water per cleaning cycle. It is assumed that cleaning would take place up-to a maximum of 24 times per annum therefore 4,356m^3 of water is required. In addition, back panel wet cleaning requires 131m3 per cleaning cycle. It is proposed that wet cleaning of the back panels would take place twice per annum, requiring 262m^3 of water. The total water requirement for wet cleaning is estimated as 4,620m^3 per annum. Proposed. The Company will optimize module the cleaning scheme during operations depending on soiling factors at site to reduce wet cleaning cycles. If appropriate, dry cleaning will be undertaken..

The use of heavy vehicles during construction could alter surface drainage within the Solar Park and create ponding of surface water. Earth banks would prevent the direct discharge of surface water to the irrigation canals. Compaction of soils will reduce the amount and rate of water that soaks into the ground and surface ponding will increase. The risk is greatest during periods of heavy rain in December. There is unlikely to be an increased volume of water flowing into drainage channels due to the earth banks running adjacent to the irrigation canals and hence there is unlikely to be additional soil erosion. Surface run-off will also contain higher concentrations of suspended sediments during construction than would otherwise be the case but as discharge to the irrigation canals is limited, surface water will pond in the small depressions on site. Other potential sources of pollution during construction comprise leaks and spills of oils from machinery. There is no proposed discharge of sanitary waste and wastewater as waste will be collected in a septic tank for disposal

As a result, the significance of the impact is assessed as low. The extent of reduced groundwater quality due to construction activities is considered local, and the duration assessed as being temporary and short-term. However, the depth of groundwater at 80 m below ground level result in a negligible magnitude of impact. In both cases a low significance of impact is predicted which does not require additional mitigation measures to be implemented. Nevertheless, mitigation in this case will be implemented through the implementation of Good International Industry Practise pollution prevention measures.

As no physical works will take place on site during operation, it is anticipated that the level of impact during operation is significantly less than during construction.

1.7.3 Landscape and Visual

The Solar Park will be only visible to a small number of people who live locally or are travelling through the area on the main highway. The equipment used to build the Park is not large, but it is expected that the construction compound and worker accommodation will be visible from nearby settlements.

The completed Solar Park will include larger structures such as inverters, electrical substations, transformers and the Control Building. In all cases it is expected that on-site structures are no higher than the boundary fence which will be 2.5 m in height. The exception will be the substation connecting the Solar Park to the national grid. In all cases the height of the Solar Park will be significantly less than the height of the existing electricity pylons running in a west to east direction to the south of the Solar Park. The main impacts to the LCTs during operation are the installation of solar PV panels, boundary fence, and associated inverters and substation.

The finished height of the Solar Park is low and it will only be visible to the nearby settlements. The majority of people will see the Park against the industrialised landscape of the Navoi region.

The impact of the Park on the visual landscape is considered to be low and no specific mitigation is required.

1.7.3.1 Glare and Glint

Related to the visual impact of the Solar Park is the potential for the panels to result in glare and glint. The potential for glare and glint from the Project during operation is low. It is important to note that the PV panels work on the concept of absorbing sunlight rather than reflecting it as compared to other technologies that concentrate solar energy. The PV panels that will be used for the Project have very limited levels of either glint or glare and are substantially less reflective than most surfaces such as still water, glass or steel. Glint will be substantially reduced by the anti-reflective coating of the modules that is incorporated to maximise the light capture of the solar cells. Previous studies have been undertaken to compare the reflectivity of solar panels with other materials. The most commonly referenced source is a USA Federal Aviation study focusing on solar panels located at airports. This study states that

modern solar panels reflect as little as 2% of the incoming sunlight. Solar PV panels have a lower level of reflectivity than many commonly occurring features such as bare soil and vegetation.

1.7.4 Biodiversity

1.7.4.1 Lake Effect

Questions have been raised in literature about the potential of solar PV arrays to mimic waterbodies resulting in 'lake effect'. Photovoltaic panels have been shown to reflect polarised light that is attractive to polarotactic aquatic insects, these in turn could potentially attract insectivorous predators. Bernáth *et al.* (2001) describe birds attempting to drink from plastic sheets, hypothesising that this behaviour may be due to an attraction to surfaces reflecting polarised light.

Little scientific evidence exists that demonstrates a direct impact of solar PV on birds. It is likely that different avian species are likely to be affected differently by solar developments. In the case of the Solar Park site being considered, there are no features nearby that would suggest that the habitat is particularly sensitive or attractive to migrating birds or would result in an increase in species diversity. As a result, no features have been identified that could potentially increase the collision risk of migrating or resident species colliding with the solar panels.

1.7.4.2 Birds

The proposed project site is not located on a major flyway or in a geographical feature that would concentrate migrating species. Survey work has confirmed that the site is not important for breeding or migrating species.

Construction impacts are likely to include habitat loss as well as disturbance impacts in the Project and adjacent areas. The existing habitat is considered to be degraded Natural Habitat as defined in PS6.The degraded nature of the project site and the relatively small number of birds encountered mean that there is not likely to be a significant impact on resident bird species.

Habitat loss associated with construction is unlikely to result in a significant impact to migrating birds as no major attractant features (e.g. lakes / wetlands) will be lost. As a result, there are not anticipated to be any impacts on resting or stopover sites for migrating birds.

Large avifaunal species utilise large tree species and these are not present within the PV area of the site, thus the Project is not expected to affect successful breeding of local large bird species (such as raptors).

Operational impacts are deemed to be similar with the key impact being the loss of habitat associated with the installation of solar panels. The impact significant is therefore unchanged from construction phase.

1.7.4.3 Terrestrial Ecology

Construction will cause the loss of habitat as well as disturbance in the adjacent areas. However, the natural vegetation at the project site has been substantially altered by farming and irrigation. Due to the high level of anthropogenic disturbance to the natural vegetation and limited diversity on the project site, there is little natural ecosystem function demonstrated by the site and it is therefore not considered a sensitive area. The existing habitat is considered to be degraded Natural Habitat as defined in PS6. It is expected that there will be limited removal of vegetation during construction as it mainly consists of low growing species.

The abundance and diversity of terrestrial fauna was found to be low. A single species of conservation concern was recorded: Central Asian tortoise (IUCN VU). However, there is no reasonable likelihood that the tortoise population occurring within the Project site is of regional importance as the degraded steppe habitats within the site support a small population of tortoises (the population density is significantly lower than for areas of Uzbekistan which support the highest population densities). The March and June 2020 field surveys confirmed that the plant and animal species recorded within the proposed project site during the AECOM field surveys are not of conservation concern. A single desert monitor (*Varanus griseus*) was recorded within the wider area and there are anecdotal reports of gamma snake (*Boiga trigonata*); both species are included in the Red Data Book of Uzbekistan, however, although there is suitable habitat within the proposed project site, there is no reasonable likelihood that regionally significant populations occur. The sensitivity of the terrestrial habitat has therefore been assigned as Low in terms of faunal species.

The Artemisia associations which predominate in the proposed project site is the dominant habitat type within the proposed project site boundary; it is a degraded Natural Habitat as defined in PS6. This wormwood steppe vegetation is ubiquitous within this region of Uzbekistan.

The magnitude of the effect is predicted to be Medium given the area of the Project site that will require to be cleared and / or disturbed. As a result, the impact is assessed as Medium and significant. As a result, a suite of both standard mitigation measures and species specific mitigation measures will be implemented to ensure impacts are reduced to Low significance or below.

1.7.5 Archaeology and Cultural Heritage

There are no significant cultural resources within the Project site and the Project is not considered to have a direct adverse impact on any international or nationally recognised cultural heritage feature.

As a result of the absence of known archaeological, religious and aesthetic sites, the site sensitivity is assessed to be negligible.

There is the potential for the discovery of unrecorded buried archaeological remains during the construction phase as the Project will involve ground clearance activities such as levelling, grading and excavation works. These works have the potential to directly impact on unrecorded buried archaeological remains which may be present within the site boundary and may be of archaeological importance.

It should be noted that although there are no known archaeological or religious sites located within the Project footprint, the Rabat Malik Caravanserai and other Silk Road sites are located to the east of the Project adjacent to the M37. It was noted that the Caravanserai has been rebuilt to the extent possible and bears little resemblance to its original structure. Nevertheless, this site is of cultural significance. It is imperative that these sites are not disturbed further by the Project activities, such as transportation, or by the workforce. Given the distance from the site it is considered unlikely to be directly impacted by the Project.

During the operational phase there will be no new impacts on existing cultural sites. The lack of visibility of the Project from these sites and the absence of a construction workforce will mean that no impact is predicted.

1.7.6 Noise and Air Pollution

Noise pollution may result from the large workforce and construction activities, particularly the movement of trucks used to carry material to the site and removal of debris. Some heavy earth moving, and compacting machinery may be required for brief periods during construction but it is expected that much of the civil work will involve manual labour.

Levels of dust may increase locally as a result of dust from vehicle movements and other construction activity. However, this will be a temporary effect that can be mitigated by restricting vehicles to sealed access tracks and the use of dust suppression measures.

The construction of the substation building / transformers and inverters are expected to be the noisiest activities. Typically, associated construction activities within a 200 m distance from noise sensitive receptors have the potential to result in increased levels of noise at people's houses. The closest house to the Project is around 1km away. The Project layout includes a number of inverter and transformer locations toward the centre of the site which again are at a distance of over 1 km from the closest house.

Magnitude of change is anticipated to be Very low as there is unlikely to be any increase noise levels and increased dust / emissions to air associated with construction of the Project at nearby residential receptors. The impact is assessed as Negligible and not significant pre mitigation. Although no specific mitigation is required, standard good construction practice will be maintained to ensure no increase in predicted impacts during construction.

During operation, solar PV panels do not produce any noise, however equipment within the site (typically inverter stations and transformers) will emit low levels of noise. While the Project will only be operational during daylight hours, the transformers are permanently energised and emit a low hum during the night-time. However, the distance between the substation transformers and the nearest residential properties is about 1 km and a breach of the lower 45 dB limit is highly unlikely and as a result no significant impact has been predicted.

1.7.7 Social Impacts

As has been described, the nearest residential areas identified around the Project are the villages of Uzumzor (2.6 km east from the site boundary), and Farkhod (2.2 km south from the site boundary). The area is characterised by desert conditions, with irrigated land and the Zarafshan river located approximately 4.3 km north from the site. The following sections will describe some of these interactions in order to frame the social impacts. Only two householders will be directly, negatively affected by the development of the Solar Park.

1.7.7.1 Physical and economic displacement

As noted, only two householders will be directly, negatively affected by the development of the Solar Park. There has been no physical displacement and alternative land has been provided. It is considered that only Farmer B has experienced economic displacement due to the loss of available grazing areas.

1.7.7.2 Community expectations of the Project

Local communities and the local economically active population may develop higher expectations on the direct or indirect benefits of the Project, specifically regarding work opportunities. Unmanaged expectations, particularly in terms of the number of jobs being created for the local community, can begin from the moment the Project is announced for development, before site preparation activities commence.

1.7.7.3 Increased Local Employment, Capacity Building and Supply Demand

As previously mentioned, the Project will employ up to 900 personnel including technicians and low-skilled personnel (approximately 600) who will receive various levels of training before staring work on the Project. This includes basic training on HSE, labour management and, where required for specific job profiles, vocational training. The construction workforce is expected to consist of a combination of nationals and expatriate workers, with the majority being local economically active population, preferentially sourced from the surrounding communities in the AoI. A Local Hiring Plan should be developed to maximise the number of local employees on the Project (see Section 8).

Additionally, the Project will positively influence the local and regional economy during construction from the direct procurement and supply of materials and services from companies based in the local and regional area. This includes the procurement of security, construction companies involved in civil works and the interconnection to the existing transmission lines, logistics, machinery, vehicles and from lodging and accommodation services provided to the workforce.

1.7.7.4 Capacity Strain Contribution to Local Public Services and Facilities

The Construction workforce will be based on site in workers camps.

The workforce camp will be designed in accordance with IFC/EBRD guidance and will include provision for all required services including bathrooms/showers, kitchen, laundry and medical facility. The EPC Contractor will prepare detailed Covid-19 management measures to manage the risk of up to 900 workers working on the construction site and living together in the camp. A summary of these measures is included in Section 7.1.7.6 below. Detailed measures will be included in the CESMP.

Based on the current Covid-19 restrictions it is not deemed appropriate to house workers within the wider community.

1.7.7.5 Loss of Public Access and Reduced Mobility through Local Paths

The boundary fence line shall be installed at the start of construction activities to prevent the entry of unauthorised personnel into working areas to maintain public health and safety. From the moment the fences are erected, local people from the Core, Direct and Indirect AoI will lose access to footpaths inside the Project area. This will theoretically result in slightly longer time periods being required to move between locations. The road to the east and south of the Project area shall continue to be available. Additional tracks and footpaths cross the wider area. No users of the tracks and footpaths across the site were recorded during site surveys and consultations did not identify and important footpaths across the wider area.

1.7.7.6 Reduced Access to Grazing and Pastoral Land

The loss of grazing land due to project construction works may result in a negative impact on the ability of the two households to maintain the same level of income. No additional impacts to land and livelihoods are expected to occur in relation to the upgrade of existing access roads which will connect the Project area to the main road (M37), as the width of the roads will not be widened.

Preliminary work has identified that land in the Project area was predominantly used for grazing. The visit also revealed the existence of two farms within the Project area: Farm A and Farm B.

Farm B owns 200 heads of sheep and goats, but they also graze the sheep of Farmer A (i.e. 30 heads) and those of a family friend, thus grazing a total of 300 heads. They have been grazing on the farm for 10-15 years. Farmer A is not currently using the leased land and has an informal agreement with Farmer B, to graze his sheep while he is doing other work. Farmer A is the sole breadwinner of this family and has another business reselling cattle and meat.

Following consultation with the State Cadaster in March 2020 it is understood that the Government initiated the process of acquiring the land for the Project. The two users of these farms surrendered their lease of the land identified for the Project. The existing records indicated that the farmers (lessors) have returned certain land plots back in 2018 (i.e. ceased the lease agreement). The plots were recently jointly allotted for the Project purposes as a single land plot. Following the devolution of plots in 2018, Farm A currently occupied 73 ha, corresponding to 46.20 % of its former area of approximately 158 ha, while Farm B occupied an area of 7.7 ha, 2.33% of its former area of approximately 330 ha.

The land plots have been taken to the Karmana district Khokimiyat's land reserves and, further, jointly allotted for the Project purposes as a single land plot. In July 2020, NNS engaged with the farmers and the Khokimiyat and confirm that as of 18 August 2020, Farmer B applied for and has been awarded alternative land, which he subsequently considered not to be a suitable alternative. A second additional plot of land was selected by the farmer and new land allocation process was completed. As of 7 October 2020, Farmer A has not applied for land or communicated any complaints to the Khokimiyat.

The communities identified in the Core, Direct and Indirect AoI will be outside the area proposed to be fenced off for the Project. As a result, there will be no physical resettlement of any individual.

1.7.7.7 Increased presence of workers and interaction with local communities

Community H&S may be at risk from worker migration and the presence of workers in the Project area, resulting in increased tensions between residents and newcomers, a possible increase in the local incidence of crime and changes in the local disease profile (increase of Covid-19). AECOM consider the management of Covid-19 transmission to be of primary importance

1.7.7.8 Increased Presence of Security Personnel

This impact will commence at the start of construction as working areas are fenced off to prevent unauthorised entry inside the site boundary. In addition to the expected workforce, during the construction phase, private security personal shall be used to provide general security at construction working areas to ensure that there is no entry of unauthorised personnel and that construction equipment is safe and secure. There is the potential for security personnel to use excessive force that results in intimidation or even physical damage, acting as a trigger event to further potential conflicts and Human Rights risks.

1.7.7.9 Occupational health and Safety Impacts and Impacts to Project Workforce

During the construction phase, there will be occupational health and safety risks to workers from the various operation and maintenance activities expected to take place for the Project. Furthermore, these risks will exist during the upgrade to the access roads, and during the interconnection to the existing transmission line poles. Key risks could include (amongst others), collision with vehicles and the exposure to a variety of hazards such as electric shock from exposed cables and thermal burn hazards and exposure to chemicals, hazardous or flammable materials.

1.7.8 Traffic and Transportation

The Project will result in additional vehicles travelling to and from the site during construction. These will include heavy goods vehicles (HGVs) and light goods vehicles (LGVs).

The construction phase is expected to generate the traffic volumes of 6,030 HGV movements and 1,400 LGV movements. These traffic volumes are based on previous solar PV project experience and are to be confirmed once a construction strategy is available from the Project Developer. This assessment is limited to the expected amount of HGV movements and construction staff transportation requirements. It is also likely that a larger bus would be provided for construction workers thereby reducing the number of vehicle movements.

Construction times can be arranged to avoid local peak times and routing arrangements, particularly for HGVs to minimise potential impacts

The magnitude of change in traffic numbers cannot be quantified accurately at this stage for the majority of the roads due to the lack of traffic count data for the affected roads along the route.

However, it is considered that the magnitude of change associated with Project generated traffic would likely to be Low. Considering that the majority of the road network is of low sensitivity and the likelihood that the magnitude of change small, the overall impact is likely to be Negligible during the construction process.

The main transport impacts will occur during the construction phase. The number of vehicles during operation is likely to be very low, with access required only for maintenance and servicing. The majority of these will be light vehicles and, at the worst case, an HGV trip may be required to transport a replacement transformer to site. The effects of traffic movements stemming from the operational phase are therefore considered Negligible and so insignificant.

1.7.9 Decommissioning Phase Impacts

Decommissioning impacts are considered to be similar to construction phase impacts. The assessments outlined for construction should therefore be referred to.

1.8 Mitigation and Enhancement Measures

The proposed mitigation measures outlined below will be further developed during the ESIA process. Those required for the Project based on the information available to date and have been developed in line with IFC Performance Standards and Guidance. The developer will prepare an Environmental and Social Management and Monitoring Plan (ESMMP) which includes all required mitigation. This will be implemented for the duration of the project.

1.8.1 Environment and Social Management and Monitoring Plan

An ESMMP is included as Appendix D which summarises the proposed mitigation and monitoring. Taking into account the relevant findings of the Project ESIA and the result of consultation with affected communities, NNS established a plan of mitigation and performance improvement measures and actions that address the identified significant social and environmental risks and impacts. These are included in the project ESMS and CESMP.

Management plans consist of a combination of operational policies, procedures and practices. The measures and actions to address identified impacts and risks will favour the avoidance and prevention of impacts over minimization, mitigation, or compensation, wherever technically and financially feasible. Where risks and impacts cannot be avoided or prevented, mitigation measures and actions will be identified so that the Project operates in compliance with applicable laws and regulations and meets the requirements of Performance Standards 1 to 8.

The management system will clearly define the desired outcomes or targets and provide the means to meet those targets. The performance of the management system will be tracked through a suite of performance indicators that can be tracked over defined reporting periods, and if necessary, further mitigation would be implemented if targets fail to be met.

The ESMMP will be transposes into the CESMP which will constitute the overarching document, referring to a number of sub-plans required for the Project that will be implemented by the EPC Contractor.

1.9 Next Steps

The general recommendation from the ESIA study is that the proposed 100 MW Nur Navoi Solar Plant Project should proceed but in order to ensure the environmental and social sustainability of the proposed Project, it is recommended that the developer implements the following:

- Implement the Project ESMS and CESMP to mitigate negative impacts and enhance the positive impacts. The CESMP requires that the proposed Project follows the recommended mitigation measures; and livelihood and community benefit enhancement strategies.
- Develop a Workers Accommodation Plan. Given current COVID-19 restrictions, the Project is planning to install workers camp.
- Project will carry out a skills audit and develop a Local Hiring Policy that would identify and prioritise local community employment opportunities to ensure gender equity in human resource recruitment.
- Implement the Stakeholder Engagement Plan and commit to a pro-active and continuous stakeholder engagement process to address emerging project issues and to continue the enlightenment of the community on Project benefits. Community engagement should be undertaken in close collaboration with the local administration (local representatives and the county leadership).

2. Introduction

Nur Navoi Solar FE LLC is planning the construction of large solar power station in the Navoi region of Uzbekistan. The new solar power station will produce a maximum of 100MW of electricity, enough to supply approximately 35,607 households[5], and will form an important part of for the local and national power supply. It is important for Nur Navoi Solar to understand how the new solar power station ("Solar Park") could affect the environment and local communities and they asked independent specialists to undertake an Environmental and Social Impact Assessment (ESIA) of the new solar park. This ESIA Report presents the findings of the ESIA for the solar park, both positive and negative. The ESIA considers the construction, operation and decommissioning of the solar park, transformers and an overhead power line connection to the national grid.

The ESIA involved an assessment of the existing environment; review of the relevant legislation; stakeholder engagement including public participation and consultation; identification of potential environment impacts during the pre-construction, construction, operation and decommissioning phases of the Solar Park; and development of an appropriate management framework for the mitigation of negative effects associated with the proposed Solar Park.

Based on the ESIA findings, the following conclusions have been reached and recommendations made:

- Project stakeholders include international organizations and funding institutions who will provide investment and sustainable financing, meeting the aims of Uzbekistan's Green Economy Strategy.
- The Solar Park will produce local, clean energy which will reduce Uzbekistan's use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and release carbon dioxide into the air, making a significant contribution to changes in the global climate. The Project contributes directly to Uzbekistan's low carbon pathway strategies.
- Positive impacts of the proposed Solar Park are expected due to the financial contribution the project will make to the regional and national economy during construction and operation. It is also hoped that the project will increase local employment and training during construction and operation.
- The Solar Park will be located on land assessed to be of low ecological value. Previous attempts to cultivate arable crops on the site failed due to a combination of poor soil quality and lack of water. The ESIS assesses the impact of the Solar Park on the natural environment is expected to be negligible.
- The Solar Park has the potential to cause some level of negative environmental and social impact on one tenant farmer who uses the land to graze his goats. Nur Navoi Solar provided support to enable this individual to gain access to alternative grazing land. The land issue is resolved following the allocation and acceptance by Farmer B of alternative land.
- The majority of potential environmental impacts are considered to be minor and will be reduced by the use of simple management controls that will be applied during the construction and operation of the Solar Park.

A description of the Solar Park, the potential impacts of construction and operation, as well as description of the mitigation plans is provided in the following chapters.

2.1 Development Partnership

Nur Navoi Solar FE LLC (the "Developer" or "NNS" or the "Project Company") is a wholly owned by Masdar, a global leader in renewable energy and sustainable urban development. Over the past decade, Masdar have pioneered commercially viable solutions in clean energy, sustainable real estate and clean technology in the UAE and around the world. Masdar has its headquarters in Abu Dhabi.

The Government of the Republic of Uzbekistan attaches great importance to the development of renewable energy projects. The country has very many days of strong sunshine which make it suitable for the development of large-scale commercial solar plants. The development of the Solar Park is in-line with the national Economic Development Vision 2030. This Solar Park will be developed as a joint

[5] Based on an average household size of 5.25 and per capita electricity consumption of 1,488.98kWh per annum. From: WorldData.info (2020). Energy consumption in Uzbekistan. Data accessed at: https://www.worlddata.info/asia/uzbekistan/energy-consumption.php

venture with the government of Uzbekistan under the International Finance Corporation's (IFC) Scaling Solar program. The IFC is expected to agree to support the Solar Park in the autumn of 2020.The anticipated lifespan of the Solar Park is approximately 25 years; however, the Developer may repower the project to extend its operational life. Following decommissioning the site will be reinstated back to the current land use (rough grazing land).

2.2 Overview of the Project

The proposed project site is located in the Navoi region, approximately 35 kilometres east of Navoi City, 16.2 kilometres due west of Navoi International Airport, and 2.5 kilometres to the west of Uzumzor settlement. It is considered that the project is located on the flightpath primarily for flights landing at Navoi International Airport.

The Solar Park will occupy approximately 268 hectares (2.6 km^2) of land and will be enclosed by a 2.5-meter-high fence. These features are demonstrated in Figure 2-1 with the plot boundaries shown in Figure 2-2. A view of the general site area is shown in Figure 2-3.

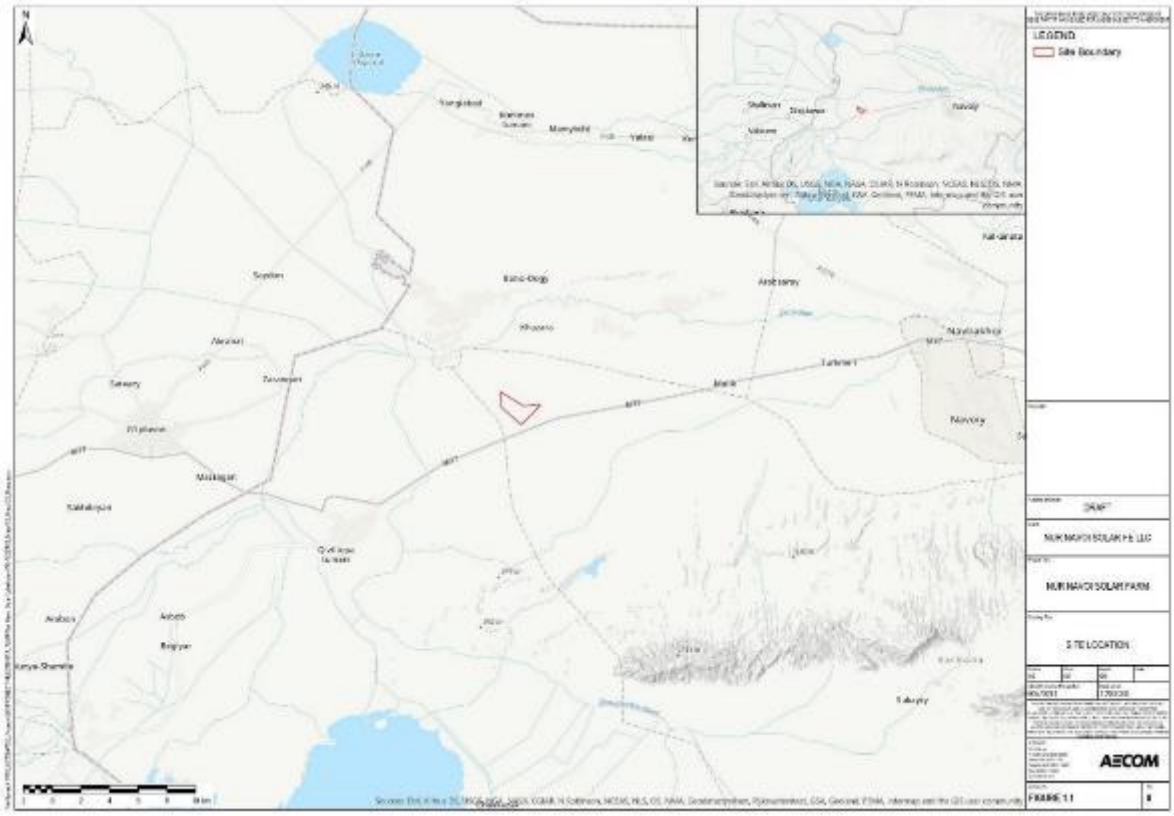

Figure 2-1: Project Geographical Location

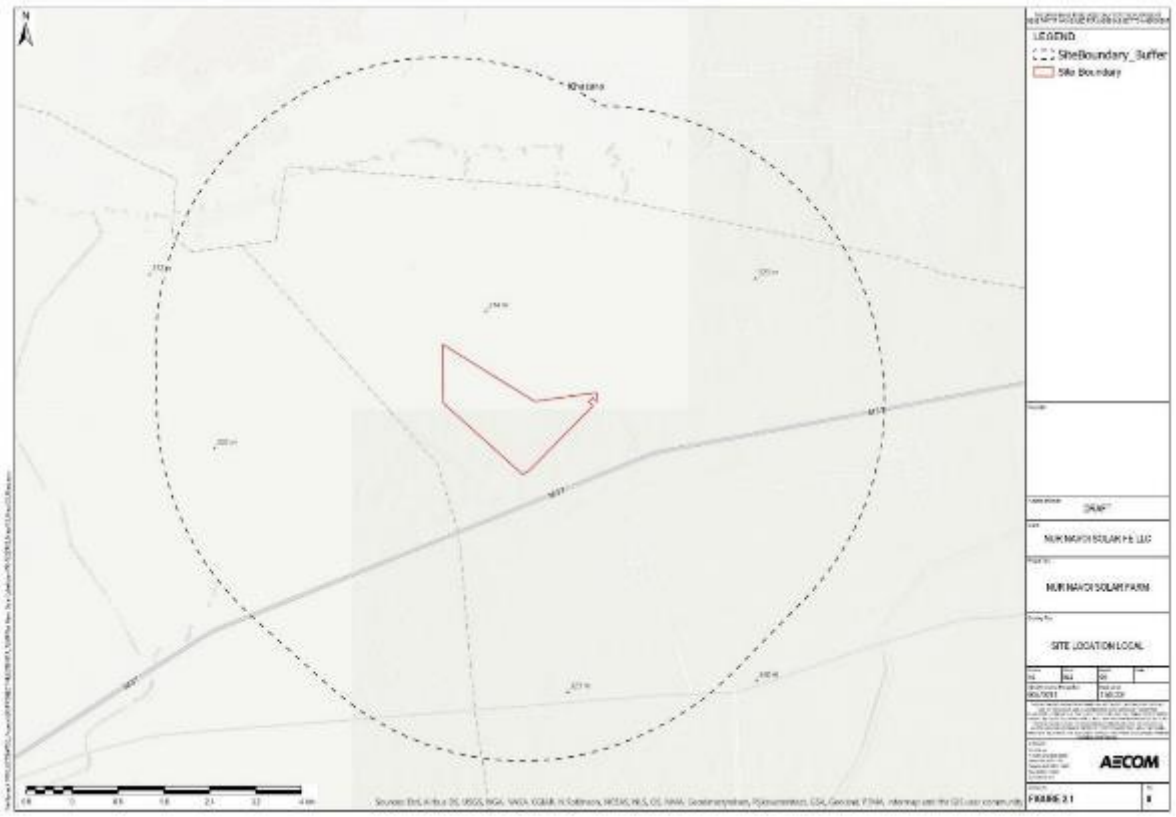

Figure 2-2: Project Site

Figure 2-3: View of the Project Site outside the NW boundary looking SE

2.3 Report Structure

This ESIA report has been developed following good international practice and comprises the following sections as outlined in Table 2-1. The ESIA includes mitigation protocols and an Environmental and Social Management and Monitoring Plan ("ESMMP").

Table 2-1: ESIA Report Structure

Chapter	Contents
1. Introduction (this chapter)	An overview of the Solar Park, purpose and structure of the ESIA report, and the Project team.
2. Project description	Description of the proposed facilities and structures, construction methods, power plant operation, anticipated waste streams and other key aspects of the Solar Park that are pertinent to the ESIA.
3. Legal and Policy Framework	Summary of the key national legislation and regulations in the sphere of environment and social aspects applicable to the Solar Park, pertinent international conventions, standards and guidelines.
4. Assessment Methodology	Description of the methodology used to determine sensitivity, magnitude and significance of impacts.
5. Environmental and Social Baseline	Description of environmental and social baseline conditions, including physical environment, habitats, flora and fauna, local socio-economic conditions.
6. Impact Assessment	Description of the individual impacts particularly those that will require further mitigation to be developed.
7. Mitigation and Enhancement Measures	Description of the required mitigation measures to be implemented through the project ESMMP. This is either site specific mitigation or general adherence to good international industry practice.
8. Summary and Recommendations	Overall summary of the project ESIA and any key impacts or mitigation that should be implemented.
Appendix A: Figures	All figures associated with the report.
Appendix B: Species List	Full list of all species recorded during site surveys
Appendix C: Attendance Records	Attendance records for public meetings that took place in the two settlements close to the site.
Appendix D: ESMMP	Plan to implement the mitigation measures identified in the ESIA.
Appendix E: Example KPIs	A selection of suggested Key Performance Indicators
Appendix F: Response from Cultural Heritage	Response from Cultural Heritage Department under the Ministry of Culture of the Republic of Uzbekistan
Appendix G: Response for Water Utility	Response from Water Utility "NAVOI SUV TA'MINOTI" LLC

3. Project Description

The Solar Park will consist of a Solar PV Power Plant covering a maximum area of 268 ha with a capacity of 100 MWp. It will be connected to an existing 220 kV overhead line adjacent and parallel to the southeast boundary of the proposed site. Any interconnections to the grid will be constructed within the proposed boundary.

3.1 Project Location

The proposed Solar Park site is located in the Navoi region, approximately 35 kilometres east of Navoi City, 16.2 kilometres west of Navoi International Airport, and 2.5 kilometres to the west of Uzumzor settlement. The location of the site is shown in Figure 2-1 and Figure 2-2. A view of the centre of the site is shown in Figure 3-1. The site is generally flat with few features of interest.

Figure 3-1: General View of the Centre of the Project Site

As noted, the land is currently used for rough grazing of livestock. At the time of the March 2020 site visit this consisted of sheep and goats although AECOM were informed that cattle would also be grazed on occasions (Figure 3-2).

Figure 3-2: Grazing taking place on site

Previous attempts to cultivate arable crops were noted but it is important to note that a combination of poor soil quality and lack of water made this unviable. Based on discussions on site, attempts at arable cultivation were abandoned approximately 5 years ago. The condition of irrigation ditches and culverts confirm that these areas are no longer in active use (Figure 3-3, Figure 3-4, Figure 3-5).

Figure 3-3: Previously cultivated area

Figure 3-4: Irrigation ditch no longer in use

Figure 3-5: Culvert on irrigation ditch no longer in use

The proposed site for the development is located adjacent to a secondary road that connects with a national highway (M37) (Figure 3-6). The development will access the site via a short length of existing secondary road (Figure 3-7).

Figure 3-6: M37 Highway Adjacent to the Site

Figure 3-7: Site access from the M37 Highway

Two farms are located outside the northern (Figure 3-8) and southern (Figure 3-9) boundaries of the site. The buildings to the south of the site were inhabited on a seasonal basis but the household has now moved to an alternative location. The farmer's permanent house is located 6 km from site. The remaining buildings were uninhabited. The buildings are outside the boundary of the Solar Park and will

not be demolished by the Project Company. The closest identified residential areas are the village of Uzumzor (~600 inhabitants), located approximately 2.6 km east from the boundary of the site, and a small village-sized cluster (~100 inhabitants) of residential properties approximately 2.2 km south.

Figure 3-8: Farm to the north of the Site (uninhabited at the time of site visit)

Figure 3-9: Farm to the south of the Site (inhabited at the time of site visit)

The natural drainage of the site is slightly inclined towards the west and is not envisaged to be modified. The site area is bordered on the west and east by two drainage channels, also referred to as collectors (Figure 3-10 and Figure 3-11). The intended purpose of these collectors is to capture and channel unused irrigation water back to the Zarafshan River.

Figure 3-10: Drainage channel (collector) on eastern boundary of site

Figure 3-11: Drainage channel (collector) on western boundary of site

3.2 Overview of Solar Photovoltaic (PV) Technology

In general terms, solar PV technology converts the sun's energy into electricity using a series of solar panels, inverters and transformers to connect to the electricity grid.

PV cell technologies are broadly categorised as either crystalline or thin-film. Crystalline silicon (c-Si) cells provide high efficiency modules. They are sub-divided into mono-crystalline silicon (mono-c-Si) or multi-crystalline silicon (multi-c-Si). Mono-c-Si cells are generally the most efficient but are also more costly than multi-c-Si. Thin-film cells provide a cheaper alternative but are less efficient. There are three main types of thin-film cells: Cadmium Telluride (CdTe), Copper Indium (Gallium) Di-Selenide (CIGS/CIS), and Amorphous Silicon (a-Si).

The performance of a PV module will decrease over time due to a process known as degradation. The degradation rate depends on the environmental conditions and the technology of the module.

Modules are either mounted on fixed-angle frames or on suntracking frames. Fixed frames are simpler to install, cheaper and require less maintenance. However, tracking systems can increase yield by up to 20 %. Tracking, particularly for areas with a high direct/diffuse irradiation ratio also enables a smoother power output. Tracking frames are proposed for the Solar Park.

Inverters convert direct current (DC) electricity generated by the PV modules into AC electricity, conforming to the local grid requirements. They are arranged either in string or central configurations. Central configuration inverters are considered to be more suitable for multi-MW plants. String inverters enable individual string Maximum Power Point Tracking (MPPT) and require less specialised maintenance skills. String configurations offer more design flexibility.

PV modules and inverters are all subject to certification, predominantly by the International Electrotechnical Commission (IEC). New standards are currently under development for evaluating PV module components and materials.

The performance ratio (PR) of a well-designed PV power plant will typically be in the region of 77 % to 86 % (with an annual average PR of 82 %), degrading over the lifetime of the plant. In general, good quality PV modules may be expected to have a useful life of 25 to 30 years.

The main components of the Solar Park tare:

Solar PV modules: These convert solar radiation directly into electricity through the photovoltaic effect in a silent and clean process that requires no moving parts. The output from a solar PV cell is DC electricity. A PV power plant contains many cells connected together in modules which are then connected in strings to produce the required output.

Inverters: These are required to convert the DC electricity to alternating current (AC) for connection to the utility grid. Many modules in series strings and parallel strings are connected to the inverters.

Module mounting (or tracking) systems: These allow PV modules to be securely attached to the ground at a fixed tilt angle, or on sun-tracking frames.

Step-up transformers: The output from the inverters requires a further step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage.

The grid connection interface: This is where the electricity is exported into the grid network. The substation will also have the required grid interface switchgear such as circuit breakers (CBs) and disconnects for protection and isolation of the PV power plant, as well as metering equipment.

Figure 3-12 shows the key principles and associated structures of this PV facility.

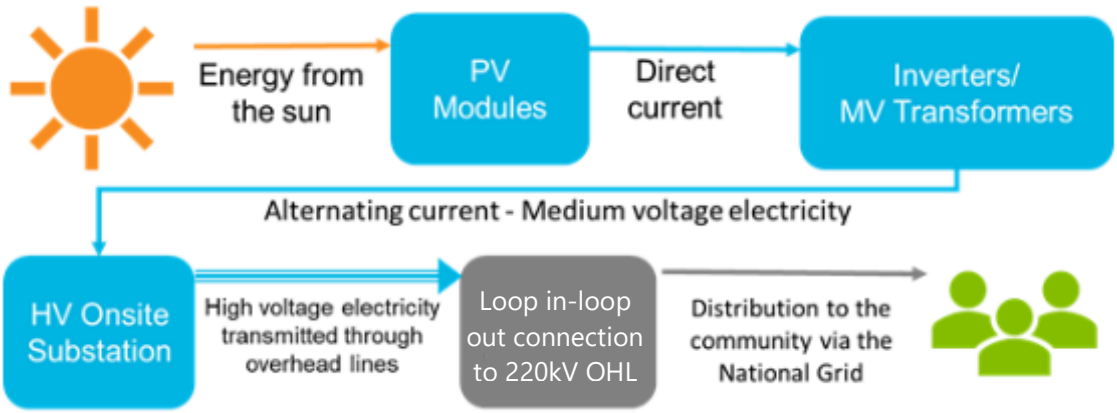

Figure 3-12: PV Power Plant Overview

3.3 Description of Key Design Components

The 100 MWp power generation plant is designed to use solar PV technology, where solar modules/panels made from silicon material are used to convert sun rays (solar energy) into electricity. The proposed plant is a medium size utility grade grid-connected solar-PV power system consisting of Photovoltaic modules/panels, MPPT solar power inverters, power conditioning units, 220 kV step-up power transformers and grid connection equipment. The plant will feed power directly into the grid with no batteries employed.

The ESIA has been undertaken assuming East-West Single Axis Tracker (+/- 55 degrees) mounting structures. Tracking systems require additional space and are technically more complex compared with fixed mounting structures and consequently, consequently assuming a tracking mounting system ensures the assessment is based on the realistic worst case. Any change to this design will therefore result in an impact that is of equal or lower magnitude than that assessed herein.

The view of a typical PV facility is shown in Figure 3-13.

Figure 3-13: Typical PV Facility, using Tracking System

Source: National Technology and Engineering Solutions of Sandia, LLC. (2018)

Table 3-1 provides a summary of the key project components. Such information is based on information and design provided by Nur Navoi.

Table 3-1: Key Project Components

Component	Parameters
Inverter units:	659 x SUN2000-185KTL-H1
No. PV Modules:	292236 x bifacial modules JAM72D20-445/MB
Total DC kWp:	130045
Total Export Act. Power (kW):	100,000 kW
Tracker Configuration:	Nclave SP160 +-55° E-W Single Axis Tracker
Pitch (Centre to Centre Substructure Spacing)	14.4 m
Site boundary area:	268 ha

3.3.1 PV Power Plant Layout

The proposed layout of the Solar Park is shown in Figure 3-14. The detailed plan is also provided in Appendix A.

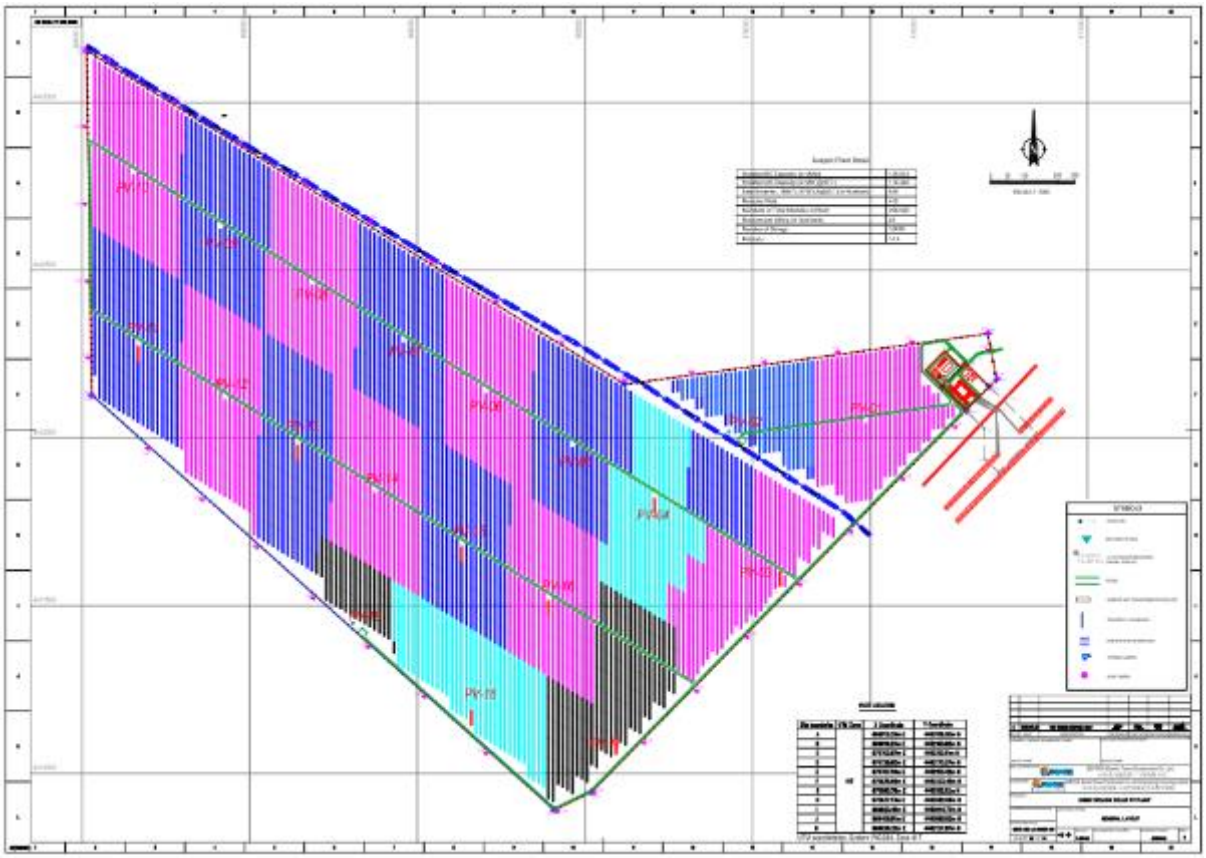

Figure 3-14: PV Power Plant Layout

3.3.2 Photovoltaic Modules

Photovoltaic (PV) cell technologies are broadly categorised as either crystalline silicon or thin film:

- **Crystalline Silicon (c-Si):** Crystalline silicon cells provide relatively high efficiency modules. Modules are made from cells of either monocrystalline or multicrystalline silicon. Monocrystalline silicon cells are generally slightly more efficient, but are also costlier than multicrystalline.
- **Thin Film:** Thin film modules are less efficient at peak levels than crystalline modules; however, they can provide performance advantages at varying irradiance and temperature conditions. Modules are made with a thin film deposition of a semiconductor onto a substrate.

In this instance, crystalline technology has been chosen for the Solar Park due to the high irradiance experienced at the site and the fact that such technology is likely to deliver higher efficiency under such conditions. A tracking system involves attaching the PV modules to a table that can move in relation to the sun. This allows for optimal performance throughout the day. Single axis systems are typically mounted on a single vertical stand and rotate around the horizontal axis which follows the sun as it moves east to west.

3.3.3 Mount Foundations

The foundation design will comprise either galvanised driven piles, ground screw piles, or concrete foundations. These designs are illustrated in Figure 3-15. Piles are typically installed to the depth of 2.5 m to 3 m below ground, whereas concrete foundation slabs are placed directly onto the ground.

The choice of one option over the others depends on the substrate characteristics (whether the ground is too soft, too rocky, contaminated or accessible by the drilling machines) and the expected wind loads in the area. The final choice of mounting structure and foundations may depend on the outcome of further geotechnical surveys and may comprise a combination of the foundation types. However, based on the findings of the ground investigation work, piled foundations are deemed appropriate. No associated land clearance is required.

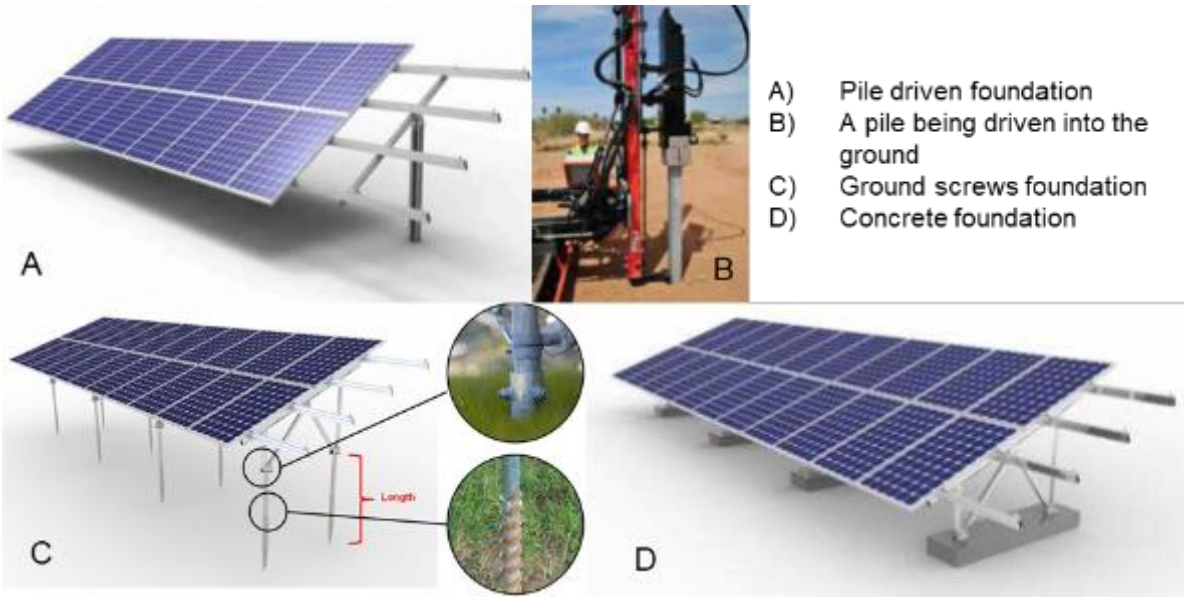

Figure 3-15: Foundation Options

Source: (ILF Consulting Engineers, 2019)

3.3.4 Solar Inverter, Switchgear, and Transformers

The primary function of a solar inverter is to convert the direct current (DC) produced by the PV modules into an alternating current (AC), which is suitable for use by the new substation.

There are two broad classes of inverters, central inverters and string inverters. Nur Navoi will install string invertors during the construction of the Solar Park. Each inverter has a footprint of approximately 1.6 m by 2.8 m and 2.5 m tall. The layout concept and a typical centralised inverter are illustrated in Figure 3-16.

The string inverter concept uses multiple inverters for multiple strings of modules, with inverter capacities in the region of approximately 15 to 30 kVA when used on large-scale PV plants. String inverters provide MPPT on a string or dual-string level with all strings being independent of each other. This is useful in cases where modules cannot be installed with the same orientation, where modules of different specifications are being used, or when there are shading issues.

Up to 659 small units will be located on the site to house the inverters and transformers. These are used to convert the electricity generated by the panels to grid quality AC power.

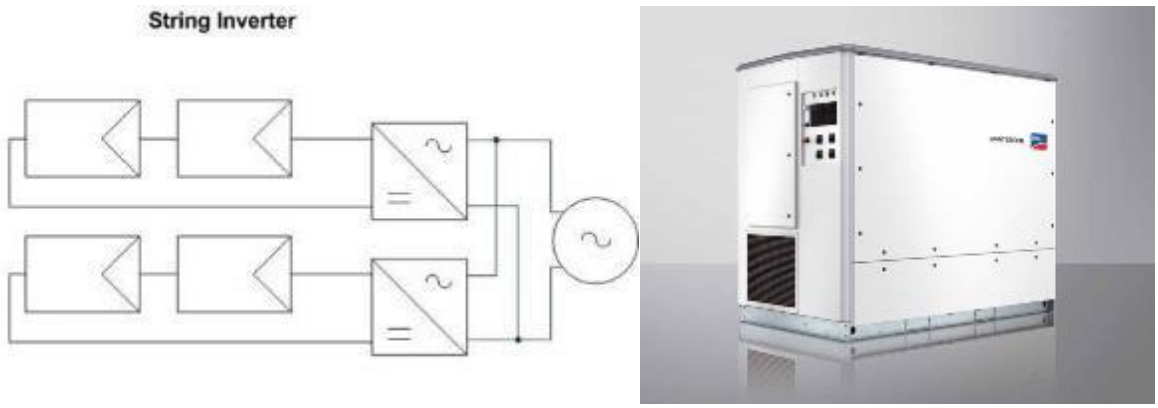

Figure 3-16: String Inverter Connection Concept (right) and Exterior.

Source: (ILF Consulting Engineers, 2019; SMA Solar Technology AG)

3.3.5 Cabling

Direct current string cables, connecting several strings to a combiner box, will run along the backside of the module substructure avoiding loops and will be stabilised by special clamps or ultraviolet-resistant cable conduits. DC main cables, connecting each monitor box with the inverter, will be placed

underground within a pipe or a DC cable trench, typically buried up to 1.5 m below ground and in a 300 to 500 mm width trench.

The main AC cables will connect the onsite substation (Section 3.3.6) to the existing overhead line. The main AC cables will be routed as a separate overhead line.

3.3.6 Transformers

A transformer would typically comprise of the components illustrated on Figure 3-17.

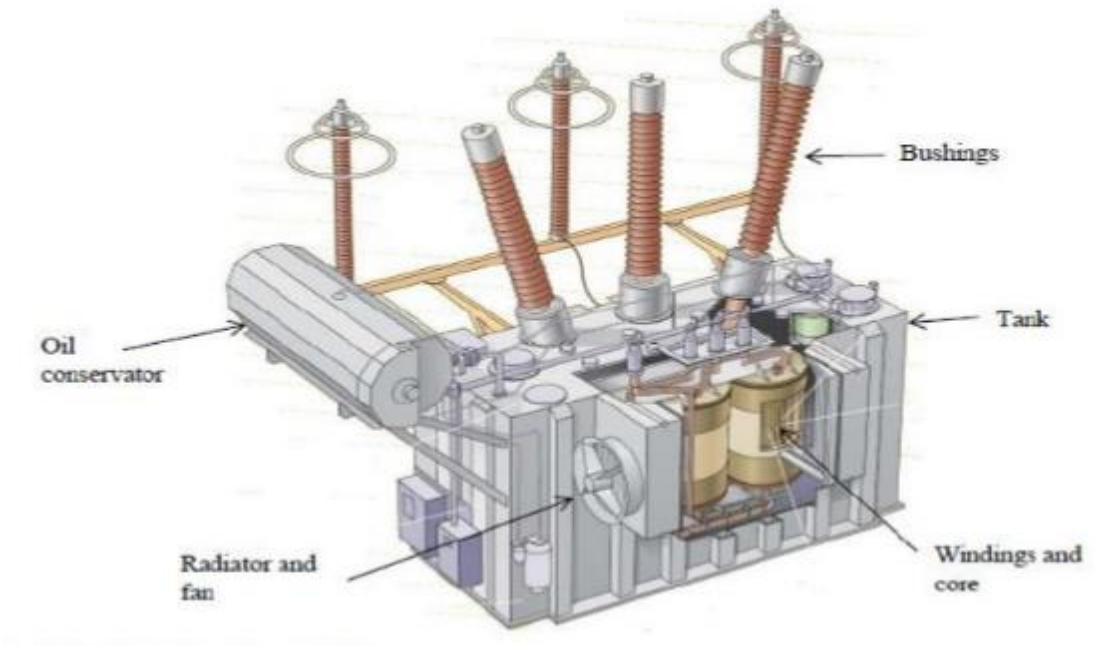

Figure 3-17: Major Components of a Liquid-Immersed Power Transformer

The transformers found in solar applications vary significantly in their characteristics. These are detailed further in Table 3-2.

Table 3-2: Transformer Electrical Characteristics

Category	Electrical Characteristic
Type	Liquid filled or dry type
Nominal Voltage of HV Winding	Depends of the application but typical values include 11 kV, 22 kV, 33 kV, etc.
Nominal Voltage of LV Winding	Depends of the application but typical values include 400 V, 660 V, etc.
Capacity	Depends of the size of the inverter.
Frequency	50 Hz or 60 Hz
Number of Windings	Two or three windings
Short Circuit Impedance	10%
Cooling Method	ONAN, ONAF, OFAF, ODAF
Vector Group	Delta or star connection of windings (Yy, Dy, YNd)

3.3.7 Onsite Substation

The onsite electrical substation transforming medium voltage (MV, 33 kV) electricity produced by the inverters to high voltage (220 kV) electricity that can be accepted by the grid will be placed close to an existing overhead line to deliver the shortest route to connect the Solar Park to the public grid. The

substation will consist of electrical infrastructure such as the transformer, switchgear, and metering equipment. It is also expected to include a control building, comprising office space, and storage facilities, as well as operational monitoring and maintenance equipment.

The onsite substation will be located in the south of the site and will have a maximum footprint of up to 0.8 ha and height of up to 5 m tall (incorporating a basement floor in the design). A typical substation is illustrated in Figure 3-18.

Figure 3-18. Typical Substation

Source: McAlister (2017). Sainshand Substation, Mongolia.

3.3.8 Transport Infrastructure

The existing transportation network (a combination of road and rail) is well established in Navoi region. The site is located off highway M37 and is accessible through a new access track leading to the temporary construction compound. The highway is currently used by HGV traffic. It is not expected that any road widening would be required.

Short sections of the existing road off the M37 highway leading to the site entrance will be upgraded as necessary (e.g. levelling, and surfacing) to accommodate heavy construction vehicles. The existing road will be extended by less than 1km to provide access to the site. The new access road will be created by levelling, cut to 300 millimetres (mm) depth and filling using sub-base and base gravel material.

Within the site boundary an internal network of tracks (4 m wide, gravel base) will be constructed between the panel arrays to allow access during construction and for operational maintenance.

The source of material for road construction will be confirmed by the EPC Contractor but it is expected that this will be sourced from an existing commercial quarry. The geotechnical investigations carried out to date suggest that there is no suitable material available on site. No borrow pits are proposed.

3.3.9 Fencing and Security

To prevent unauthorised access, the perimeter of the PV power plant will be fenced with an approximate 2.5 m high welded wire fabric fence with 0.5 m coil of razor wire mounted above. Pole mounted internal facing closed circuit television (CCTV) cameras will be installed around the perimeter of the site. Lighting of the fence shall be sufficient for the operation of the security CCTV system. A typical fence and CCTV system is normally relatively subtle against the landscape of the solar park and a typical set up is shown in Figure 3-19.

Figure 3-19: Typical Fence and CCTV System at a UK PV Facility

Source: AECOM, 2019

3.3.10 Water Resources

The following sources of water have been identified that may be able to meet the project's potential construction and operational needs:

1. Drainage canals located at the east and west of the proposed site:
2. Superficial groundwater (>20 m deep) and aquifer at approximately 80m depth below ground level.
3. Direct abstraction from the Zarafshan River.

In all cases, the chemical analysis of the drainage water shows that a treatment plant will have to be installed if this water is used for PV module cleaning.

Further potential sources of water are:

4. Direct connection to potable water pipeline crossing the site
5. Tanker delivery from closest municipal water works (currently identified as Samarkand)

All five options are considered in the table below.

Table 3-3: Water Resources

Source	Benefits	Risks	Summary conclusion
Drainage canal	This canal provides drainage from upstream agricultural areas and there are no users downstream that could be affected if the project obtains water from this canal. As reported during the consultation meetings, the canal carries sufficient flow during the year to provide the water for panel washing.	The use of this water will require a permit from the Irrigation and Land Improvement Department. No permit from a local institution is required. Water quality results are provided in Table 6-2 above and show that further treatment would be required before the water is fit for use.	Use of this water source represents a simplified permitting process but may be perceived as impacting existing users of the canal water. A detailed hydrological study would need to take place to show that water is available and would not impact other users or the general water resource. There is also a requirement for further treatment.

Source	Benefits	Risks	Summary conclusion
			This option is not recommended to meet operational needs.
-Groundwater	The shallow (>20 m deep) is not used for agriculture as the salt content is very high (reported by the Environmental department). As discussed during consultation, no permit is required to abstract groundwater level from the superficial table.	There is a deeper groundwater body (it was reported that there is an impermeable level and a confined aquifer at approximately 80m depth underneath) and a permit is required (provincial level Environmental Department) to abstract water from this deeper interface. A water purification unit will be required if this solution is adopted.	Although groundwater is available, additional treatment would be required and the project would be required to carry out detailed groundwater study to determine the suitability of the aquifer and volume of water available for abstraction.
Zarafshan River	Likely to be sufficient water for construction and operational needs.	The use of this water will require a permit from the Water Management Directorate. Infrastructure would be required to take water from the river to site. A water purification unit may be required if this solution is adopted and the level of treatment would be determined by the water quality requirements for concrete and panel washing. Seasonal water constraints were reported during the meeting with the Environmental Department.	Use of this water source may be perceived as exacerbating water constraints in the area. A detailed hydrological study would need to take place to show that water is available and would not impact other users or the general water resource. There is also likely to be further treatment required. This option is not recommended to meet operational needs.
Direct connection to the Tashrabot-Xozara water pipeline	Water pipeline runs adjacent to the project site and contains potable water suitable for both construction and operational needs as well as providing drinking water.	Water is for residential use. AECOM were advised that the pipe is the responsibility of Samarkand Khokimyiat but that direct connection is likely to be problematic. A detailed study would need to be undertaken to identify the impacts on the existing residential users.	Pipeline would represent to easiest connection option, would require minimal new infrastructure and no treatment. Agreement has been reached to abstract water for a specified period of time. It is understood that communities are also given set times to use the public supply to fill local storage tanks for community use. As a result there are not expected to be any direct impacts on local communities. A 1050m pipeline would be required to take water from tie in point to the construction compound where it would be stored in a storage tank. This option is recommended to meet

Source	Benefits	Risks	Summary conclusion
			construction and operational needs.
Tanker delivery	Water would be sourced from the public water works at Samarkand and tinkered to site. Water is suitable for both construction and operational needs as well as providing drinking water. Delivery would be along major highway with perhaps two deliveries per week. The impact on the road network would be negligible.	Agreement would need to be reached with the relevant Authority.	Tankered water would not require any specific permits, no new infrastructure and no treatment. However, approval is needed from the appropriate Authority.

On the basis of the analysis above it is considered that water will be obtained from the public water pipeline crossing the site. The Tashrabot-Xozara pipeline belongs to the Kiziltepa district branch of "NAVOI SUV TA'MINOTI" LLC. The pipeline currently supplies potable water to nine villages and delivers water straightway to consumer's special water reservoirs. The current water supply is presented in Table 3-4.

Table 3-4: Water supply from the Tashrabot-Xozara pipeline adjacent to the site

Current water supply	Average daily supply (m^3/ day)	Average monthly supply (m^3/ month)	Daily supply hours (hours)
Summer	1,490	40,000	10
Winter	930	28,000	6

NAVOI SUV TA'MINOTI" LLC confirmed that the system is capable of continuously supply up to 3,500 m^3 of water per day. A capacity 2.3 times higher than the existing demand. The company has confirmed capacity and infrastructure to supply water during both operation and construction periods, informing that this additional water consumption will not result in negative or any other consequences.

Due to soiling rate at site, the Company adopted a semi-automatic high efficiency wet cleaning scheme (as a base case) to maintain a 1.3% soiling losses factor at site. However, the selected technology can perform both dry and wet cleaning according to site conditions. To assess the realistic worst case, the ESIA has assessed water consumption of 4,620m^3/year for wet cleaning.

3.3.10.1 Surface Water Drainage

The detailed operational drainage design will be carried out pre-construction with the objective of ensuring that drainage of the land is maintained without affecting areas outside of the Solar Park boundary. The design of the drainage systems will take account of the site topography and seasonal fluctuations in surface water runoff, such as during snowmelt.

A suitable drainage system will be designed to accommodate surface flow and divert it to the existing irrigation canals in the area that are currently fed by the existing drainage system onsite. The Solar Park drainage system will ensure that runoff rates from the site remains at or less than current conditions.

3.3.11 Grid Connection

Electricity generated by the Solar Park will be connected to the grid by means of:

- Construction of a 33/220kV step-up substation for Navoi Solar PV Power Plant with 220kV out-door (AIS) switchyard and a 33/230kV step-up main transformer. Note that both these elements will be contained in a single substation.

- Construction of approximately 200m of 220kV OHL from the new 220kV out-door (AIS) switchyard of Solar Power Plant to the existing Л-17-Б-1 or Л-17-Б-2 220kV OHL LILO type connection.
- Delivery point: newly built 220kV open switchyard. The limit is the line to PV Plant bay isolating switch, line side.

The layout and dimensions of the new overhead line are shown below.

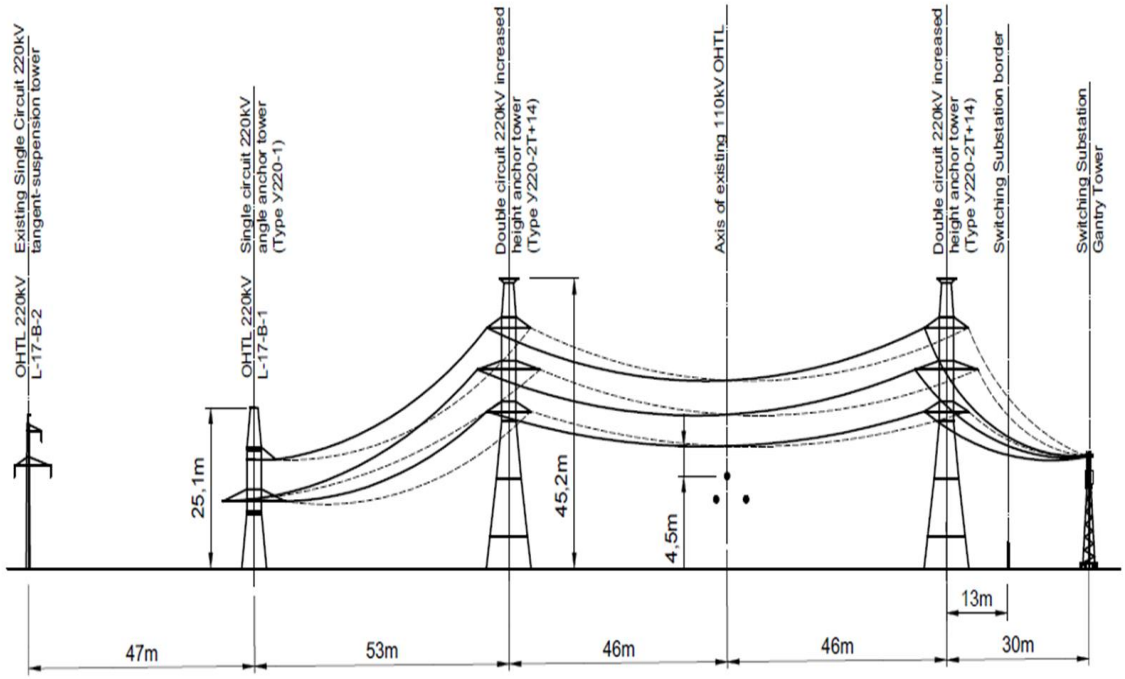

Figure 3-20: New overhead line between site and grid connection

3.4 Developments Resulting in Cumulative Impacts

Cumulative impacts have been defined by IFC as: *those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as "developments") when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities.*

Examples of cumulative impacts include the following:

- *Effects on ambient conditions such as the incremental contribution of pollutant emissions in an airshed.*
- *Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation.*
- *Reduction of water flow in a watershed due to multiple withdrawals.*
- *Increases in sediment loads on a watershed or increased erosion.*
- *Interference with migratory routes or wildlife movement.*
- *Increased pressure on the carrying capacity or the survival of indicator species in an ecosystem.*
- *Wildlife population reduction caused by increased hunting, road kills, and forestry operations.*
- *Depletion of a forest as a result of multiple logging concessions.*

- *Secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways owing to increases in transport activity in a project's area of influence.*

Multiple and successive environmental and social impacts from existing developments, combined with the potential incremental impacts resulting from proposed and/or anticipated future developments, may result in significant cumulative impacts that would not be expected in the case of a stand-alone development.[6]

IFC provide further guidance for identifying reasonably predictable projects that should be considered as part of a CIA and recommends that emphasis be given to identifying other projects in the planning stage or formal approval process (e.g., through preparation of ESIA documents or permit submissions). Based on this approach, no development of a comparable size and scale to the Solar Park have been identified with the project's area of influence (see Chapter 5.1.1 for further detail of project areas of influence). For the purposes of determining applicable projects, UK guidance for wind farm development suggests an initial area within 60km of the site is screened for all similar developments[7]. This initial area of search has been used to identify sites for consideration as part of this ESIA.

Based on current understanding, the Government of Uzbekistan has launched tenders for the development of three 200MW solar projects together with wind farm developments at Zarafshan and Nukus, none of which are within the 60km buffer. AECOM are not aware of any developments of a similar size and scale that are the subject to a valid planning application, approval or are in construction. In terms of considering increased traffic load on the national road network, it is considered that the Solar Park will have completed construction prior to any of the other wind or solar projects reaching construction. As a result, there will be no overlap in construction timescales and hence no additional cumulative loading on the road network. Cumulative assessment has therefore been scoped out of the assessment and is not considered further. However, future developments within 60km of the Solar Park would be required to consider this project as part of their respective cumulative assessments.

3.5 Overview of Project Construction and Commissioning Activities

The Solar Park will entail a series of activities including:

e) The pre-construction phase will include carrying out land survey, power plant design review with reference to ESIA recommendations; planning for storm water drainage and containment, undertaking site preparation, manufacturing-procurement of items and transporting the required components and construction equipment to site.

f) The construction phase will include establishment of internal tracks and upgrading external access roads; establishment of construction areas; construction of the solar arrays, substation and other associated ancillary infrastructure (i.e. powerline for evacuation of electricity); and inter-connection of the solar plant substation to the national electricity utility grid.

g) The post-construction phase will include plant operation and maintenance, site remediation, clearance and deposition of debris off the site, restoration of areas where construction activities temporarily disturbed the environment, repairs and replacements of failed parts; and finally decommissioning the entire plant when the useful life of the facilities is over.

3.5.1 Construction Programme

The potential for harsher winter conditions on site present the key constraint to the construction of the PV power plant. Currently, the construction programme is planned to start in Q3 2020 and end in Q4 2021.

[6] IFC, 2013. Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. Report viewed at: www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_cumulativeimpactassessment

[7] SNH, 2012. Guidance – Assessing the Cumulative Impact of Onshore Wind Energy Developments. Para 57. Report viewed at: https://www.nature.scot/sites/default/files/2019-11/Guidance%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf

3.5.2 Pre-construction Phase

3.5.2.1 Site Preparation and Grading

Site preparation activities will include clearance of vegetation for the establishment of internal access roads and at the footprint of each project component. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site. The total extent of site levelling work is approximately 147,867m^2 or 5.5% of the total site area including the temporary facilities. It is estimated that the total volume of topsoil stripped would be 9,861m^3 as a result of extraction work.

It should be noted that solar-PV sites require the lack of obstruction from surrounding trees and buildings or other infrastructure; otherwise power production is reduced due to shadows on the solar modules. No trees were observed within the Solar Park boundary but large shrubs within the vicinity and very close proximity to solar panels will be removed to prevent any of these casting a shadow on the solar-PV modules. These will be manually removed without the need for herbicides.

The extent of ground clearance is shown below:

Table 3-5: Site clearance works

Project Component	Number	Total Area (m^3)
Inverter bracket foundation	569	1,653
Fence	n/a	9,436
Substation	1	16,500
Internal roads	n/a	68,900
Transformer location foundation	19	1,330
Temporary facilities	1	50,000
Meteorological station	3	48

The site clearance works will comprise of the following activities:

- Topsoil removal (excavation) - Approximately 9,861 m^2
- Coverage by gravel or asphalt - approximately 81,093 m^2
- Simple grading with no topsoil removal - approximately 56,913 m^2

3.5.3 Construction Phase

3.5.3.1 Establishment of Access Roads to the Site

The site is accessible via the M37 road and a short length of metalled road. The road joins the M37 at a point approximately 35 km west of Navoi city centre. The road from the M37 is in a poor condition in some locations and may be upgraded by the EPC Contractor if required.

At this stage, it is proposed to transport solar PV components over land from China to the location of the proposed Solar Park: Further details are provided in Section 7.9.

3.5.3.2 Stores and Power Control Centre, and Storage Facilities

The power control centre and storage facilities will be constructed on site where all equipment will be stored. This will help to limit the potential ecological impacts associated with this phase of the project to within one designated area.

No permanent fuel storage at site is anticipated. For vehicle refuelling, a petrol station has been identified within 5 km from the site and will be used. For heavy equipment, a fuel truck will be used as required and will be during a pre-specified refuelling time, most likely on a weekly basis.

No concrete batching plant is proposed. Ready Mix concrete will be used from a supplier based local to Navoi.

3.5.3.3 Power Substation and Interconnection Facilities to the Utility Electricity Grid

A power substation including several power step-up transformers and switchgear will be constructed at site for stepping up power to 220 kV standard, as well as switching and power control mechanisms.

3.5.3.4 Workers Accommodation

All foreign and migrant workers will be accommodated in a worker's camp on site. The camp will be located within the area marked as temporary compound and laydown area. The camp will be fully designed in accordance with IFC/EBRD's Guide for Workers Accommodation. The location and layout are shown in separate drawing N0579-TJN-CT-DD0001_RO1 GENERAL LAYOUT OF TEMPORARY FACILITIES.

It is recognised that a significant number of migrant workers will be employed in the construction phase. These workers will come from China or elsewhere in Uzbekistan. It is noted that there is likely to be sufficient hotel and guesthouse accommodation to accommodate the full workforce however the current Covid-19 restrictions dictate that a more managed approach is required to control the potential spread of the virus.

Secondly, from a social perspective, the local population are not likely to look favourably on a significant migrant workforce living in the local towns during a period when widespread restrictions are in place. It is important to consider how this will impact on the surrounding communities mainly during construction works. It is considered that the best way to control the potential spread of the coronavirus from the migrant workforce to the local population is to ensure the migrant workforce is separated from the wider population. Furthermore, Covid-19 management measures will be put in place and will be constantly under review.

It is noted that a workers' camp in the vicinity of the local communities may strain existing infrastructure, in particular the water and sanitation, electricity and transport systems. To ensure no such conflict, all required services will be available to the workers on site.

It is important to ensure good standards in living facilities in order to avoid safety hazards and to protect workers from diseases and/or illness, as well as to maintain a good level of morale. The living quarters would be sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. A separate Covid-19 management plan will be prepared and will be implemented prior to the start of construction.

Given that the workers accommodation falls within the project footprint, impacts associated with the workers accommodation have been incorporated into the individual assessment of each aspect, for example water use, communicable diseases and employment. The detailed layout and management procedures associated with the camp are described in the Workers Accommodation Management Plan.

The workers camp will be designed fully in accordance with the IFC/EBRD Workers accommodation processes and standards and will adhere to the following key requirements:

General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers' accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is adjacent to the work site to avoid workers spending undue amounts of time travelling from their accommodation to the worksite.

Water

Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers will have easy access to clean water from the municipal potable water pipeline. An adequate supply of potable water will be available in the buildings where bedrooms or dormitories are provided.

Wastewater and solid waste

Wastewater treatment and effluent discharge as well as solid waste treatment and disposal will comply with local and World Bank effluent discharge standards9 and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Wastewater will be collected in a septic tank and collected and disposed of at a licensed facility.

Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. A separate bed for each worker will be provided. There will be a minimum space between beds of 1 metre. Dormitories and rooms will be single-sex.

Sanitary and toilet facilities

Sanitary and toilet facilities will include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities will be kept in a clean and fully working condition. Facilities are likely to be of portacabin type and will be easily cleanable and ensure privacy. Separate sanitary and toilet facilities will be provided for male and female residents. Additional specific additional sanitary facilities will provided for women. A minimum of 60 toilets will be provided to coincide with the peak workforce of 900. At other times a reduced number of toilets will be provided at the ratio of 1 toilet per 15 persons.

Showers/bathrooms and other sanitary facilities

Hand wash basins and showers will be provided in each of the bedrooms. These facilities will be kept in good working condition and cleaned frequently. Adequate space will be provided for hanging, drying and airing clothes. Hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular. A minimum of 60 showers will be provided to coincide with the peak workforce of 900. At other times a reduced number of showers will be provided at the ratio of 1 shower per 15 persons.

Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. A centralised kitchen will prepare all food for distribution to individual dining areas. Laundry facilities will also be provided.

Medical facilities

Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. It is assessed that the local medical facilities could become overwhelmed should there be a significant number of workers requiring treatment. It is proposed that there will be one doctor on site during normal working hours, one doctor on call, and two nurses. In addition, it is proposed to have 1 first aider per 25 workers. This will require a total of 36 first aiders at the peak workforce.

3.5.3.5 Emergency and Safety Support Systems

Management of the Solar Park will ensure periodic monitoring and upgrading of the safety support systems. These include; the firefighting equipment and well-marked emergency exit routes and assembling points, the necessary signage posts erected in all areas susceptible to dangers, general information and prohibitions. Portable fire extinguishers consisting of dry chemical carbon dioxide and foam type are to be provided at strategic locations in the plant. Adequate numbers of sand buckets are to be provided at various locations and there will also be a water hydrant system at the site.

First Aid units fully equipped with the necessary materials shall be provided and proper protection gear shall be availed to employees and visitors at the plant. All the above will be supported with comprehensive continuous employee training and awareness on environmental, health and safety matters. An emergency action plan that includes the procedures for handling leaks and spillage will be developed.

A written health and safety plan will be developed by the EPC Contractor for the facility prior to construction using established safety procedures for power generation plants as guideline. This will be available in both Chinese and Russian/Uzbek. Employees will be intimately involved with the development of the process hazard analysis and on the development of other elements of process safety management required. Access to this data and all other pertinent information will be made readily available to all employees and onsite contractors.

Clear written operating procedures for safely conducting activities within the plant will be developed. This includes steps for each operating phase, operating limits, safety and health considerations and safety systems and their functions. This document will be readily accessible to employees who work on or maintain a covered process and will be reviewed as often as necessary to assure they reflect current operating practice. Safe work practice will be implemented and will provide for special circumstances such as lockout/tag out and confined space entry and training limits.

3.5.4 Infrastructure Requirements during Construction of Power Plant

The construction of the Solar Park will require a number of temporary infrastructure and services will be required:

- Construction compound that will include offices, parking, as well as equipment and material storage,
- Purpose-built storage for hazardous materials.
- Purpose-built facilities for the segregation and temporary storage of wastes.
- Effluent and storm-water drainage.
- Sanitation and sewerage disposal.
- Water supply system including reservoir and a 1,050 m pipe connecting to a public water pipeline. This system will be used during construction and remain in place during operation.
- On-site electricity supply (by means of diesel generator).
- Road access.
- Medical facilities on-site.

3.5.5 Operational Phase

3.5.5.1 General Plant Maintenance

To maintain the quality of the working environment, plant management will ensure good housekeeping and sanitation around the plant. Proper maintenance and servicing of all plant auxiliaries at all times will be supported with proper process documentation and data analysis on plant performance.

Solar array maintenance will involve removing overgrown grasses and shrubs to prevent shading.

3.5.6 Decommissioning Phase

The Solar Park is expected to have an economic lifespan of approximately 25 years and the power plant infrastructure would either be decommissioned, extended or upgraded (if a new license is granted) once it has reached the end of its economic life. Upgrading the Solar Park would consist of replacing old PV modules for new ones, increasing the total peak power of the plant (a process called “repowering”) or increasing the power of the plant by adding new elements such as trackers, PV modules or transformers.

When the Solar Park is to be decommissioned, then the site will be returned to close to its original state. The components of a PV plant have an intrinsic value either for re-use or recycling. This value will cover the cost of decommissioning the plant and rehabilitating the site.

The following decommissioning activities will form part of the Solar Park scope: site preparation and temporary storage; transportation and deposition of waste material. Essentially decommissioning will follow the construction process but in reverse.

The decommissioning or upgrading of the infrastructure has not been discussed in this ESIA report but will be addressed before decommissioning is required. If requested, a separate ESIA will be conducted prior to the time of decommissioning. In addition, any decommissioning activities and related plans will comply with the applicable national regulation.

3.5.6.1 Site Preparation and Temporary Storage

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment, mobilization of decommissioning equipment, planning for temporary and or permanent storage of debris.

3.5.6.2 Disassemble and or Replace Existing Components

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements. This would be done by sorting all materials, such that they are categorized into re-usable items and debris items.

All re-usable items shall be re-packaged into containers and taken to the market areas where they can be sold; while debris will be packaged into two types, one for hazardous materials and the other for regular debris.

Hazardous wastes will be disposed of in accordance with the relevant environmental guidelines; while non-hazardous and inert materials, like waste metals or plastics, will where possible be delivered to respective re-cycling plants. These measures will be included in a Waste Management Plan.

3.5.6.3 Site Remediation

Once decommissioning is completed, all equipment and debris shall be removed from the site and the affected area will be rehabilitated where practical and reasonable, back to the normal state of the environment. Site remediation methodology is included in the project environment management plan proposed for the development. The plan provides measures to mitigate/manage the potential impacts expected during the construction phase.

3.6 Project Staffing

The number of people that will be employed during construction is expected to reach a peak of 900 personnel. This includes technicians and low-skilled personnel (approximately 600) who will receive various levels of training before starting work on the Solar Park. This includes basic training on HSE, labour management and, where required for specific job profiles, vocational training.

The construction workforce is expected to consist of a combination of nationals and expatriate workers, with the majority being locals preferentially sourced from the surrounding towns and villages. The number of jobs to be made available to local women during construction has not yet been confirmed.

Table 2-4 indicates how the size of the workforce will vary over the 12-month construction period. During the early stages of construction, the worker numbers will be low (<100) but will rise quickly from month 5 when the civils work begins. After the peak level has been reached, the local workforce will gradually be reduced leading up to the start of operations. All of the construction workers will be provided with contracts with a limited term.

The individuals employed during the construction stage, and their household members, will benefit from increased income that is likely to increase their overall standard of living, access to healthcare and educational resources, and reduce their socio-economic vulnerability. The Solar Park represents an opportunity for young people to increase their skills through vocational training that will be of use to them after their involvement in this Solar Park is completed. Individuals who receive such training should be able to seek alternative work within the growing construction sector in the future.

The operation of the Solar Park only requires a small team of people. It is expected that an O&M team of between 22 and 24 will be required. The team will be work on a three-shift basis. The O&M posts will be advertised locally and it is hoped that local people, both men and women, will apply for these positions. in addition to personnel provided through local subcontractors to provide a range of supporting services, including security.

The following workforce requirements are anticipated for the project:

Table 3-6: Workforce Requirements

Dept.	Position	Month														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Home Office	Domestic Project Management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Design Management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Procurement Centre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Surveillance Dept.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Integrated Logistic Dept	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Site Project Management	Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Project Chief Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Site Project Commercial and Contract Department	Commercial Manager		1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Commercial Engineer					1	1	1	2	2	2	2	2	2	2	2
Site Project Administrative Department	Admin. Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	HR Engineer			1	1	1	1	1	1	1	1	1	1	1	1	1
	Secretary(local)						1	2	2	2	2	2	2	1	1	1
	Nurse							1	1	2	2	2	1	1	1	1
	Driver (local)						1	1	2	2	2	2	2	2	2	1
Site Project Integrated Logistics Department	Integrated Logistics Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Procurement Engineer			1	1	1	2	2	3	3	3	3	3	3	3	1
Site Project HSE Department	HSE Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	HSE officer					1	2	3	3	4	4	4	4	4	3	1
Site Project QA/QC Department	QA&QC Manager			1	1	1	1	1	1	1	1	1	1			
	QA&QC Engineer						2	2	2	4	4	4	4	3	2	1
Site Project Financial Department	Financial Manager		1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Financial Officer							1	1	1	1	1	1	1	1	1
Site Project Construction Department	Engineering Manager			1	1	1	1	1	1	1	1	1	1			
	Civil Manager	1	1	1	1	1	1	1	1	1	1	1	1			
	Civil Engineer (China)			1	1	1	1	2	3	3	3	3	3	3	1	1
	Civil Engineer (local)				1	1	1	3	3	4	4	4	4	4	2	1
	Document control				1	1	1	1	2	2	2	2	2	2	1	1
	Plan engineer									1	1	1	1	1	1	1
	Elec. Manager	1	1	1	1	1	1	1	1	1	1	1	1			
	Elec. Engineer (China)						2	2	3	3	3	3	3			
	Elec. Engineer (local)						1	2	3	4	4	4	4	3	2	1
Subcontractor	Civil construction				23	68	147	230	480	510	520	460	72	60	50	50

Dept.	Position	Month														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Electric construction						8	50	142	252	278	224	150	70	65	65
	Total subcontractor	0	0	0	23	68	155	280	622	762	798	684	222	130	115	115
Site Total	Site Total	7	9	14	39	86	182	315	664	811	847	733	270	168	145	137

3.7 Greenhouse Gas Emissions

It is expected that the Project will reduce carbon emissions by adding a renewable energy generation asset to Uzbekistan energy mix, which will displace carbon intensive generation in the merit order of dispatch. Currently, Uzbekistan's electricity sector has a very large carbon footprint accounting for 43 percent of the country CO2 emissions. The Uzbek economy is one of the most energy intensive in the ECA region. Approximately 87 percent of the generation mix is comprised of carbon intensive technologies operating with a grid emission factor of 506g CO2e/kWh and 33 percent efficiency factor. The Project will introduce a new PV solar plant into the energy mix with a lower variable operating cost than aging thermal power generation plants. Hence, it will displace in the merit order of dispatch obsolete generation from the Syrdarya TPP with the highest marginal fuel cost in the system. As a result, the Project will reduce approximately 156,000 tons of CO2 emissions reduction annually between 2021 and 2046. IFC has estimated the economic rate of return (ERR) at 20.1 percent. The ERR reflects the social benefits of CO2 emissions savings and fuel costs due to the displacement of the Syrdarya TPP.

Greenhouse gas emissions from the project during the construction are expected to be predominantly associated with the use of fuels such as in generators, transport, on-site equipment, and machinery. Although the quantities of emissions have not been calculated, these are expected to be low and significantly less than 25,000 tones CO2 equivalent (tCO2eq/year).

The project is expected to generate approximately 270 gigawatt hours (GWh) of electricity per year, resulting in a predicated annual GHG reduction of 156,000 tCO2eq/year.

3.8 Project Alternatives

As part of the development process, Nur Navoi considered a number of alternatives to the development of the Solar Park. This section describes the reasoning behind the site selection process and the decision to take this site forward as the preferred development option.

3.8.1 Uzbekistan's Green Economy Strategy

At the national level, Uzbekistan has enacted a strategy for transition to a green economy in the period of 2019-2030. This was approved and implements an Action Strategy for five priority areas of development between2017 and 2021. The priority areas focus on the implementation of measures in various sectors of economy, including electricity, heat, oil and gas, renewable energy, construction and transportation. The Solar Park would meet the objectives of the Green Economy Strategy.

3.8.2 Without the Project

Uzbekistan is one of the few countries which is fully self-sufficient in energy resources In 2015, Uzbekistan was the third largest natural gas producer in Eurasia, following Russia and Turkmenistan. The country produced just over 2 trillion cubic feet (Tcf) of natural gas in 2015, and consumed roughly 1.8 Tcf of natural gas the same year according to the BP Statistical Review of World Energy 2016.. Its abundant natural gas resources are used both for domestic consumption and export.[8]

Oil and natural gas comprise 97% of the country's energy balance. Primary energy shares consist of 86.3% gas, 1.9% hydro, 2.5% coal and peat, and 9.3% crude oil.

Uzbekistan is the largest electricity producer in Central Asia. Total national electricity capacity is 12.6 GW (as of 2007), of which 88.5% is provided by thermal power plants and 11.5% by hydropower plants.

[8] BP Statistical Review of World Energy 2016. As referenced in: IEA (2020): World Energy Outlook: Uzbekistan.

The whole population have access to electricity, although electrical supply to rural areas is unreliable and of low quality. There are often power blackouts that last many hours per day. Renovating the power transmission networks is one of the energy sectors priorities.

A 'without project alternative' would place ongoing reliance on generating additional power from fossil fuel sources and would fail to address Uzbekistan's Green Economy Strategy. A 'With Project Alternative' is therefore recommended.

3.8.3 Site Selection

In identifying a suitable site for solar energy developments, various elements need to be considered. These include factors such as:

- Solar resource.
- Environmental designations.
- Residential properties.
- Site access.
- Grid connection.

The Navoi site was identified by the Government of Uzbekistan who offered the site to potential bidders as part of the Scaling Solar program. As a result, there was no opportunity for Nur Navoi to influence site selection.

The Navoi site has good solar resource, has generally flat profile and ease of access, and has few environmental or social risks. The most efficient technology was chosen based on the specific conditions on-site.

However, the project site alternatives were screened as part of the Scaling Solar program based on availability of suitable land, access to the grid network, solar irradiation and project appraisal following the Lenders' requirements regarding environmental and social aspects.

It is considered that the site selection process carried out by Scaling Solar was appropriate and the site location meets the above criteria.

4. Legal and Policy Framework

4.1 Uzbekistan's Green Economy Strategy

Uzbekistan's strategy for transition to a green economy in the period of 2019-2030 was approved by the Resolution of the President of the Republic of Uzbekistan dated 04.10.2019 No. PP-4477 (the "Resolution"). This Resolution was adopted to ensure fulfilment of obligations under the Paris Agreement on climate change signed by Uzbekistan on April 19, 2017, as well as the implementation of the Action Strategy for five priority areas of development of the Republic of Uzbekistan in 2017-2021.

The Resolution declares that the Strategy should bring the following results by 2030:

- Reduction of emissions of greenhouse gas per unit of GDP by 10 per cent of the 2010 level;
- Twofold increase of energy efficiency indicators and a decrease in the carbon intensity of GDP;
- Further development of renewable energy sources, with coverage of more than 25 per cent of the total volume of electricity generation;
- Increase of the energy efficiency of industrial enterprises by at least 20 per cent;
- Development of electrical vehicles;
- Introduction of drip irrigation technology into an area up to 1M hectares and increasing the crops yield cultivated on them by 20-40 per cent;
- Achieving a neutral balance in the degradation of land; and
- Increasing the average productivity of the production of the main types of agricultural food products by 20-25 per cent.

In addition, the Resolution identifies the priority areas in Uzbekistan's strategy for transition to a green economy:

- Improvement of energy efficiency in the basic sectors of the economy;
- Diversification of energy consumption and development of the use of renewable energy sources;
- Adaptation and mitigation of the effects of climate change, increase in the efficiency of natural resources and preservation of natural ecosystems;
- Development of financial and non-financial support mechanisms for the green economy.

Priority areas envisage the implementation of measures in various sectors of economy, including electricity, heat, oil and gas, renewable energy, construction, transportation and many more.

4.2 Institutional framework

The Constitution and legislative norms and rules of the Republic of Uzbekistan determine the legislative, state and executive authority's environmental and social responsibilities, and also the responsibilities of private developers. The Preamble of the Constitution recognises the "priority of the generally accepted norms of the international law".[9] It is therefore considered that international conventions and ratifications will prevail over national legislation whenever the former are more stringent.

The Supreme Executive body responsible for nature protection in the Uzbekistan is the State Committee for Nature Protection (SCNP), subordinated and accountable to Oliy Majlis (Parliament). It defines state policy, takes legislative acts, coordinates and manages the activity of ministries and agencies regarding E&S issues. The Cabinet of Ministers is the Executive body responsible for the implementation of state nature protection policy, coordinate development and realization of state programs of socio-economic development. The Cabinet controls their execution and is responsible for registration and evaluation of nature resources. Obligations of regions regarding environmental protection are put to the Soviets of National Deputies, headed by the Leader of administration (khokims). Regional and local government are responsible for registering and evaluating the condition of nature resources, ecologically harmful facilities and are responsible for control, nature protection and usage of nature resources.

Execution of nature protective measures, control function and responsibility regarding nature protection rests on a number of ministries and agencies. Responsibilities of these bodies include provision of

[9] Constitution of the Republic of Uzbekistan http://constitution.uz/en/clause/index (20/02/2020)

stable system of state service, development and realization of specialized programs, strategies and plans of actions and sustainable nature management. Regional departments and agencies are generally lower executive bodies of the SCNP and other responsible ministries on regional and district levels. Organizations at the regional level have the same structure as the republican level.

Public meetings (makhalla) are an independent mechanism of self-government, which carries out general initiatives and measures, including those connected with ecology, directly in villages, regions, districts and cities. See more information on makhallas below in Section 4.3.3.

4.3 National Environmental and Social Legislation

4.3.1 Overview

Within the limits of established state policy under the direction of the President and Cabinet of Ministers (CM) in the Uzbekistan, attention is paid to the execution of accepted ecological obligations. Nature conservation policy of Uzbekistan and implemented measures related to environmental protection and nature management are based on the following principles:

- integration of economic and ecological policy for conservation and rehabilitation of the environment as a necessary condition for increasing the population's standard of living;
- Transition from protection of some individual environmental elements to a more general and complex protection of ecosystems;
- Placing a responsibility on all members of society for environmental protection, conservation of biodiversity and improvement of the conditions of the general population.

National environmental legislation is based on the regulations of the Constitution of Uzbekistan, which was accepted on December 8, 1992, amended in accordance with the Law of Uzbekistan dated 28.12.1993, No. 989-XII, and the Law of Uzbekistan dated 24.04.2003 No. 470-II. There is a requirement that Government, departments, public officers, social associations, and citizens act in accordance with the relevant Constitution and laws. (Article 15). None of the regulations of Constitution can be interpreted to the prejudice of rights and interests of Uzbekistan. None of the laws or other normative-legal acts can contradict norms and principles of the Constitution (Article 16).

In accordance with the Constitution of Uzbekistan, land, its resources, flora and fauna, and other natural resources are national wealth and are subjected to rational usage and protected by government. Article 55 of the Constitution of the Uzbekistan states, "... land, its resources, flora and fauna and also other nature resources are the national wealth and should be rationally used and protected by state".

On the basis of the Constitution, the laws are taken by Oliy Majlis (OM), signed by the President of the Uzbekistan and have the highest legal power. The President of the Uzbekistan, on the basis and in pursuance of execution of the Constitution and laws of the Uzbekistan, issues orders, statements and decrees, having compulsory power on the whole territory of the Uzbekistan (Article 94).

The Cabinet of Ministers (CM), in accordance with acting legislation, issues statements and decrees which are compulsory for the whole territory of Uzbekistan. The Khokim takes decisions which are compulsory for all ventures, establishments, associations, public officers and citizens on corresponding territory (Article 104).

The SCNP of the Uzbekistan is subordinated to OM and has responsibility for ministries, state committees, establishments and organizations for the use and protection of lands, subsoils, water, forests, flora and fauna, and air.

The fundamental legislative act regulating nature conservation is the Law "On nature protection" No. 754-XII dated December 9, 1992 (last revision was made by Law of Uzbekistan No.59 dated 10.10.2006). This Law states legal, economic and organizational bases for keeping conditions of environment, rational usage of nature complexes. It has the aim to provide balanced harmonic development of relations between humans and nature, protection of ecological systems, nature complexes and separate objects, and guarantee rights of citizens for favourable environment. The influence of economic activity on nature environment is limited by norms and quality standards established for various components of the natural environment. The aim is to guarantee ecological safety of population, production and protection of nature resources.

State control of environmental protection is carried out by public authorities and regulatory bodies and departments/agencies specifically responsible for nature protection. Authorized departments responsible for nature protection are:

- State Committee for Nature Protection of Uzbekistan;
- Ministry of Health of Uzbekistan;
- Agency for control of safe industry works and mines inspectorate;
- Ministry of Internal Affairs of Uzbekistan;
- Ministry of Agriculture and water resources of Uzbekistan;
- State Committee for land resources of Uzbekistan.

Payments for special nature management and pollution of environment consists of taxes and also, compensation payments for pollution of the environment (emissions, discharge of contaminants and wastes disposal), payments for protection and restoration of nature resources.

In addition to the Law "On nature protection" some other laws, regulating different areas of management and environmental protection have been developed such as:

1. "On water and water usage" No. 837-XII dt May 6, 1993 (last revision was made by Law of Uzbekistan No. 240 dt 25.12.2009).
2. "On protection of atmospheric air" No. 353-I dt. December 27, 1996 (last revision was made by Law of Uzbekistan No.59 dt. 10.10.2006).
3. "On protection and usage of flora" No. 543-I dt. December 26, 1997 (last revision was made by Law of Uzbekistan No. 82-II dt. 26.05.2000).
4. "On protection and usage of fauna" No. 545-I dt. December 26, 1997 (last revision was made by Law of Uzbekistan No.59 dt. 10.10.2006).
5. "On wastes" No. 362-II dt. April 5, 2002.
6. "On order of promulgation of a Land Code of Uzbekistan" No. 598-I dt. April 30, 1998. (last revision was made by Law of Uzbekistan No.714-II dt. 03.12.2004).
7. "On state land cadastre" No. 666-I dt. August 28, 1998 (last revision was made by Law of Uzbekistan No. 621-II dt. 30.04.2004).
8. "On woods" No. 770-I dt. April 15, 1999 (last revision was made by Law of Uzbekistan No.238 dt. 22.12.2009).
9. "On protected nature territories" No. 710-II dt. December 3, 2004.
10. Law of Uzbekistan "On subsoils" is approved by Law of Uzbekistan No.444-II dt. 13.12.2002r. (last revision was made by Law of Uzbekistan No.133 dt. 18.12.2007.)
11. Law of Uzbekistan "On EIA" No. 73-II dt. May 25, 2000.

As a whole, ecological legislation of the Uzbekistan covers a wide spectrum of issues and includes regulations including:

- Protection of the environment and its main components;
- Protection of ecosystems and regulation of usage of nature resources;
- Evaluation of influence on environment and ecological expertise;
- Regulation of compensations for damage made to environment (including economical and administrative aspects);
- Regulation of property rights for nature resources.

The legislation of Uzbekistan prioritises a number of international agreements above the national legislation. For example, Article 53 of Law of Uzbekistan "On nature protection" requires that "in cases, when international agreement, concluded by Uzbekistan, states rules other than that contained in the present Law or other legislative act of Uzbekistan on nature protection, the rules of international agreement are applied, excluding cases when legislation of Uzbekistan established more strict requirements".

4.3.2 Requirements of the National EIA Procedure

There are specific requirements as to the content, development procedure and examination of Environment Impact Assessment (EIA) documents. These are governed by the following legislative acts of the Republic of Uzbekistan:

4) Law of the Republic of Uzbekistan No 754-XII dated 09.12.1992 “On Environment Protection”;

5) Law of the Republic of Uzbekistan No 73-II dated 25.05.2000 “On Environmental Impact Audit”;

6) Regulation “On State Ecological Expertise in the Republic of Uzbekistan”, approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No 491 dated 31.12.2001.

A series of EIA documents consisting of the following stages are required to be developed for designed facilities in accordance with the given requirements:

- DEIA - Draft Environmental Impact Assessment, which shall be developed in the conception stage of planned or anticipated economic or other activity prior to the beginning of project financing (1st stage of EIA);
- EIA - Environmental Impact Assessment, which shall be developed if, based on the results of DEIA State Environmental Expertise (SEE), it was ascertained that additional surveys, on-site investigations, special analyses, simulation experiments and development of well-founded environmental actions are required (2nd stage of EIA). Necessity of EIA development shall be defined by State Committee on Nature Protection of the Republic of Uzbekistan based on the results of DEIA state environmental expertise.
- EEA - Ecological Effect Assessment, which shall be developed prior to commissioning of the project and shall be final stage of EIA procedure for designed facilities (3rd stage of EIA).

The Solar Park is required to take all reasonable measures in accordance with these laws and standards in order to minimize any potential violations of general balance of environment, including, but not limited to, land surface, subsoils, air, lakes, rivers, flora and fauna, crops and other natural resources. The hierarchy of protection is determined in the following order: life protection, environmental protection and property protection.

4.3.3 National Social Legislation

The findings regarding the key legislation in relation to social matters were based on a revision of publicly available legislation translated into English.

The key findings are summarised below:

The **Constitution of the Republic of Uzbekistan,** in particular:

- Art. 105. Recognises makhallas as self-governing bodies whose Chairmen and advisers are elected by citizens for terms of two and a half years.[10] This is relevant because this type of organisation is an important channel for the decision-making process of local communities. Makhallas carry out general initiatives and measures, including those connected with ecology, directly in villages, regions, districts and cities. The main principles of makhalla are democracy, publicity, social justice, humanism and mutual aid. A makhalla is responsible for taking decisions regarding problems of local importance, including issues of improving and development of infrastructure, arrangement of khashars (voluntary unpaid work on Sunday) and provision of social aid to low-income families, among others.

The Labour Code of the Republic of Uzbekistan of April 1,1996 (as amended on December 22, 2010); in particular:

- Chapter VI. Employment contract - Articles 4 and 72 to 76 determine the content, form and term of the employment contract, the limitation of rights of the employer to enter into fixed-term employment contract, and the ratio of legal and contractual regulation of labour relations. This is relevant because there is no specific requirement to provide workers with documented information that is clear and understandable, regarding their rights, including their rights related

[10] Constitution of the Republic of Uzbekistan http://constitution.uz/en/clause/index (20/02/2020)

to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.

- Article 77 determines the age at which employment is permitted (i.e. 16 years old).
- Article 239 establishes that all persons under the age of 18 years shall be employed only after undergoing a preliminary medical examination and further until reaching the age of 18 are subject to mandatory annual medical examination.
- Article 7 prohibits forced labour, understood as work performed under threat of punishment (including as a means of labour discipline).
- Articles 211 and 212 establish requirements on labour protection, and the duties of the employee to comply with the norms, rules and regulations on labour and protection. The employee is obliged to comply with the norms, rules and regulations on labour protection, as well as the administration of the order of safe operation, use the obtained personal protective equipment, and immediately notify their supervisor (foreman, master, chief of a site, and others) if any accidents or situations that create a direct threat to human life and health occur.

Article 213 establishes the right of the worker to the information on occupational health and safety (OHS). At the conclusion of the employment contract and the transfer to another job worker shall be informed by the employer about working conditions, including the presence of risk occupational and other diseases due to him in connection with these benefits and compensation, as well as personal protective equipment. The employer must also inform employees or their representatives about the state of OHS in specific workplaces and production.

4.3.4 Archaeology and Cultural Heritage Legislative and Policy Context

Standards and legislation applicable to archaeology and cultural heritage are divided into two sub-sections, namely:

- National: Uzbek legislative and regulatory framework, and international protocols/agreements/ treaties to which Uzbekistan is party.
- International: International policies, standards and guidelines including the International Finance Corporation (IFC) Performance Standards and Environmental Health and Safety (EHS) Guidelines, and Good International Industry Practice (GIIP).

4.3.4.1 Uzbek Legislative Context

The principal legislation applicable to the archaeology and cultural heritage study comprise the Constitution of the Republic of Uzbekistan[11], the Criminal Code of the Republic of Uzbekistan[12], Law No. ZRU-229 “On protection and use of the objects of archaeological heritage” (13 October 2009)[13], Law No. 269-II “On the Protection and Use of Cultural Heritage Sites (30 August 2001, as amended)[14], Presidential Decree No. R-5181 “On improving the protection and use of objects of tangible cultural and archaeological heritage” (16 January 2018)[15] and Presidential Decree no. PP-4068 “Regarding the strengthening of the protection, management and enhancement of tangible and intangible cultural heritage” (19 December 2018)[16]. A summary of the applicable legislation that will be considered during the ESIA process is presented in Table 3-1.

[11] Constitution of the Republic of Uzbekistan (2017). Available at: http://www.gov.uz/en/constitution/
[12] Criminal Code of the Republic of Uzbekistan of September 22, 1994 No. 2012-XII (as amended on 03-12-2019) Available at: https://www.lex.uz/acts/111457
[13] Law of the Republic of Uzbekistan dated 13 October 2009 No. ZRU-229 “On protection and use of the objects of archaeological heritage”. Available at https://lex.uz/docs/1526179
[14] Law of the Republic of Uzbekistan dated August 30, 2001 No. 269-II “On the Protection and Use of Cultural Heritage Sites”. Available at: https://www.lex.uz/acts/10375#1526009
[15] Presidential Decree No. R-5181 of 16 January 2018 “On improving the protection and use of objects of tangible cultural and archaeological heritage”. Available at: https://www.lex.uz/docs/3506339
[16] Presidential Decree No. PP-4068 of 19 December 2018 “Regarding the strengthening of the protection, management and enhancement of tangible and intangible cultural heritage”. Available at: https://lex.uz/ru/docs/4113474

Table 4-1: National legislation, standards and guidelines applicable to the archaeology and cultural heritage study

Law/Act/Regulation	Objective
Constitution of the Republic of Uzbekistan (2017)	The 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. Cultural monuments shall have protection by the state" (Art. 49).
Criminal Code of the Republic of Uzbekistan	Article 132 states that the intentional destruction, destruction or damage of objects of tangible cultural heritage under state protection causing significant or major damage shall be punishable by a fine, obligatory community service or by correctional labour up to three years. Article states that violation of a grave or a corpse, as well as the seizure of objects located on a corpse, grave or burial ground, shall be punishable by a fine, by corrective labour up to three years, by restriction of liberty or imprisonment from three to five years.
Code of the Republic of Uzbekistan on Administrative Responsibility	Article 64 notes that the violation of the rules for the protection and use of objects of tangible cultural heritage shall be sanctioned by a fine on citizens and officials. Construction or destruction of protected cultural property real estate objects in protected areas in specially protected historical and cultural territories without obtaining permission shall be sanctioned by a fine or administrative arrest.
Law No. 269-II "On the Protection and Use of Cultural Heritage Sites (30 August 2001, as amended)	Regulates the protection and use of cultural heritage objects (CHO), which are the national property of the people of Uzbekistan. The law protects ensembles, sites, monuments, objects of tangible and intangible cultural heritage. The law defines objects of tangible cultural heritage as representing historical, scientific, artistic or other cultural value ensembles, sites and monuments; and objects of intangible cultural heritage as representing customs, historical, scientific, artistic or other cultural value, folklore (the art of word, dance, music, performance), as well as knowledge, skills, tools, artefacts related to them and folk arts and crafts, and cultural spaces. Tangible cultural heritage is divided into CHO of national and local historical, scientific, architectural, artistic and memorial significance. Designated cultural heritage comprises World Heritage properties, elements inscribed on the Representative List of the Intangible Cultural Heritage of Humanity, CHO on the State Register, historical and cultural reserves, museum reserves and historical settlements. These are maintained on the State Cadastre of tangible CHO and the List of intangible objects of intangible CHO.
Law No. ZRU-229 "On protection and use of the objects of archaeological heritage" (13 October 2009)	Regulates the protection and use of the objects of archaeological heritage. The state has exclusive right of ownership of the objects of archaeological heritage. Objects of archaeological heritage are subject to compulsory state registration. The Ministry of Culture issues field investigation permits and approves the scientific report for each permit issued. Specially authorised institutions in the field of protection and use of archaeological heritage objects (authorised agencies) approve the procedures for archaeological exploration, archaeological excavations and archaeological surveillance, issue open sheets and participate in the historical and cultural examination of archaeological heritage sites.
Presidential Decree No. PP-4068 "Concerning measures on preservation of objects of cultural and archaeological heritage" (19 December 2018)	Includes a 'Road Map' to radically improve the protection, conservation, scientific research, propaganda and rational use of tangible cultural heritage objects for 2019-2021.
Presidential Decree No. R-5181 "On improving the protection and use of objects of tangible cultural and archaeological heritage" (16 January 2018)	Required the creation of a national digital inventory, used as the basis for developing comprehensive measures to radically improve the protection, conservation, scientific study, promotion and use of objects of tangible cultural and archaeological heritage in 2018-2023.

The 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. Cultural monuments shall have protection by the state" (Art. 49).

Article 132 of the Criminal Code of the Republic of Uzbekistan states that the intentional destruction, destruction or damage of objects of tangible cultural heritage under state protection causing significant or major damage shall be punishable by a fine, obligatory community service or by correctional labour up to three years.

Article 134 Criminal Code of the Republic of Uzbekistan states that violation of a grave or a corpse, as well as the seizure of objects located on a corpse, grave or burial ground, shall be punishable by a fine, by corrective labour up to three years, by restriction of liberty or imprisonment from three to five years.

Article 64 of the Code of the Republic of Uzbekistan on Administrative Responsibility[17] notes that the violation of the rules for the protection and use of objects of tangible cultural heritage shall be sanctioned by a fine on citizens and officials. Construction or destruction of protected cultural property real estate objects in protected areas in specially protected historical and cultural territories without obtaining permission shall be sanctioned by a fine or administrative arrest.

Law No. 269-II "On the Protection and Use of Cultural Heritage Sites (30 August 2001, as amended) regulates the protection and use of cultural heritage objects (CHO), which are the national property of the people of Uzbekistan. The law protects ensembles, sites, monuments, objects of tangible and intangible cultural heritage. The law defines objects of tangible cultural heritage as representing historical, scientific, artistic or other cultural value ensembles, sites and monuments; and objects of intangible cultural heritage as representing customs, historical, scientific, artistic or other cultural value, folklore (the art of word, dance, music, performance), as well as knowledge, skills, tools, artefacts related to them and folk arts and crafts, and cultural spaces. Tangible cultural heritage is divided into CHO of national and local historical, scientific, architectural, artistic and memorial significance.

Designated cultural heritage comprises World Heritage properties, elements inscribed on the Representative List of the Intangible Cultural Heritage of Humanity, CHO on the State Register, historical and cultural reserves, museum reserves and historical settlements. These are maintained on the State Cadastre of tangible CHO and the List of intangible objects of intangible CHO.

Law No. ZRU-229 "On protection and use of the objects of archaeological heritage" (13 October 2009) regulates the protection and use of the objects of archaeological heritage. The state has exclusive right of ownership of the objects of archaeological heritage. Objects of archaeological heritage are subject to compulsory state registration. The Ministry of Culture issues field investigation permits and approves the scientific report for each permit issued. Specially authorised institutions in the field of protection and use of archaeological heritage objects (authorised agencies) approve the procedures for archaeological exploration, archaeological excavations and archaeological surveillance, issue open sheets and participate in the historical and cultural examination of archaeological heritage sites.

The Presidential Decree "Concerning measures on preservation of objects of cultural and archaeological heritage" (19 December 2018) includes a 'Road Map' to radically improve the protection, conservation, scientific research, propaganda and rational use of tangible cultural heritage objects for 2019-2021. Presidential Decree No. R-5181 (16 January 2018) required the creation of a national digital inventory, used as the basis for developing comprehensive measures to radically improve the protection, conservation, scientific study, promotion and use of objects of tangible cultural and archaeological heritage in 2018-2023.

4.3.4.2 Uzbek International Agreements and Conventions

Environmental and social conventions and agreements of relevance to archaeology and cultural heritage are outlined in Table 4-2.

[17] Code of the Republic of Uzbekistan on Administrative Responsibility (1994, as amended) Available at: https://www.lex.uz/acts/97661

Table 4-2 International environmental and social agreements and conventions of relevance to the archaeology and cultural heritage study

Agreement/ Convention	Objective	Status and Date of Signature
UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (Convention on Cultural Property) – 1970[18]	Prohibits and prevents the illicit import, export and transfer of ownership of cultural property and aims to discourage the pillage of archaeological sites and cultural heritage by controlling international trade in looted antiquities through import controls and other measures.	15 March 1996 (ratification)
UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) – 1972[19]	To ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage on states' territories.	13 January 1993 (ratification)
UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage – 2003[20]	To safeguard and ensure respect for the world's Intangible Cultural Heritage, including raising awareness of the importance of intangible heritage and encouraging international cooperation and assistance.	29 January 2008 (ratification)
UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions – 2005[21]	Recognises the rights of states to protect and promote the diversity of cultural expressions, encompassing cultural and natural heritage, movable cultural property, intangible cultural heritage and contemporary creativity.	15 November 2019 (ratification)

4.4 International Agreements

Uzbekistan is signatory to a number of international conventions and agreements relating to industry, development and environmental management.

Table 4-3 below lists some of the relevant international conventions and protocols to which Uzbekistan is signatory. Many of these are incorporated into the various International Finance Corporation (IFC) Performance Standards.

Table 4-3: International Environmental and Social Conventions Ratified by Uzbekistan[22]

Name of Convention	Date of Ratification
C029 - Forced Labour Convention, 1930 (No. 29)	13 July 1992
C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)	12 Dec 2016
C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)	13 July 1992
C100 - Equal Remuneration Convention, 1951 (No. 100)	13 July 1992
C105 - Abolition of Forced Labour Convention, 1957 (No. 105)	15 Dec 1997
C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)	13 July 1992

[18] UNESCO 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Paris, 14 November 1970. United Nations Educational, Scientific and Cultural Organization http://www.unesco.org/new/en/culture/themes/illicit-traffic-of-cultural-property/1970-convention/
[19] UNESCO 1972 Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972. United Nations Educational, Scientific and Cultural Organization http://whc.unesco.org/en/conventiontext/
[20] UNESCO 2003 Convention for the Safeguarding of the Intangible Cultural Heritage. (Paris, 17 October 2003) United Nations Educational, Scientific and Cultural Organization http://www.unesco.org/culture/ich/index.php?pg=00006
[21] UNESCO 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005. United Nations Educational, Scientific and Cultural Organization https://en.unesco.org/creativity/convention/2005-convention/2005-convention-text
[22] International Labour Organisation (ILO): Ratifications for Uzbekistan.
Website: http://ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:103101 (date viewed: 28.02.2018)

Name of Convention	Date of Ratification
C138 - Minimum Age Convention, 1973 (No. 138)	06 Mar 2009
C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)	13 July 1992
C122 - Employment Policy Convention, 1964 (No. 122)	13 Jul 1992
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (IEA ID# 2793)	08/02/2002
Convention for The Protection of The World Cultural and Natural Heritage (IEA ID# 2812)	13/01/1993
Convention on International Trade in Endangered Species of Wild Fauna and Flora (IEA ID# 2814)	08/10/1997
Convention on The Conservation of Migratory Species of Wild Animals (IEA ID# 2896)	01/09/1998
Convention for The Protection of The Ozone Layer (IEA ID# 2982)	16/08/1993
Montreal Protocol on Substances That Deplete the Ozone Layer (IEA ID# 3021)	18/08/1993
Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal (IEA ID# 3042)	07/05/1996
Agreement on cooperation in the field of ecology and environmental protection (IEA ID# 2489)	08/02/1992
Agreement on Cooperation in The Field of Joint Water Resources Management and Conservation of Interstate Sources (IEA ID# 3113)	18/02/1992
Convention on The Protection and Use of Transboundary Watercourses and International Lakes (IEA ID# 3116)	03/12/2007
United Nations Framework Convention on Climate Change (IEA ID# 3126)	21/03/1994
Convention on Biological Diversity (IEA ID# 3128)	17/10/1995
Statute of the Interstate Commission for Water Coordination of Central Asia (IEA ID# 4765)	05/12/1992
Agreement on Joint Activities in Addressing the Aral Sea and The Zone Around the Sea Crisis, Improving the Environment, And Ensuring the Social and Economic Development of The Aral Sea Region (IEA ID# 3155)	26/03/1993
Convention to Combat Desertification in Those Countries Experiencing Serious Drought And/or Desertification, Particularly in Africa (IEA ID# 3188)	26/12/1996
Agreement on The Conservation of African-Eurasian Migratory Water birds (IEA ID# 3216)	01/04/2004
Agreement between the Government of Kazakhstan, the Government of Kyrgyzstan and the Government of Uzbekistan on management of water resources in Central Asia (IEA ID# 8452)	05/04/1996
Agreement on The Use of Water and Energy Resources of The Syr Darya Basin (IEA ID# 3279)	07/05/1999
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (IEA ID# 2793)	08/02/2002
Convention for The Protection of The World Cultural and Natural Heritage (IEA ID# 2812)	13/01/1993
Convention on International Trade in Endangered Species of Wild Fauna and Flora (IEA ID# 2814)	08/10/1997
Convention on The Conservation of Migratory Species of Wild Animals (IEA ID# 2896)	01/09/1998
Convention for The Protection of The Ozone Layer (IEA ID# 2982)	16/08/1993
Montreal Protocol on Substances that Deplete the Ozone Layer (IEA ID# 3021)	18/08/1993
Convention on The Control of Transboundary Movements of Hazardous Wastes and Their Disposal (IEA ID# 3042)	07/05/1996

Name of Convention	Date of Ratification
Agreement on cooperation in the field of ecology and environmental protection (IEA ID# 2489)	08/02/1992
Agreement on Cooperation in The Field of Joint Water Resources Management and Conservation of Interstate Sources (IEA ID# 3113)	18/02/1992
Convention on The Protection and Use of Transboundary Watercourses and International Lakes (IEA ID# 3116)	03/12/2007
United Nations Framework Convention on Climate Change (IEA ID# 3126)	21/03/1994
Convention on Biological Diversity (IEA ID# 3128)	17/10/1995
Statute of the Interstate Commission for Water Coordination of Central Asia (IEA ID# 4765)	05/12/1992
Agreement on Joint Activities in Addressing the Aral Sea and The Zone Around the Sea Crisis, Improving the Environment, And Ensuring the Social and Economic Development of The Aral Sea Region (IEA ID# 3155)	26/03/1993
Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (IEA ID# 3188)	26/12/1996
Agreement on The Conservation of African-Eurasian Migratory Waterbirds (IEA ID# 3216)	01/04/2004
Agreement between the Government of Kazakhstan, the Government of Kyrgyzstan and the Government of Uzbekistan on management of water resources in Central Asia (IEA ID# 8452)	05/04/1996
Agreement on The Use of Water and Energy Resources of The Syr Darya Basin (IEA ID# 3279)	07/05/1999

4.5 International Best Practice Guidelines

International lenders who are signatories to the Equator Principles (EPs) require projects that they finance to meet international standards. Beyond Uzbek legal requirements, the following international guidelines, regulations and policies will be followed and applied to the Solar Park development and implementation:

- IFC Performance Standards (IFC, 2012).
- Environmental, Health & Safety (EHS) General Guidelines, including wastewater and ambient water quality, waste management and hazardous materials management, noise management, occupational health and safety, and construction and decommissioning guidelines (IFC, 2007a).
- EHS Guidelines for Electric Power Transmission and Distribution (IFC, 2007b).
- World Bank Safeguard Policies.
- Asian Development Bank (ADB) Safeguard Policy Statement (ADB, 2009).

These are all specific policies, procedures, strategies and regulations designed for promoting sustainable development. These procedures include a detailed environmental review process prior to final approval of financing for the Solar Park, detailed environmental guidelines, detailed health and safety requirements, procedures for social impact assessment and public consultation and information disclosure and many other issues, associated with project construction, operation and decommissioning. Many of the mitigation measures described in later sections of this ESIA are based on these requirements. In all cases where there are National and International requirements, the most stringent will be applied.

Of particular relevance is Principle 1 of the Rio Declaration of Environment and Development (United Nations, 1992c) states that “Human beings are entitled to a healthy and productive life in harmony with nature”. Principle 18 requires that an impact assessment be undertaken.

Further detail relating to the IFC Performance Standards and African Development Bank Integrated Safeguards System are provided below.

4.5.1 Equator Principles and IFC Performance Standards

The Equator Principles (EP) apply to all new project financings with total capital costs of USD10 million or more across all industry sectors globally. The EPs represent a framework for project financing, which is underpinned by the revised IFC Performance Standards (PS).

The extent to which the EPs apply to a project depends on whether the country in which the project is located is “Designated” or “Non-Designated”. Projects within Non-Designated countries such as Uzbekistan are required to follow the standards and guidelines as set out in the IFC PSs and Environmental Health and Safety Guidelines.

The IFC PS are detailed below:

- IFC PS1 – Assessment and Management of Environmental and Social Risks and Impacts.
- IFC PS2 – Labour and working conditions.
- IFC PS3 – Resource Efficiency and Pollution Prevention.
- IFC PS4 – Community Health, Safety, and Security.
- IFC PS5 – Land acquisition and involuntary resettlement.
- IFC PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- IFC PS7 – Indigenous peoples.
- IFC PS8 – Cultural heritage.

PS 1 establishes the importance of assessment to identify the environmental and social impacts associated with development, effective community engagement and project information disclosure and consultation with local project affected communities and environmental and social management measures. This ESIA Study has therefore been carried out to meet the requirements of IFC PS1 as applicable to this stage of assessment.

The remaining IFC PS set out objectives and requirements to avoid and minimize potential environmental and social adverse effects on the environment and to offset/compensate any residual effects. PS 2 to 8 have therefore been considered as part of the assessment process and discussed where relevant within the topic specific sections below. PS7 has been scoped out of the assessment due to the absence of indigenous peoples in this area.

4.5.2 Asian Development Bank Safeguard Policy

The Asian Development Bank (ADB) Safeguard Policy Statement adopted in 2009 is aligned and consistent with the IFC policies, integrating previous ADB policies and Safeguard Requirements on environment, involuntary resettlement and Indigenous Peoples under it.

5. Environmental and Social Assessment Methodology

An assessment of impact of the Solar Park was carried out as part of the ESIA. A number of criteria were used to determine whether or not a potential impact of the Solar Park could be considered 'significant'. These are outlined with reference to specific environmental and social issues in the subsequent topic chapters of this ESIA Report. Wherever possible, a quantitative assessment of the impacts was undertaken. Where this was not possible, a qualitative assessment of impacts was carried out, based on existing information available for the site and the surrounding study area, and professional experience with other solar PV developments.

Where relevant, the anticipated impact was compared against appropriate legal requirements and standards. Where no such standards exist, assessment methods involving interpretation and the application of professional judgement were employed. The assessment of significance in all cases accounted for the impact's deviation from the established baseline conditions and the sensitivity of the environment.

5.1 Baseline

Obtaining accurate and reliable baseline data within the project Area of Influence is an essential component of the ESIA process, to provide a reference point against which potential impacts can be assessed and monitored. The approach to baseline characterisation is illustrated in Figure 5-1.

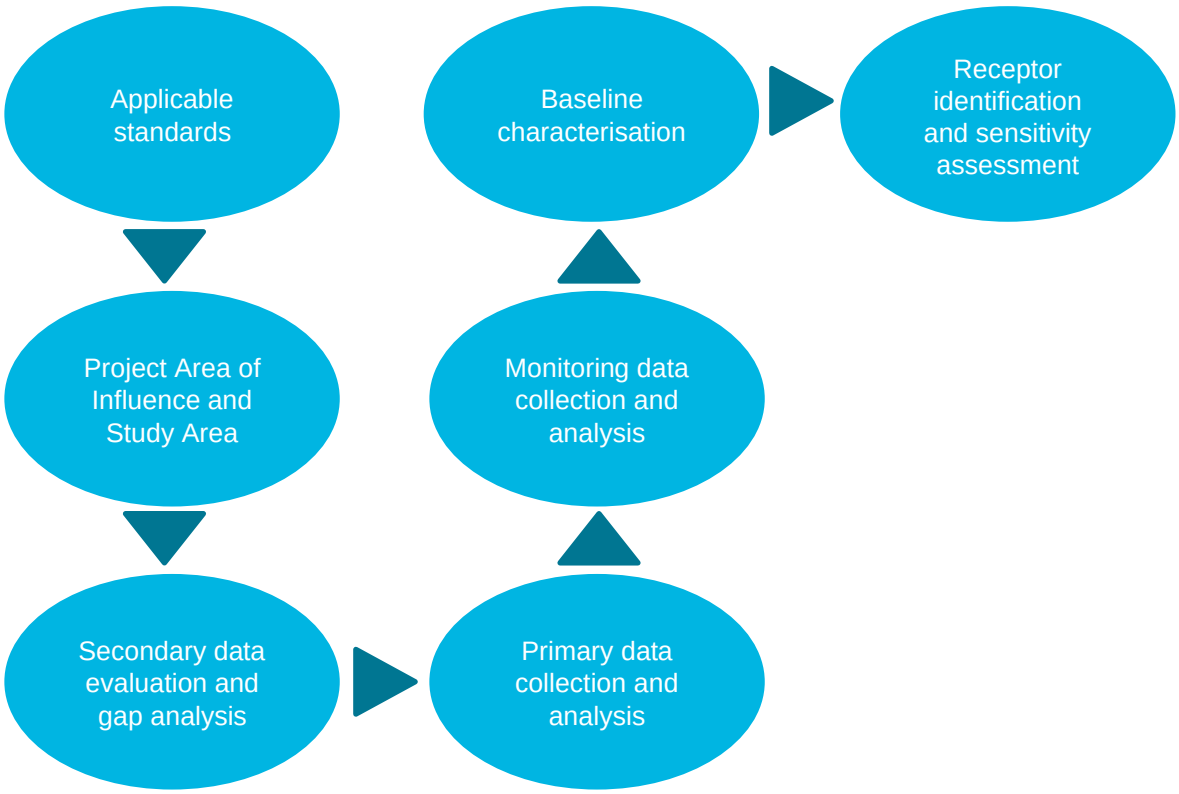

Figure 5-1. Approach to Baseline Characterisation

5.1.1 Project Area of Influence and Study Area

The initial step in the baseline characterisation is the definition of the Project Area of Influence (AoI) and the Study Area.

The AoI (based on the definition in IFC PS1) adopted by the Project is:

- The area likely to be affected by:
  - Project activities and facilities that are directly owned, operated, or managed (including by contractors) by the Developer and that are a component of the Solar Park;
  - Impacts from unplanned but predictable developments caused by the Solar Park that may occur later or at a different location; or

  - Indirect project impacts on biodiversity or on ecosystem services upon which 'Affected Communities'[23] livelihoods are dependent.

- Associated facilities, which are facilities that are not funded as part of the Solar Park and that would not have been expanded if the Project did not exist and without which the Solar Park would not be viable. It is anticipated there will not be any associated facilities for the Solar Park; and,
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the Solar Park, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

Using this definition of the Solar Park components an Area of Influence was prepared using the following criteria:

- Physical footprint of the Solar Park, overhead lines and substation.
- Area where noise effects may be experienced.
- Area local to the Solar Park that may be used as a resting/stopover point for migrating birds. This has been deemed to represent the area bounded by the two collectors to the west and east, the Highway to the south and the Zarafshan River to the north.
- Area within the zone of theoretical visibility of the solar panels.
- Area of 100 m either side of roads and access tracks.
- Area of 100 m either side of overhead lines.

A series of AOI maps were prepared and have been used to identify survey areas, stakeholders and project affected peoples (PAPs) who would be targeted as part of the ESIA process. The AOI was then used to guide the implementation of the ESIA study.

The term PAP is broadly defined as persons affected by land acquisition, relocation, or loss of incomes associated with change in land use due to a project.

5.1.2 Data Collection and Baseline Characterisation

The baseline characterisation of the physical, biological, and social environment is based on secondary (desktop research) data, supplemented by primary (field surveys) data where necessary.

A desktop study was undertaken to collate available baseline data from published sources. The information was evaluated by the technical study teams and data gaps were identified. The desktop study was supplemented by field surveys undertaken in March 2020 at selected locations within the AoI. Field surveys were undertaken for the following ESIA topics: soil and ground conditions, surface water, terrestrial ecology, cultural heritage, traffic, landscape and visual, and social (including meetings with stakeholders).

Geographic Information System (GIS) data have been developed to support baseline characterisation (and impact assessment), incorporating remotely sensed data (satellite imagery and aerial photography), topographical maps, engineering drawings, and Geographical Positioning System (GPS) data linked to information collected in the field (e.g. photographs and field notes).

Primary and secondary baseline data were evaluated by the technical subject matter experts.

5.2 Impact Assessment

One of the key requirements of ESIA is to assess likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term permanent and temporary, positive and negative effects of the development.

Short-term effects are those considered to extend over a short period. In the context of this type of development, short-term relates typically to the construction and decommissioning periods. Effects lasting less than the life of the Solar Park are considered to be medium-term whilst those over or exceeding the life of the Solar Park are considered long term. Reversibility of effect; i.e. whether the

[23] Local communities who are directly impacted by the Project

effects will be reversible either wholly, or in part, in the short to medium term, are also considered where relevant.

The sensitivity of the receptor depends upon the relative importance of existing environmental features on or in the vicinity of the site or the sensitivity of receptors which have the potential to be affected by the Solar Park. The criteria for determining sensitivity or importance are based on existing guidance, legislation, statutory designation and / or professional judgement.

Following the assessment of receptor sensitivity, the potential impact on a receptor and the predicted magnitude of that change or impact was identified (i.e. the scale or degree to which the environment is affected from the existing situation). An example of the framework used to assess sensitivity and magnitude is given in Table 5-1 and Table 5-2 below. However, it should be borne in mind that the criteria used will very much depend on the specific environmental aspect being considered.

Table 5-1 Assessment Criteria –Sensitivity of Receptor

Magnitude of Change / Impact	Criteria
High	Site or species subject to international or national protection.
Medium	Site or species subject to regional or local protection.
Low	Site or species subject to no specific protection measures.
Negligible	Site or habitat already significantly degraded.

Table 5-2 Assessment Criteria – Magnitude of Impact

Magnitude of Change / Impact	Criteria
High	Fundamental change to the specific environmental conditions assessed resulting in temporary (long term) or permanent change.
Medium	Detectable change to the specific environmental conditions assessed resulting in non-fundamental temporary or permanent change.
Low	Detectable but minor change to the specific environmental conditions assessed.
Negligible	No perceptible change to the specific environmental conditions assessed.

The above tables will be used to determine the significance of impact. Significance is a function of the impact magnitude and sensitivity of the receptor. It is proposed to use the following matrix to determine sensitivity. It is noted that impact magnitude and receptor sensitivity will be defined qualitatively or quantitatively, depending on the methodology and nuances of the individual technical assessment topics. The methodology for determining magnitude and sensitivity will be clearly defined in the respective technical chapter.

Table 5-3 Assessment Criteria – Significance of Impact

Magnitude of Change / Impact	High	Medium	Low	Negligible
High	High	High	Moderate	Low
Medium	High	Medium	Low	Low
Low	Medium	Low	Low	Negligible
Negligible	Low	Low	Negligible	Negligible

5.2.1 Assessment of Cumulative Impacts

Cumulative impacts are an important issue to be considered for the Solar Park. Cumulative impacts are those effects that may result from the combination of past, present or future actions of existing or planned activities. While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative impact that is significant.

Good practice requires that, at a minimum, project sponsors assess during the ESIA process whether their development may contribute to cumulative impacts and/or may be at risk from cumulative effects on valued environmental and social components they depend on. This will be done through a rapid cumulative impact assessment during the ESIA process and will follow of Environmental Management and Assessment (IEMA) EIA guidance, the Guidelines for the Assessment of Cumulative Impacts prepared for the European Commission and guidelines under IFC PS1[24].

The rapid cumulative impact assessment involves a combination of desk-based research and engagement with stakeholders. The identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/ or concerns of affected communities.

5.2.2 Mitigation Design

When developing a project, and in particular when it comes to recommending mitigation which would involve changes to the project design – either physically or operationally – it is important to ensure that both the environmental and technical teams work closely together to develop solutions that will work in practise.

AECOM ensured the ESIA process effectively interacts with other pre-application project activities, to generate an improved development proposal, and better environmental outcomes that otherwise would not have been achieved.[25] When considering the level of mitigation required the objective is to reduce the impact to a level which is deemed not significant.

If there are specific project parameters that must be adhered to then these have been defined by the Client so that mitigation is developed in line with an achievable project concept. Nevertheless, if there are opportunities to implement more robust mitigation measures which would to deliver a better environmental outcome without impacting the viability of the project then these have been identified.

All mitigation measures will be guided by the mitigation hierarchy (Figure 5-2); a systematic approach to addressing environmental impact and its potential compensation. However, it should be noted that the ESIA Report contains an initial assessment of impacts based on the limited amount of data currently available. This assessment will be expanded upon as part of the ongoing ESIA process. Nevertheless, the key principles are:

- Identify the impact
- Avoid the impact
- Minimise the impact through appropriate mitigation measures. Mitigation can be achieved through project design or through on-site operational measures.
- Compensate for the impact by offsetting residual, unavoidable impacts primarily through on- or off-site restoration and improvement works. When implementing offsetting and compensation measures, the minimum objective should be no net loss or reduction in environmental quality.

[24] IFC and ESSA Technologies Ltd (2013). Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets.

[25] Institute of Environmental Management and Assessment (2015). Environmental Impact Assessment Guide to Shaping Quality Development November 2015. http://www.lda-design.co.uk/wp-content/uploads/2015/11/IEMA-Guide-to-Shaping-Quality-Development.pdf

Mitigation can be carried out by:

- *Structural measures*, such as design or location changes, engineering modifications and landscape or site treatment; and
- *Non-structural measures*, such as economic incentives, legal, institutional and policy instruments, provision of community services and training and capacity building.

Structural measures are well established for large scale projects, such as energy generation, dams, roads, and oil and gas exploration and development. However, these will be applied with regard to the nature and severity of environmental impacts; for example, taking account of nearby protected areas, patterns of wildlife mitigation or constraints imposed by natural hazards. Some examples would include changes to track layout, module footprint, method of watercourse crossings or location of access point.

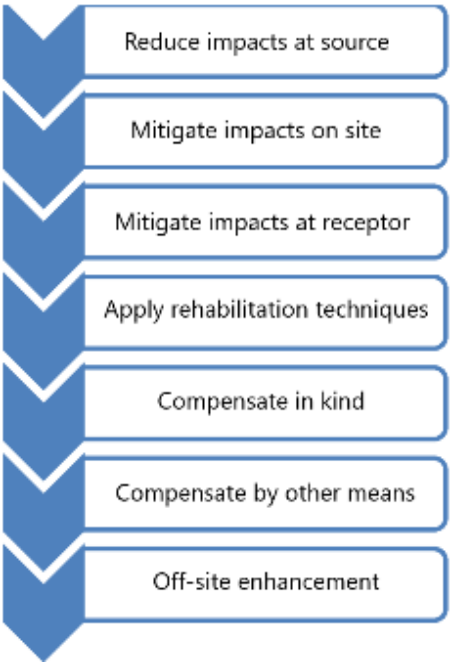

Figure 5-2: Mitigation Hierarchy

Non-structural measures are used increasingly. They can be applied to reinforce or supplement structural measures or to address specific impacts. For example, many types of social, community and health impacts are addressed by non-structural measures and their use is becoming broader. A good example of this would be the requirement to develop a community benefits package

The key steps in the mitigation hierarchy as described below.

Reduce impacts at source (Impact avoidance). This should be applied at an early stage of project planning. It can be achieved by:

- not undertaking certain projects or elements that could result in adverse impacts;
- avoiding areas that are environmentally sensitive; and
- putting in place preventative measures to stop adverse impacts from occurring, for example, installing a free span bridge crossing rather than a pipe culvert to cross a watercourse.

Mitigate (Impact minimisation). This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- Scaling down the proposal i.e. reducing overall installed capacity;
- Redesigning elements of the project; and
- taking supplementary measures to manage the impacts, for example, installing bird diverters on overhead transmission lines.

Rehabilitation. This step is applied to mitigate unavoidable residual adverse impacts. It can be achieved by:

- Rehabilitation of the affected site or environment, for example, by habitat enhancement;
- Restoration of the affected site or environment to its previous state or better.

Impact compensation and off-site enhancement. Both methods involve the principle of ensuring no net-impact *by providing a positive impact of the same magnitude as the negative impact from the project.*

- Provision of replacement land at an alternative location to compensate for loss of farmland (i.e. in-kind);
- Compensation equal to the lost revenue experienced as a result of the project;
- Replacement of the same resource values at another location, for example, by habitat improvement to provide an equivalent area to that lost.

Mitigation and monitoring measures identified within the ESIA process will be carried forward and further developed within the Solar Park's Environmental and Social Management Plan (ESMP) and associated sub-plans.

5.2.3 Assessment of Residual Impacts

Following the identification of mitigation measures to address significant adverse effects, an assessment of the significance of any residual effects (i.e. those remaining after mitigation) will be completed. Where significant residual impacts remain, consideration has been given to offsetting or compensating for residual impacts.

6. Stakeholder Engagement Programme

As part of the ESIA study, AECOM has carried out a stakeholder engagement programme which is documented in more detail in the Stakeholder Engagement Plan.

The programme of engagement activities presented in Table 6-1 was focused on engagement activities Nur Navoi are completing during the EIA and ESIA phases of the planned project. During these activities, stakeholders expressed concerns and asked questions about what happens during and after the construction and operations activities. The programme will be updated following each formal engagement activity undertaken. The aim of these activities was to:

- Build and maintain stakeholder relationships;
- Gather information on the local environmental and social issues;
- Continue to disclose project information (including any access restrictions, employment and procurement opportunities, and community health and safety issues);
- Monitor and evaluate stakeholder engagement;
- Provide stakeholders the opportunity to provide feedback to Nur Navoi; and
- Manage grievances through the Grievance Mechanism.

Brief information on the different communication methods for carrying out stakeholder engagement is presented in the Stakeholder Engagement Plan. This SEP (and the engagement programme) will be updated with the Solar Park moving to the construction stage, as well as upon commencing the operations.

6.1 Previous Stakeholder Engagement Activities: Scoping and ESIA Phases

The first official round of stakeholder engagement activities (from an E&S perspective) took place in Navoi (city) and in Uzumzor on the 5th and 6th of March 2019.

Further stakeholder engagement took place in March 2020 and June 2020 as part of the detailed ESIA studies.

The stakeholders identified and relevant information about the outcomes of the meetings are described below.

Table 6-1: Summary of Stakeholder Engagement to Date

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
6 March 2019	• Farm A Land lessor	Face-to-face meetings (Attempt, Farmer A didn't attend the meeting)	At Farm A	• Inform the relevant stakeholders about the proposed project; • Capture views and concerns of the relevant stakeholders about the project; • Understand the needs of the communities and capture valuable information to make an informed decision.	Did not attend meeting
6 March 2019	• Farm B land user	Face-to-face meetings	At Farm B	• Inform the relevant stakeholders about the proposed project; • Capture views and concerns of the relevant stakeholders about the project; • Understand the needs of the communities and capture valuable information to make an informed decision.	Farm B are content with the development, but they are concerned about the lack of response to obtain alternative land from the Administration.
6-7 March 2019	• Deputy Khokim of Navoi region • Chief of the Main Department • Chief specialist of the Investments department of Navoi region • Deputy Khokim of Karmana district on investment, innovation, support of privatized enterprises, free economic and small industrial zones as well the development of tourism • Head of District Irrigation Department • Chief Engineer, Cadastral officials of Karmana district	Common meeting at the Provincial Administration Offices	Navoi City	• Identify and prioritize key stakeholder groups; • Inform the relevant stakeholders about the proposed project; • Capture views and concerns of the relevant stakeholders about the project; • Understand the needs of the communities and capture valuable information to make an informed decision; • Enhance ownership of the Project within the host communities; • Provide a basis for stakeholder participation in impact identification and mitigation; • Provide a basis for managing and responding grievances from the local communities and other stakeholders, and	Generally satisfied with the project. Observations made in terms of: • Nature of the canal adjacent to the site (irrigation) and permits to obtain water. • General status of the proposed land, previous and current contracts (right of use).

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
				• Provide a strategy and timetable for sharing information and consulting with each of these groups.	
6-7 March 2019	• Chairman of the mahalla committee Malik (Uzumzor is part of the Mahalla Malik)	Meeting at the Local Administration Offices	Uzumzor	• Understand the EIA regulatory framework; • Explain the Project and its expected effects; • Get the views and opinions on potential Project impacts; • Gather existing baseline information on the environmental aspects.	Satisfied with the fact the that project will be developed in the local council she rules. She mentioned that there is a community (named Residential Area in the Project Location section), that apparently is not within her jurisdiction, with a high unemployment rate.
6-7 March 2019	• Specialist from the Women's Committee	Meeting at the Provincial Administration Offices	Uzumzor	• Capture views and concerns of the relevant stakeholders about the project.	They have a programme to integrate women, including but not limited to vulnerable categories (e.g. ex-convicts, domestic violence, etc.), in the job market. They offered support to the future concessionaire to help recruit women for the project.
12 April 2019	• Cadastral officials of Karmana district	Navoi Khokimiyat	Navoi	• Confirm that there were no grievances, open claims or court cases, filed by the project area land occupiers/users with the government.	No issues identified
PRELIMINARY ESIA PHASE					
2 March 2020	• Kamoliddin Khasanov. Deputy Khokim of Navoi Region on Investments	Face-to-face meetings	Navoi Khokimiyat	• Mission tasks, stakeholders meeting list •	• Overview of the region economic indicators
2 March 2020	• Elbek Gafforov. Deputy Head of Investment Department n of Navoi Region Khokimiyat	Face-to-face meetings	Navoi Khokimiyat	• Mission tasks, stakeholders meeting list	• Provided general support to the ESIA team.
2 March 2020	• Hurshid Karamatov. Investment and Foreign Trade Department of Navoi Region Khokimiyat	Face-to-face meetings	Navoi Khokimiyat	• Mission tasks, stakeholders meeting list	• Provided general support to the ESIA team.
2 March 2020	• Mumin Ikromov. Head of Navoi region Melioration Department	Face-to-face meetings	Navoi Khokimiyat	• Specialists required for the meeting	• Provided general support to the ESIA team.
3 March 2020	• Abbos Ibragimov. Lead Specialist of Navoi Region Irrigation Department	Face-to-face meetings	Navoi Khokimiyat	• Specialists required for the meeting	• Information provided on irrigation canals, water abstraction permits and issues.

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
3-7 March 2020	• Sherzod Jumaev. Deputy Khokim of Karmana District	Face-to-face meetings	Navoi and Karmana Khokimiyat	• Arranging the meetings and support with any information required.	• Provided general support to the ESIA team.
4 March 2020	• Farm B land user	Face-to-face meetings	At Farm B	• Inform the relevant stakeholders about the proposed project status; • Capture views and concerns about the project.	• As per previous meeting Farm B are content with the development, but they are concerned about the lack of response to obtain alternative land from the Administration.
4 March 2020	• Participants: consultants (Yusupova Saida, Sharipova Elmira), representative of the Karmana khokimiat, teachers of school No. 26, representatives of the makhalla committee, elders and residents of the makhalla Malik (Kurgan Gulshan) and a doctor from the rural medical center of the mahalla Malik.	Meeting at the local school 26	Malik	**The purpose of the meeting** is to present the project; answer to questions of the residents in connection with a new project in the mahalla. The following issues were discussed: • Construction of a solar power plant (SPP). • SPP is planned to be built on the territory of Uzumzor village, a part of the makhalla Malik. • Brief information about the company • Company projects in other countries • Area of the SPP • Technology to be deployed at the plant (solar panels) • Impact on the residents •	Questions and answers session: - What will be the environmental impact of the project? - How many jobs will be created? - What kind of specialists will be needed? - What technology will be used when installing solar panels? - Have such projects been implemented in Uzbekistan? - Are there any similar projects in neighboring countries? - Who is the customer of the project? - Will there be a change in electricity tariffs for the population? - Where will the equipment come from? - How many kilometers from the SPP to the village? - Who is the developer of the SPP project? - Will provide services to repair solar panels installed by the population (for private use)? - Drinking water coming through Damhodzha waterpipe in the summer has a weak watercourse. Gulshan barrow is located above the level of the water conduit and resedents pump water. Such situation exists only in this section of the Mahalla. Other sections are below the water level. Residents are afraid that if the SPP uses water, they will receive less water for their own needs. - Farmers use water for irrigation from the Ami-Bukhoro canal and from two collectors. This summer, water was significantly reduced. Will there be enough water for irrigation and for the needs of the SES?

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
					- Why this construction is prioritised? Law on Renewable Energy Lawa and the need for additional electricity capacity. - When will construction begin and when will the SPP start operations?
4 March 2020	• Present: Yusupova Saida, Sharipova Elmira, representative of the Karmana khokimiyat, teachers of school No. 23, representatives of the makhalla committee, residents of the mahalla Malik, Uzumzor village	Meeting at the local school 23	Uzumzor	• The purpose of the meeting is to present the project; answer to questions of the residents in connection with a new project in the mahalla.	Questions & answers and suggestions received: - For what needs the electricity generated by SPP to be used? - Who is the developer of the project? - What will be the impact on the environment? - During the work of the SPP, will there any radiation and what impact can it have on children? - Will jobs be created? - How can we get information about possible vacancies and employment opportunities for local residents in the SPP project? - Residents would like to receive information about vacancies at the SPP through the mahalla committee and the employment center. - Is it possible to organize additional training for local specialists for employment in the SPP project? - Will there be an increase in taxes and payments in connection with the construction of the SES? - Where will the SES be located? - Will there be an impact on plants and wildlife? - Project cost? - The approximate cost of the project is $ 100 million per 100 MW. - Is it possible to get sponsorship from project owners for educational purposes, educational programs, trainings for school students on the topic of solar

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
					energy, and assistance in obtaining better Internet for educational purposes? - To work at the SES, what education do you need to receive and in which educational institution?
4 March 2020	• Xamraeva Inobat. Chair of Malik Mahalla, Kaldirgoch village	Face to face meeting	Malik Mahalla, Kaldirgoch village	• Informing about the project • Interviewing and collecting social baseline data	• Provided general socio-economic discussion of issues affecting the project area and locality.
4 March 2020	• Nilufar Gafforova. Chief specialist on women and gender issues, Malik Mahalla	Face to face meeting	Malik Mahalla, Kaldirgoch village	• Informing about the project • Interviewing and collecting social baseline data on gender and women issues	• Provided social baseline data on gender and women issues
5 March 2020	• Gulnoza Shermatova. First Deputy, Department for support of marhalla and families, Karmana Khokimiyat	Face to face meeting	Karmana Khikimiyat	• Informing about the project • Interviewing and collecting social baseline data on gender and women issues	• Provided social baseline data on gender and women issues
5 March 2020	• Khusnitdin Shovkiev. Research specialist on tourism and archaeology, Karmana museum	Meeting on site.	On site	• Join visit to the project site and collecting data on archaeological sites	• Provided specialist support on site.
5 March 2020	• Nuriddin Hamraev. Specialist of Karmana District Kadastr Department	Face to face meeting	Karmana Khokimiyat	• Information on the land lease process.	• Legal status of the land of the project • Land allocation procedures for farmers A and B;
5 March 2020	• Muzafar Sharipov. Head of investment department of Karmana Khokimiyat	Face to face meeting	Karmana Khokimiyat	• Discuss the Project details, make preliminary agreements and arrangements that need to be in place as part of the Project design documentation development process/getting various approvals	• Additional information on landowners and land allocation procedures
5-6 March 2020	• Akbar Asloitov. • Lead Specialist on biodiversity of Navoi Region Environment Committee	Meeting on site.	On site	• Data collection on flora and fauna of the project area	• Provided specialist support on site.
6 March 2020	• Specialists of the Emirate Centre for the Conservation of the Houbara in Navoi	Face to face meeting	Emirate Centre for the Conservation of the Houbara	• Observation of avifauna data	• Provided overview of Houbara bustard conservation work, range and confirmed site is unlikely to support any breeding pairs.
6 March 2020	• Otabek Zaripov. Head of water department of Karmana District	Face to face meeting	Karmana Water Department	• Information about water pipe on the project area;	Documents and maps of the pipe provided.

Date	Stakeholders	Stakeholder Engagement Methods	Location	Purpose	Summary Feedback
6 March 2020	• Rustan Matsuev. Chief Engineer, water department of Karmana District	Face to face meeting	Karmana Water Department	• Information about water pipe on the project area;	Documents and maps of the pipe provided.
24 June 2020	• Zokir Khusinov, farm shepherd, He is the son of Farmer B (Mehrigiyo farm).	Face to face meeting	On site	• Inform the relevant stakeholders about the proposed project status; • Capture views and concerns about the project.	Not particularly happy with the construction of the facility because he and his family were deprived of land. They had 280 hectares of desert land as pasture. Despite the early start of the project, they have not yet been shown alternative land in return.
24 June 2020	• Farmer A, the lessor of the farm	Face to face meeting	On site	• Inform the relevant stakeholders about the proposed project status; • Capture views and concerns about the project.	The farm area is 230 hectares of which 158 hectares was taken back to the state land fund for the project. He informed that he didn't sign consent form yet. He is not currently using his land.
24 June 2020	• Meeting with 8 residents of Uzumzor (600 residents, about 2.5 km to the east). A family of elderly people living in the village was interviewed separately.	Community hall	Uzumzor	• Inform the relevant stakeholders about the proposed project status;	The residents of Uzumzor repeated that unemployment is the main problem. They want an employer organization in their settlement. They complain about the lack of street lighting, the lack of pavement on the inner streets, and public transport and on the shortage of irrigation water. Respondents were interested in sharing phone numbers for future possible employment and participants were recommending their relatives as candidates for a job in the future Solar Park. This indicates that there are certain expectations regarding the Project.
25 June 2020	• Meeting with residents of Farhod (100 residents, about 2.2 km to the south) • The meeting organized by the local community was attended by 15 women. A local farmer was interviewed separately	Community ha	Farhod	• Capture views and concerns about the project.	Residents of Farkhod also mentioned unemployment as one of the main problems. Just like in Uzumzor, Farhod has similar difficulties: there is no street lighting, poor or no road surface, no public transport, no preschool, no irrigation water for vegetable gardens. Respondents were interested in sharing phone numbers for future possible employment and participants were recommending their relatives as candidates for a job in the future Solar Park. This indicates that there are certain expectations regarding the Project.

Figure 6-1: Meeting at School 26

Figure 6-2: Meeting at School 26 (2)

Figure 6-3: Meeting at School 23

6.2 Continuing Stakeholder Engagement Activities

The future planned engagement methods are divided into the following categories:

- Notification methods: Used to inform the identified stakeholders and the general population of the SEP activities and the project development process;
- Disclosure and consultation methods: Used to provide information to stakeholders or to engage in a two-way dialogue by which information is shared with the stakeholders and these in turn can express their views and concerns about the project; and
- External grievance mechanism: System to receive and facilitate resolution of the stakeholder's concerns and grievances about project-related issues.

The proposed timeline for the stakeholder engagement during the pre-construction phase and beyond is described in the SEP. The SEP developed with the ESIA will be updated annually to account for ongoing engagement during construction and operational phases.

Table 6-2: Stakeholder Engagement Programme

Stakeholder Category	Stakeholder Engagement Methods	Location/ Timeline	Purpose	Consultation Disclosure Materials	Mean of Advance Notification
EIA /ESIA DISCLOSURE PHASE					
All stakeholder groups	• Disclosure online • Placement of paper versions in public places • Leaflets in public places • Media announcements	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Disclose and discuss the results of the ESHIA study online	NTS of the ESIA online	Media announcements Website announcements
Regional Government Agencies	• One-to-one meeting	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Discuss/coordinate the public hearing event on the local EIA results	Local EIA package	Personal interaction
Local libraries	• One-to-one meetings • Phone calls • Placement of paper versions • Placement of leaflets	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Arrange disclosure of the local EIA package	Local EIA package	Personal interaction
All stakeholder groups	• Public hearing event • Placement of leaflets in public places • Media announcements	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Comply with the RUz EIA regulatory requirements • Disclose and discuss the results of the EIA study	Local EIA package NTS of the ESIA online	Media announcements
CONSTRUCTION PHASE					
All stakeholder groups	• Disclosure online • Placement of paper versions in public places • Leaflets in public places • Media announcements	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Disclose and discuss the construction status and any major events due to take place (component delivery for example).	Notices	Media announcements Website announcements. Notice posted in public locations.
Regional Government Agencies	• One-to-one meeting	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Disclose and discuss the construction status and any major events due to take place (component delivery for example).	Local EIA package	Personal interaction
Local libraries	• One-to-one meetings • Phone calls • Placement of paper versions • Placement of leaflets	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Disclose and discuss the construction status and any major events due to take place (component delivery for example).	Local EIA package	Personal interaction Notice posted in public locations
All stakeholder groups	• Public event • Placement of leaflets in public places • Media announcements	Location/Date: [TBC and will be decided on relaxation of Covid-19 restrictions]	• Disclose and discuss the construction status and any major events due to take place (component delivery for example).	Local EIA package NTS of the ESIA online	Media announcements Notice posted in public locations

7. Environmental and Social Baseline

7.1 Overview

Specific local conditions have been described from a combination of desk-based review and site survey. The preliminary site reconnaissance was carried out by the TYPSA E&S Scoping team on the 30 October 2018 followed up by detailed ground investigations in January 2019. A further E&S visit took place in March 2019.

Further primary baseline data was collected by the AECOM ESIA team during March 2020 as part of a Preliminary ESIA studies and these were used to fill any knowledge gaps for the baseline section of the ESIA report. A final site visit took place in June 2020 for the detailed ESIA study.

7.2 Field Reconnaissance

The initial reconnaissance exercise was undertaken in October 2018 and involved a walkover of the Solar Park site, as well as the area immediately surrounding the Site. Further site walkovers and intrusive investigations were carried out during January 2019, March 2019, March 2020 and June 2020 visits to the Project area.

Table 7-1: Record of Field Reconnaissance

Date	Description and purpose
30 October 2018	The first reconnaissance was undertaken on October 30th, 2018 by a team of three consultants, two consultants from TYPSA and one consultant from the local E&S subcontractor.
9-26 January 2019	Ground investigations were carried out from January 9 to 26 by ELLIPS, and a geotechnical expert from TYPSA was on site supervising the ground investigations, including the procedures and the collection of samples. A chemical analysis of the water quality of adjacent drainage canals was performed.
5-6 March 2019	The other two trips were done on March 5th and 6th 2019 by one consultant from TYPSA, one consultant from 5 Capitals and one consultant from the local E&S subcontractor. The information provided in the baseline section is based on satellite imagery, information provided by an Uzbekistani environmental consultancy, information captured during a site visit undertaken by the 5 Capitals' team on the 5th and 6th of March 2019, and information provided by administrative, interest and affected based stakeholders during consultation meetings. The first official round of stakeholder engagement activities (from an E&S perspective) took place in Navoi (city) and in Uzumzor on the 5th and 6th of March 2019.
3-6 March 2020	Ecology, social, archaeological site surveys carried out by AECOM with one specialist from Green Business Innovation and an ecologist from Navoi. Social surveys took place at Uzumzor and stakeholder meetings were held in Navoi and Uzumzor.
20-26 June 2020	Ecology and social site surveys carried out by Green Business Innovation and an ecologist from Navoi. Social surveys took place at Uzumzor and further stakeholder meetings were held in Navoi and Uzumzor.

7.3 Covid-19 Restrictions

It should be borne in mind that Covid-19 restrictions which came into place late March 2020 had a significant impact on the ability to hold stakeholder meeting and to travel to site for specialist surveys. In particular, restrictions prevented face to face household interviews and more in depth FGDs. As a result, the second site visit in August included only the local team and not specialists from the UK.

7.4 Physical characteristics

7.4.1 Climate and Meteorology

The average annual precipitation for 2010-2017, according to weather stations[26] varies from 74.0 mm to 284.2 mm per year. The annual amount of precipitation for several years (2010-2017) within the

[26] Data from nearest weather station: Samarkand, Uzbekistan (146.0 KM).

irrigated area varies from 97.0 mm to 284.2 mm. Most of the precipitation (70-90%) occurs in the winter and spring. In summer rainfall is rarely observed. Average annual air temperature in the area of Navoi city equals to 15.87 ℃. The coldest month is January (average temperature is 2.77℃), the hottest one is July (average temperature is 28.78 ℃). Absolute minimal air temperatures in a cold period of a year reach – 17.4℃. Absolute maximum value is observed during the period of time from May to August and is more than 40℃ (43.8 ℃ in 2007).

The monthly weather averages are shown in more detail in the figures below.

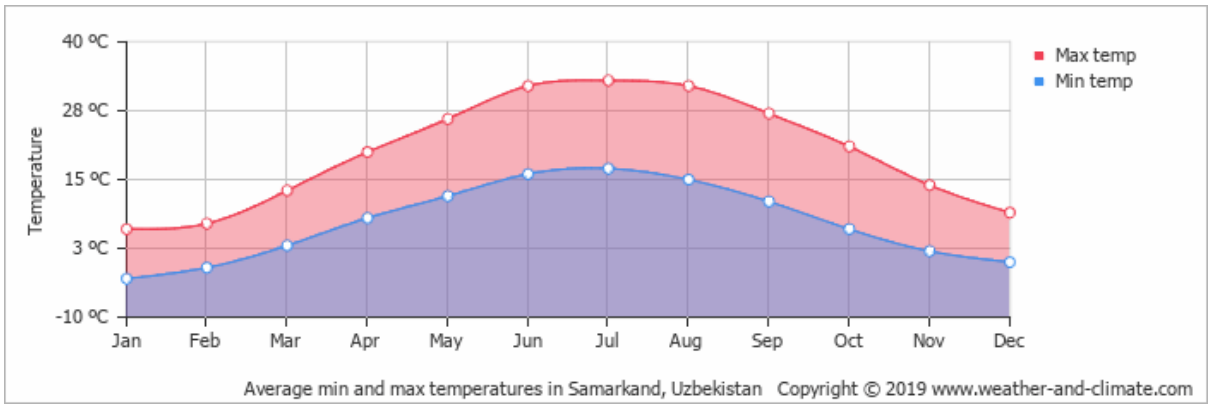

Figure 7-1: Average minimum and maximum temperature over the year

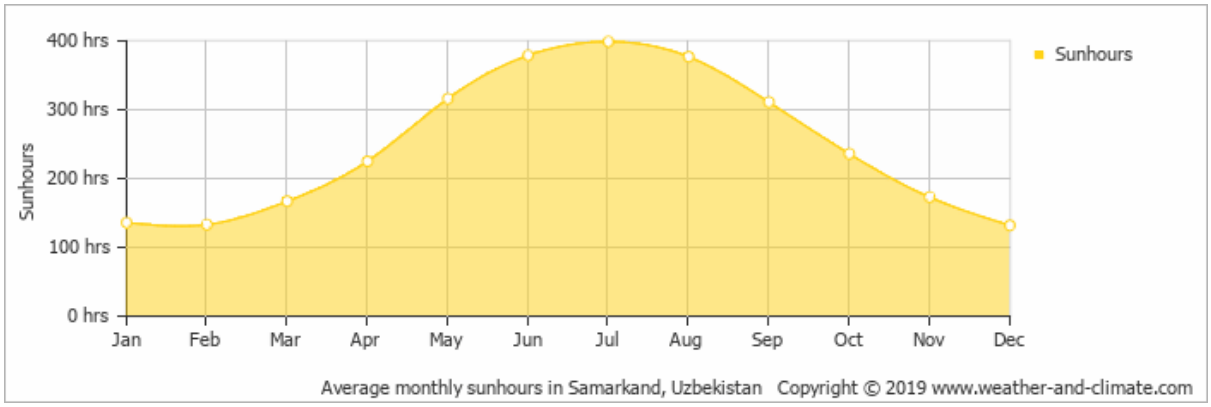

Figure 7-2: Average monthly hours of sunshine over the year

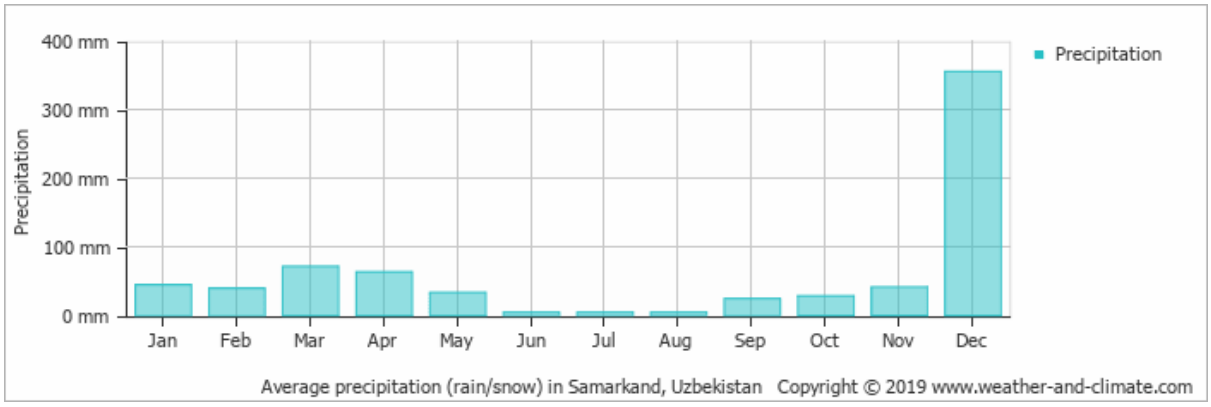

Figure 7-3: Average monthly precipitation over the year (rainfall, snow)

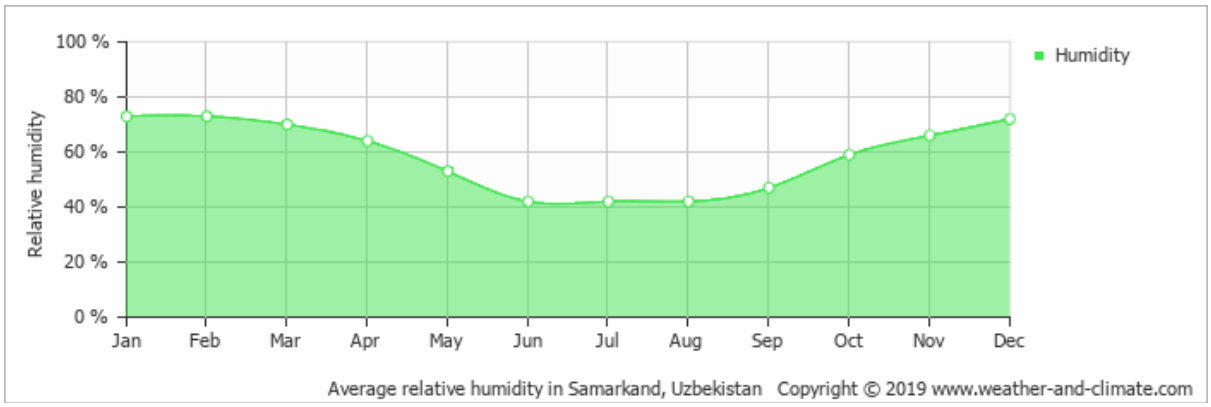

Figure 7-4: Average humidity over the year

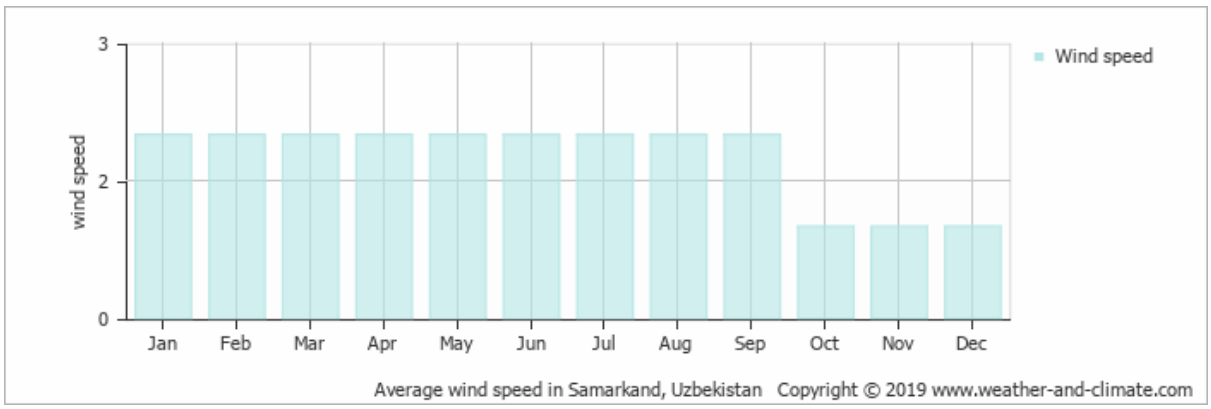

Figure 7-5: Average wind speed over the year

7.4.2 Geology and Soils

7.4.2.1 Overview

A study of the geology encountered in the region has been carried out based on desktop research and the site survey carried out during the initial geotechnical survey on site. This study was carried out and reported by TPYSA and has been summarised within this chapter.[27]

7.4.2.2 Ground investigations

Ground investigations were carried out from January 9 to 26, 2019 by ELLIPS, and a geotechnical specialist from TYPSA was on site supervising the ground investigations, including the procedures and the collection of samples. Site investigations included the following:

- Surface geological survey (1)
- Trial pits (23)
- Dynamic penetration tests (22)
- Boreholes (1)
- Vertical electric soundings (1)

22 trial pits were excavated by means of a drilling machine with a 45cm diameter helical auger. Pits were excavated to a depth of 3 meters, except when problems arose during excavation, due to excessive hardness of soil which occurred on three occasions, P-4, P-15 and P-21, where the final depth was limited to 2.5, 2.7 and 2.5 meters respectively.

In addition, one trial pit was manually excavated to a depth of 1.6 meters, with the aim of obtaining undisturbed soil samples.

[27] TYPSA, 2019. Geotechnical Report. Project SP5331. Code SP5331-Geotechnical-00-D02.docx

Dynamic penetration tests were carried out until rejection occurred, which was encountered at depths of between 1.9 and 3.7 meters, although in the majority of cases it took place between a depth of 2 and 3 meters.

The borehole was of a continuous core recovery type and extended to a depth of 8.8 meters. Due to drilling difficulties, two boreholes were started. The first of stopped at a depth of 3.3 meters, and the second one, located at a distance of 3 meters from the first, extended to a depth of 8.8 meters from the surface. 7 SPT tests were carried out in the borehole.

Disturbed samples were obtained from the extracted soil in borehole and trial pits. 40 samples were numbered in pits and three in the borehole. Furthermore, one undisturbed sample was obtained in the manual pit MP-1. Additionally, two water samples were collected from the adjacent channels, east and west of the plot, for chemical analysis.

Vertical electric soundings had a maximum AB/2 extension of 65 meters, and it is understood that a depth of between 20-25 meters has been explored.

All these research points were scattered around the plot following a regular pattern, aimed at covering the whole project area involved. The borehole and two additional pits/dynamic penetration tests couples were located on the east end, where placement of the control building and main electric facilities was considered to be most likely.

Based on the results of the on-site research, a laboratory test program was carried out. Some identification, strength, compaction and chemical tests were carried out on the samples extracted on site.

7.4.2.3 Local Geology

From a geological point of view the solar plant area is located on an extensive and plain surface, as a part of the fluvial terrace of the Zarafshan river, about 20 to 25 meters above the flood plain of the river.

The Quaternary sedimentary bodies were deposited predominantly by river systems and intermittent streams during uplift of the Tien Shan ridges at the central and eastern area of Uzbekistan. Four sedimentary sequences record four episodes of mountain uplift. Each sequence started with conglomeratic layers and ended with sandstone and shale. These deposits left river terraces on four levels which are well preserved in mountainous regions.

In this area, the terrace is mainly made up of sandy gravel to the surveyed depth (8.8 meters on the PV plant site), though a superficial sandy silt layer has been detected on the surface.

This gravelly body mainly occupies a huge area south of the Zarafshan river and has been identified and described on the cuts over the alluvial plain of the river (C-4 soil cut – see Annex 3 of TYPSA report), in the actual PV plant plot (at a distance of about 4.5 km from the river) and to the south, beyond the area being studied.

The gravel is made up of rounded quartzite pebbles less than 10cm in diameter, immersed in a silty sandy matrix and interbedded with sand layers. Gravel is prevailing in observed points, though sandy layers may be present in some places.

This gravel body is deeply embedded in gypsum near the surface, though salinization seems to lessen as the depth increases. Most of surveyed points are no more than 2 or 3 meters deep and they all are deeply primed by gypsum (see C-4 and C-5 cuts in Annex 3 of TYPSA report), though in pits and borehole carried out on site (where gravel is below the superficial sandy silt layer) the presence of gypsum is relatively low, and seems to decrease as the depth increases.

This gravelly body is part of the old deposits of the Zarafshan river, that are now above the river elevation due to the subsequent fluvial erosion.

Over this sandy gravelly body, a superficial sandy silt body exists. It is mostly made up of sandy silts that occasionally become silty sand, occasionally with a proportion of gravel. Its thickness is very low, about 2 meters, and it covers the entire PV plot.

Although the occasional presence of pebbles suggests the fluvial origin of the soil, the extreme abundance of the particle size 0.1 - 0.05mm (fine sand - silt, see chapter 5) suggests aeolian or a mixture of fluvial-aeolian origin.

Furthermore, intense gypsum cementation (whether amorphous or crystalline) widely affects this superficial sandy silt layer. Some gypsum is dispersed into the soil filling the interstices while some others fill the existing fissures, giving rise to vertical aligned gypsum bodies several centimetres thick, associated with geological structural directions.

The intense salty enrichment seems to have happened after soil sedimentation, and it is likely that contamination of sandy silty layer may also come (at least partially) from aerial contamination; this phenomenon is currently ongoing. From a practical point of view, the high salt enrichment makes the area unsuitable for arable farming.

It should be noted that the superficial sandy silt layer does not always sit directly on the gravel bodies but sometimes sand layers are located in between. Given the lower content of gypsum and the higher compactness of this sand layer, it is thought that they are in fact horizontal transitions from gravel bodies, linked in some way to fluvial dynamics (such as gravel bodies) more than to the fluvial-aeolian presumed origin of the superficial sandy silt layer. The TYPSA study confirms that the first superficial layer consists of topsoil of depth between 10-30 cm.

The sand layer sometimes identified between the defined sandy silt body and the sandy-gravel body, is not represented in sections as it was not possible to define this appropriately, and therefore it will be somewhere over the sandy silt and gravel contact.

In the valley of the Zarafshan River, the groundwater is confined to alluvial-proluvial gravel formation with an aquifer thickness of up to 50m. Nevertheless, no groundwater was identified in surveys carried out to a depth of 8.8 meters. It can therefore be concluded that no groundwater would be encountered during construction works which would take place to around 3 m depth.

7.4.2.4 Seismicity

For the purposes of seismic resistant design, Uzbekistan has issued the code KMK 2.01.03-96 “Norms and Regulations for Construction in Seismic Zones” and KMK 2.07.01-94 “Town planning, lay-out and building of urban and village settlements “

According to the seismic code, the project site is located between zones 7 and 8. The intensity and return period of earthquakes with probable intensity above VII are provided in this design code, where Navoi has an intensity of VII with 100 years of return period.

In the context of the Global Seismic Hazard Assessment Project (GSHAP), a seismic hazard distribution map of Uzbekistan was extracted from the global seismic risk data. The resulting map contains the global distribution of the Peak Ground Acceleration (PGA), expressed in m/s2, with a 10% chance of exceedance (90% chance of non-exceedance) for an exposure time of 50 years and a corresponding return period of 475 years.

The project site is located between medium seismic hazard (PGA=0.8 - 2.4 m/s2) and high seismic hazard (PGA=2.4 - 4.0 m/s2) and 475 years of return period.

7.4.3 Hydrology and hydrogeology

7.4.3.1 Regional

The water bodies in close proximity to the proposed project site are:

- Zarafshan River – ~5km N of the proposed site
- Skurkulshoe Reservoir – ~25km N of the proposed site
- Navoi Canal – ~9km SE of the proposed site.

The Zarafshan is the third largest river of Uzbekistan. It originates at 2,750 m a.s.l. and is glacier fed. The total river basin covers an area of 4,000 km^2 and the river length is 781 km. The other water bodies are manmade canals or reservoir.

Figure 7-6: Zarafshan River north of the Project site

Figure 7-7: Zarafshan River north of the Project site (2)

On entering Uzbekistan from Tajikistan, the annual river discharge is 5.3 km^3. Further downstream the discharge increases only to 5.5. km^3. Tajikistan at present utilizes only 0.3 km^3, i.e. 8% of the discharge. The rest of the water is used in Uzbekistan.

The river has a number of dams and barrages: Pervomai, Akdarin, Damkhodzhin, Narpai, Karmarin, Shafrikan, Kharkhur, Babkent, and many large and medium canals for irrigation and water supply. In the middle Zarafshan are situated the reservoirs Tudakul (22,000 ha), Kuyumazar (1,600 ha), and Shurkul (1,600 ha). There are also several reservoirs which contain highly saline water. Four lakes receive drainage water through collector canals: Dengizkul (25 000 ha), Karakyr (12 000 ha), Tuzgan (5,700 ha), and Shurgak (1,600 ha). In the Samarkand and Navoi regions the river water is used for irrigating 530,000 ha of land, mainly for agricultural products serving the immediate needs of the fast-growing country population. In the past the river disappeared 20 km short of connecting with the Amu-Darya.

7.4.3.2 Local

Two man-made canals form the eastern and western boundary of the site. Based on information gathered during consultation, the canals are for drainage purposes only (i.e. they collect water from upstream agricultural fields at the south), there are no other additions (e.g. treated or untreated industrial, domestic or other streams) and there are no downstream users of the canal.

The water quality in the river has deteriorated in recent years due to the impact of the return water from irrigation and waste waters from towns, such as Samarkand, Kattakurgan and Navoi. Water salinity in the river increases from 0.27 g/l at its source to 2.4 g/l at its mouth. The highest pollution level is downstream of the towns Kattakurgan and Navoi, and the maximum allowable levels of oil, phenols, copper, and pesticides are usually considerably exceeded. The river water is classified as having a medium level of pollution.

No groundwater was found in the surveys carried out. As shown in the Hydrogeological map of Uzbekistan (scale 1:500.000) edited in 1998, the groundwater level is located at about 290m ASL; with the plot altitude between 310 and 320 m ASL, it is concluded that the water table is located more than 20 metres below the plot surface. The Khokimyiat suggested that groundwater is present at a depth of 80m below ground level but that the groundwater is non potable and would require some form of treatment prior to use.

A full hydrologic and hydraulic study[28] was carried out by TYPSA and according to the available data there is no flooding risk in the site of the project related to extreme flows of the Zarafshan River. This conclusion is consistent with the geographical information (distance and elevation difference between the project site and the river). As no ground or surface water abstraction is proposed, no further hydrological studies will be carried out.

Although there is no risk of flooding related to the increase of flowrates of the natural drainage systems where the site is located, an appropriate drainage network will be developed by the EPC Contractor to properly drain runoff generated inside the site of the project.

7.4.3.3 Water Quality

The water quality in the river has deteriorated under the impact of the return water from irrigation and waste waters from towns, such as Samarkand, Kattakurgan and Navoi. Water salinity in the river increases from 0.27 g/l at its source to 2.4 g/l at its mouth. The highest pollution level is downstream of the towns Kattakurgan and Navoi, and the maximum allowable levels of oil, phenols, copper, and pesticides are usually considerably exceeded. The river water is classified as having a medium level of pollution.

A chemical analysis of the water of adjacent drainage channels was performed in January 2019 and it concluded that surface waters are characterized as brackish water, with high levels of chlorides and sulphates. The table below shows the chemical analysis results.

Table 7-2: Water analysis results (National Standards)

Parameter	Maximum Permissible Concentration	Location A (mg/l)	Location B (mg/l)	Status
HCO_3	-	183	164	N/A
Cl^-	300	420	378	Not compliant
SO_4	100	1793	199	Not compliant
Ca	180	460	590	Not compliant
Mg	40	120	144	Not compliant
Na+K	-	445	314	Not compliant[29]
Na	120	-	-	-
K	50	-	-	-
pH	6.5-8.5	7.6	7.6	Compliant

Based on the test results, the water has a high degree of hardness and corrosivity. The mineralization of tested water exceeds the limits set out in the Uzbek maximum permissible concentrations. Therefore, the water resource is not likely to be of sufficient quality, without further treatment, for use as drinking water and will be corrosive to concrete and piled foundations. As a result, the Solar Park will utilise the public water pipeline crossing the site.

7.4.3.4 Groundwater

No groundwater was found in the surveys carried out. None of the pits or dynamic penetrometers have found free water or wet areas. No groundwater level has been identified in the borehole. As shown in the Hydrogeological map of Uzbekistan (scale 1:500.000) edited in 1998, the groundwater level is

[28] TYPSA (2019). Scaling Solar Uzbekistan: Hydrology and Hydraulic Report. Ref. SP5331-RP-HE-HydrologyReport-00-D02
[29] Note analysis results provided total concentration of Na plus K whilst MPC provides separate limits for Na and K. Given the concentrations recorded either one or both parameters are in exceedance of MPC.

located at about 290m ASL; with the plot altitude between 310 and 320 m ASL, it is concluded that the water table is located more than 20 meters below the plot surface. Furthermore, extensive groundwater pumping is still going on the area, therefore deeper water is now expected. Discussion with the Khokimyiat suggested that groundwater is present at a depth of 80m below ground level. Previous studies suggest that groundwater is non potable and would require some form of treatment prior to use.

7.4.3.5 Flood Risk

A full hydrologic and hydraulic study[30] was carried out by TYPSA and according to the available data there is no flooding risk in the site of the project related to extreme flows of the Zarafshan River. This conclusion is consistent with the geographical information (distance and elevation difference between the project site and the river).

A theoretical Intensity-Duration-Frequency (IDF) curve estimation has been performed in order to analyse flooding risk in the southern basin, where the site of the project is partially included. According to the analysis performed, there is no flood risk in the project site related to extreme rainfall events on the southern drainage basin: Calculated maximum water elevations are below 296 masl and terrain elevation of the site is above 300 masl.

Although there is no risk of flooding related to the increase of flowrates of the natural drainage systems where the site is located, an appropriate drainage network should be considered in order to properly drain runoff generated inside the site of the project.

7.4.4 Utilities

In addition to the water channels, a drinking water pipeline has been identified adjacent to the project Site.[31] AECOM carried out further investigation during March 2020 and identified a pipe crossing at the drainage canal to the west of the site (Figure 7-9). Discussion with the Khokimyiat suggests the pipe is a water pipe constructed around 2015 or 2016. It was also suggested that responsibility for the pipe did not reside with the Navoi Khokimyiat but with Samarkand. An additional survey was completed by AECOM which confirmed the route of the pipe and also confirmed that the official drawings were substantially inaccurate. The water pipeline is operational and has capacity to supply the project during construction and operation. The figure below shows the confirmed pipeline routing in dashed line.

Confirmation was received from NAVOI SUV TA'MINOTI" LLC, Kiziltepa District Branch on 09 October 2020. It was verified that the D-250 mm "Tashrabot-Xozara" water supply pipeline that runs adjacent to the site supplies potable water to 9 villages and delivers water to consumer's special water reservoirs. The capacity of the water supply pipeline is as follows:

Table 7-3: Pipeline capacity

	Summer	Winter
Average monthly supply	40,000m^3	28,000m^3
Average daily supply	1,490m^3	930m^3
Daily supply hours	10 hours	6 hours

NAVOI SUV TA'MINOTI" LLC confirm that, currently as well as in future, for purposes of Nur Navoi Solar's PV plant, "Toshrabot-Xozara" water supply pipeline is capable of supplying (a) 12 m^3 of water per hour to satisfy the operational needs and (b) 120 m^3 of water per day for construction period (12 months), and this water consumption will not result in negative consequences to other users.

To summarise, it was confirmed that the water supply organization has available capacity and infrastructure to supply water during both operation and construction periods in the volumes quoted above.

[30] TYPSA (2019). Scaling Solar Uzbekistan: Hydrology and Hydraulic Report. Ref. SP5331-RP-HE-HydrologyReport-00-D02
[31] Refer to the topographic drawing for the pipe routing

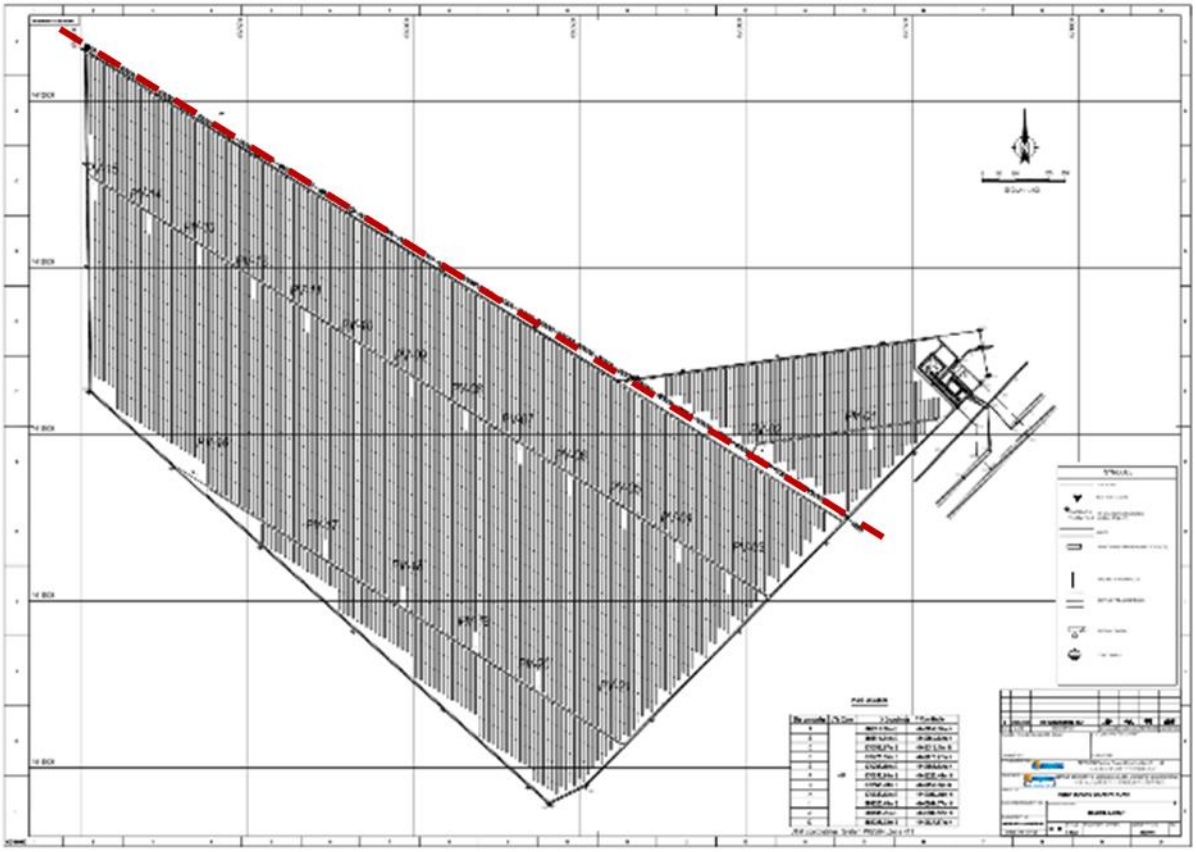

Figure 7-8: Plan showing route of water pipeline in red dotted line (confirmed)

Figure 7-9: Water pipeline crossing (March 2020)

Figure 7-10: Location of Water pipeline crossing (confirmed March 2020)

7.4.5 Air Quality

Current sources of air pollution in the vicinity of the Project site include the burning of fuels in surrounding communities and vehicular traffic along neighbouring roads.

Dust conditions were low (not discernible) at the proposed site on the days of the site visits. The likelihood of dust storms is low as reported by the Environmental Department during the consultation meetings. No stationary emitting sources were identified in the surrounding areas of the proposed site. The closest emitting sources were the vehicles using the M37 road. The operational coal fired power station is 28km to the east of the Project. The main source of air pollution will be dust during construction works and the receptors will be the two farms identified as well as the settlement of Uzumor, 2km to the east.

7.4.6 Noise, Vibration and Light

Current anthropogenic noise in the vicinity of the Project site is related to agricultural and domestic activities, as well as vehicular traffic along the M37 road to the south of the site. Natural noise sources include noise from birds and insects. There were no significant sources of vibration noted during the site visits. The area is also generally not illuminated at night.

For the purposes of assessing the change in baseline noise conditions it is assumed that the substation transformer is the dominant source of noise as the other sources (transformer and invertor stations) are over 200 m from the closest receptor. For the purposes of the assessment the following details have been assumed.

The substation power transformer (oil natural, air natural or ONAN) sound pressure level is 65 dB(A) at 1 m from a L x W x H: 5500 x 3600 x 4900 mm transformer.

The substation transformer is located approximately 1 km from the closest receptor.

The sound pressure level is assumed as without forced cooling as oil natural, air natural or ONAN cooled. Should cooling fans be required (oil natural, air forced or ONAF) the sound pressure level would increase, and a revised assessment will be required.

The assessment is based on the above details and distances to closest receptor. Should the sound pressure level increase, or the detailed design process revise locations or dimensions of infrastructure within the site, a revised assessment would be required.

The relevant calculation is presented below.

Assuming a clean 50 Hz supply, the critical frequency will be in the 125 Hz octave band.

At 75 m distance, the attenuation, according to ISO 9613-2, with worst-case assumptions of temperature and humidity, and assuming hard ground (ground absorption G = 0) at source and receiver and semi-soft (G = 0.5) in between, is 45.5 dB ref 20 µPa/pW.

Assuming the sound power level of the substation power transformer is 65 dB(A), the sound pressure level at 75 m will be 19.5 dB(A).

The (oil natural, air natural or ONAN) sound pressure level is 65 dB(A) at 1 m from a L x W x H: 5500 x 3600 x 4900 mm transformer, then the sound power level, according to IEC 60076-10, is 65 + 10log10((4.9 + 1)*2(5.5 +2 + 3.6 + 2)) = 86.9 dB(A), leading to a sound pressure level at 75 m of 41.4 dB(A).

7.5 Landscape and Visual

7.5.1 Introduction

The establishment of baseline conditions of the landscape and visual resource has involved a desk study subsequently verified through field work, GIS/computer analysis, and informed by local knowledge. This section provides a description and analysis of the existing landscape designations, landscape character areas/types, and existing visual resource. The Study Area contains a number of landscape and visual receptors, including settlements, local routes and a range of distinctive landscape elements.

Key terms used in this baseline description and subsequent impact assessment are:

- Landscape character areas (LCAs): Areas which are unique, discrete geographical areas of the landscape which demonstrate a series of recognisable features and characteristics.
- Visual amenity: The overall pleasantness of the views of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through the area.
- Representative viewpoints: Views selected to represent the experience of diverse types of visual receptor (such as local resident, recreational visitor, passer-by), where larger numbers of viewpoints cannot be included individually and where significant effects are unlikely to differ.

7.5.2 Baseline Data Collection

7.5.2.1 Study Area

The extent of the study area is informed by the potential visibility of the Project in the surrounding landscape and is proportionate to its size and the nature of the surrounding landscape. For the purposes of this assessment the study area shown on Figure 7-11 has been defined by the zone of theoretical visibility (ZTV) analysis and professional judgement. Based upon this it is considered that it is highly unlikely that significant long-term residual effects will be possible from further than 10 km from the Site boundary.

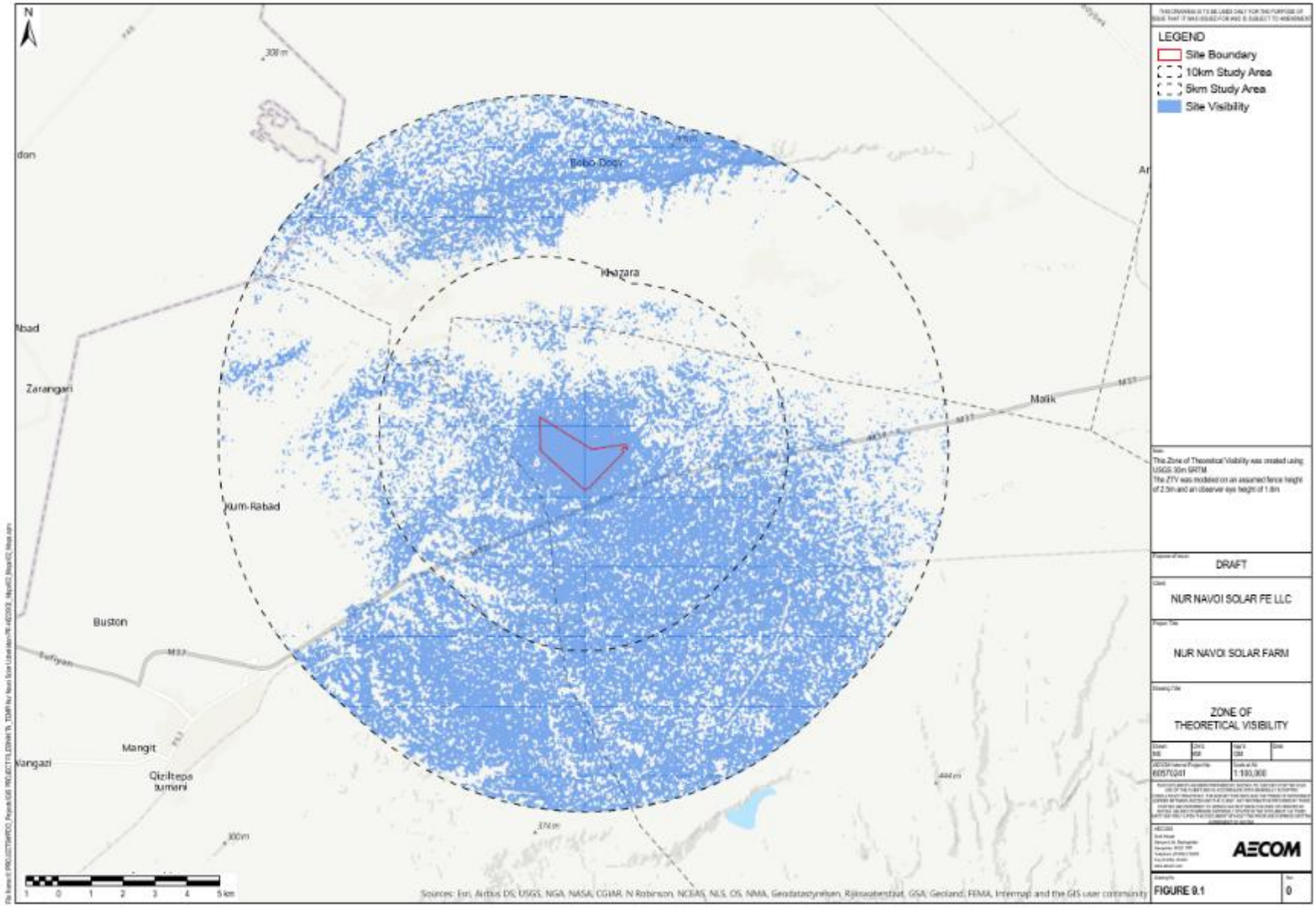

Figure 7-11. Zone of Theoretical Visibility and Landscape Study Area

7.5.2.2 Data Sources

The approach to the landscape and visual assessment has been devised to address the specific effects likely to result from a development of this scale and nature. The methodology draws upon the following established good practice guidance, based predominantly on UK guidance:

- UK Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013); and
- Visual Representations of Development Proposals, Technical Guidance Note 06/19 (Landscape Institute, 2019).

The landscape and visual assessments are primarily desk based and informed by Site photography. There are no published Landscape Character Assessments for Uzbekistan; therefore, for the purpose of this assessment, and in the absence of existing specific datasets, GIS and mapping have been used to develop landscape character areas relevant to this Project and Study Area.

The visual assessment is based on 7 viewpoints which have been selected to represent the experience of the different types of visual receptor where significant visual impacts are most likely to result.

7.5.3 Current Landscape Condition

The Project is located on flat open plain enclosed by the Zarafshan river to the north and highway M37 to the south. A general view of the site is shown on Figure 7-12**.** The only features of interest within the site and immediate surroundings are a single tree and the two farms to the north and south. OHLs are clearly visible to the south.

Figure 7-12. Site Context

The region is semi-arid and land cover within the Site and immediate context is predominantly scrub grassland. Settlements are small, comprising nucleated villages and isolated farmhouses, connected by the M37 highway and an informal network of smaller tracks. Agricultural land tends to surround settlements. The largest nearby settlement, the village of Uzumzor, is 2.8 km east of the Project. Land surrounding the village is irrigated agricultural farmland and rough grazing. Existing electrical infrastructure including three overhead lines are located immediately east of the Site.

7.5.3.1 Landscape Character Areas

Desk based analysis has identified three Landscape Character Areas within the 10 km study area. The description, key characteristics, likely trends and consideration of landscape value of each are detailed below. Project Landscape Character Areas are described in Table 7-4.

Table 7-4. Project Landscape Character Areas

LCA	Description
LCA 01 Zarafshan River	Like much of this region the LCA has been disturbed by human influences. The main features of this LCT are the main river valley, irrigation canals, built development, roads and bridges however much of this infrastructure has been in a state of decay for some years. There is little in the way of vertical features within this LCA other that overhead lines and pylons. Residential properties tend to be single storey with a small amount extending the two stories. There are a number of important archaeological sites however these have often been damaged by more recent construction. For example, constructing overhead lines and pylons on the wall of a former fortress. Overall the landscape value of LCA 01 is considered to be **low**.
LCA 02 Semi Arid Plains	This LCA contains relatively commonplace steppe landscape features. The backdrop to this LCT is the city of Navoi to the east and this has a considerable influence on the scenic quality. The detracting influence of industrial developments including an electricity substation, widespread pylons and overhead lines result in an overall landscape value which is considered to be **low**. The landscape quality improves considerably to the south of the hills to the south of the project area however the hills create a natural barrier limiting the extent of LCA 02.
LCA 03 Uzumzor and Agricultural Farmlands	This LCA is largely a transition between LCA 02 and the more industrial LCA 04. The LCA is characterised by medium sized agricultural fields and irrigation channels associated with the residential edge of Uzumzor and surrounding villages. Views towards the industrial facilities including Navoi Cement Plant (26km east south east) and Navoiyskiy Elektro-Khimicheskiy Zavod (22km east south east) and overhead lines crossing this LCA significantly reduces the scenic quality of this LCA. As such the landscape value in this LCA is **low**.
LCA 04 Navoi and Environs	This LCA incudes the main settlement of Navoi but more importantly the industrial developments surrounding the city. This includes a coal fired power station (28km east south east), visible flaring (>30km east south east) and Navoi Cement Plant emitting yellow/brown smoke from the main stack (26km east south east). In addition, there are significant amounts of pylons, overhead lines and pipelines visible above ground. The setting is almost completely industrial and as a result the landscape value is **low**.

Representative views from the above LCTs are shown in the below figures.

Figure 7-13. Core Area of LCT 01 Zarafshan River

Figure 7-14. Core Area of LCT 02 Semi Arid Plains

Figure 7-15. LCA 03 Uzumzor and Agricultural Farmlands

Figure 7-16. LCA 04 Navoi and Environs – View of Coal Fired Power Station from the M37

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7.5.3.2 Zone of Theoretical Visibility

A computer generated ZTV map has been prepared for the Project, to assist the assessment process. This has been used to inform the selection of representative viewpoints and to illustrate the potential influence of the Project in the wider landscape. The ZTV map indicates areas from where it may be possible to view part of or the entire Project. However, the use of the map needs to be qualified by the following considerations:

- The ZTV has been generated using ALOS WORLD 3D Digital Surface Model at 5 m horizontal resolution assuming the observer eye level of 1.6 m;
- The ZTV mapping is limited by the detail of the digital terrain model data used and does not take account of local topographic variations or screening from built form or vegetation;
- Some areas of theoretical visibility may comprise woodland, upland or agricultural land, where there is effectively no public access and the likelihood of views being experienced is consequently low; and
- The ZTV does not take account of the likely orientation of a viewer, such as the direction of travel and there is no allowance for reduction of visibility with distance, weather or light.

These limitations mean that the ZTV map tends to overestimate the extent of the visibility, both in terms of the area from which the Project is visible and the extent of the Project, which is visible. It should be considered as a tool to assist in assessing the theoretical visibility of the Project and not a measure of the visual effect.

The ZTV shows widespread visibility of the Project in the area south of the project site to the mountains with some visibility to the north of the Zarafshan River. There are pockets where there is no visibility due to landform.

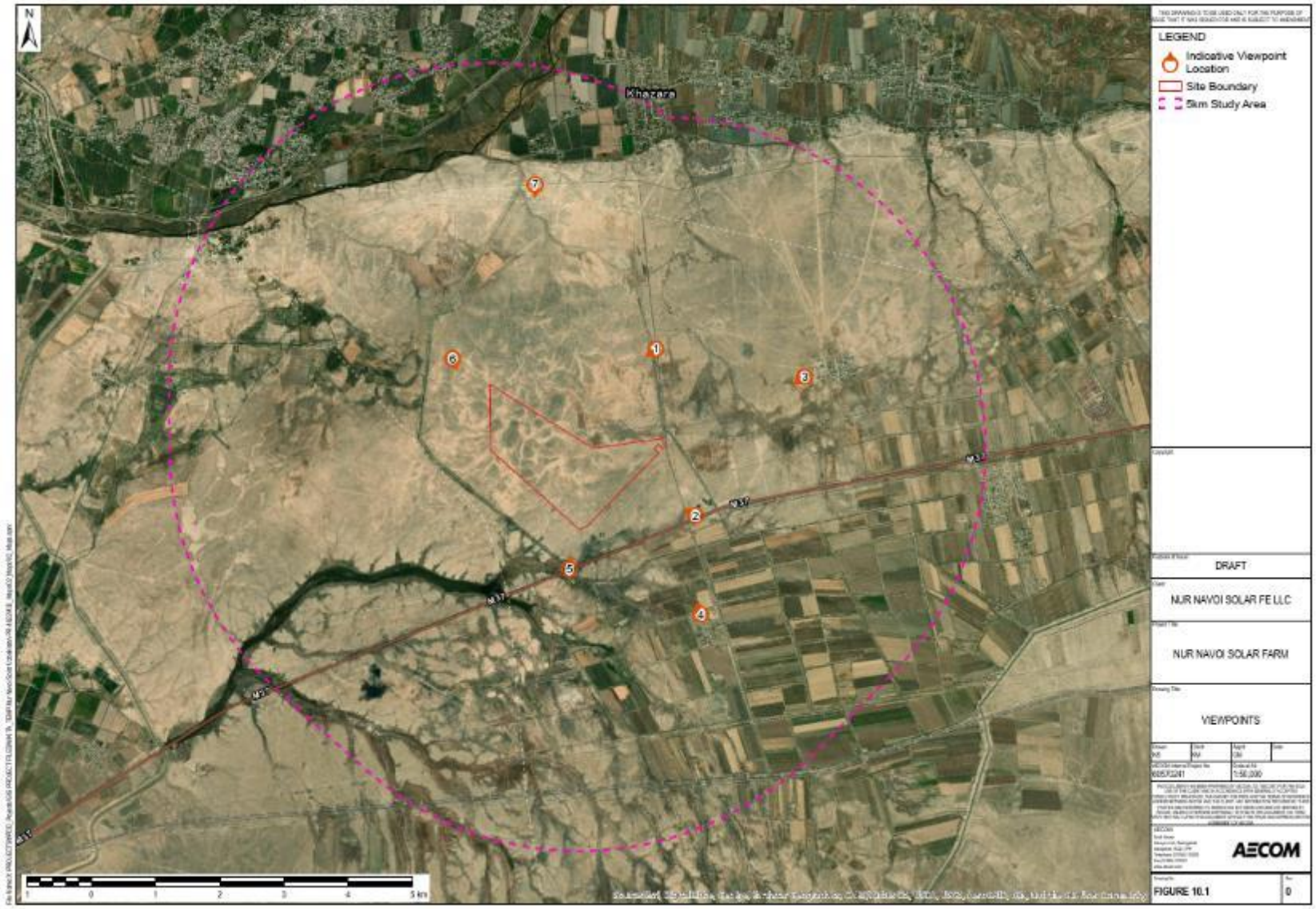

Figure 7-17. Viewpoints

7.5.3.2.1 Visual Receptors

Visual receptors within the scope of this assessment are described in the following section and are grouped into the following categories:

- Views from residential settlements;
- Transient views from nearby roads; and
- Views from recreational/access routes and places of interest.

There are a number of settlements and scattered properties within the study area where residents experience a range of views that have the potential to be affected by the Project. Uzumzor is a village approximately 2.5 km east of the Project and would experience open, expansive views towards the Site from the western extents of the village. In addition, there is a small settlement 2.5km to the south of the Site where the nature and focus of views is varied. The network of informal tracks that is occasionally used for access will experience varying views. Of wider importance are the religious and cultural sites on the Silk Road including the Deggaroni which has attracted visitors from as far afield as the UK.

7.5.3.2.2 Representative Viewpoints

A total of seven representative viewpoints have been selected based on the visual receptor criteria above and where the Project is likely to affect views. Representative viewpoints are shown on Figure 7-18 to Figure 7-23. The baseline description and value judgment for each is detailed in Table 7-5 below. Detailed photoviewpoint figures showing a 90^{o} angle of view are included in Appendix A.

Table 7-5. Viewpoint Descriptions

Viewpoint ID	Location	Representative Receptors	Description
Viewpoint 1	1.5 km north of the nearest part of the Project Site boundary	Access road	This viewpoint is representative of residents travelling from Khazara to the M37 highway and potentially visitors to the Deggaroni. The foreground of the view is enclosed by a 2 m high earth mound formed by the excavation of the drainage canal running parallel with the road. The earth mound effectively limits views to the road and immediate foreground. The number of electrical cables and transmission towers forms the predominant vertical features of this view. As the viewer approaches the M37 road the pylons become the dominant feature of the view. As noted, views of residents will be partially restricted by the topography, vegetation and earth wall and therefore the visual value is considered to be **low**.
Viewpoint 2	1 km south east of the nearest part of the Project Site boundary	Highways receptors	This viewpoint is similar to VP 1 that it is representative of residential receptors travelling to Khazara from the M37 highway and potentially visitors to the Deggaroni mosque. The foreground of the view is dominated by the overhead lines and pylons. The number of electrical cables and transmission towers forms the predominant vertical features of this view. The views experienced will be transient as there are no residential properties in this area. As noted, views of residents will be partially restricted by the topography, vegetation and earth mound and therefore the visual value is considered to be **low**.
Viewpoint 3	2.5 km east of the closest part of the Project Site boundary	Residential receptors	The view, looking south west of the project, is representative of residents in the Uzumzor area. The foreground is comprised of areas of cultivated ground and the main M37 highway which is the primary route between Samarkand, Navoi and Bukhara. The middle ground is largely comprised of the earth wall on the edge of the drainage canal and the minor road, that runs across the majority of the view, along with a mix of scattered electrical pylons. Long distance views of transmissions towers can be seen creating vertical lines on the skyline. There is considerable screening provided by the existing topography therefore the visual value is considered to be **low**.
Viewpoint 4	2.5 km south of the Project Site boundary	Residential receptors	This view is representative of residential receptors in a small cluster of dwellings, illustrates views to the south of the Project. The view is flat, with expansive panoramic views, comprising of cultivated fields in the foreground. The vast landscape is disturbed by human influence and there is a line of farm buildings which distinguish between the foreground and middle ground. A few scattered remnants of low-level structures/ materials and field boundaries can be seen in the background. Transmission towers create vertical lines in the skyline. Due to the distracting elements of the view, the visual value is considered to be **low**.
Viewpoint 5	1 km south west of the Project Site boundary	Highways Receptors	This viewpoint is similar to VP 1 and 2 that it is representative of receptors travelling on M37 highway and potentially visitors travelling to the Navoi area. Views would only be experience by receptors travelling east from the direction of Bukhara. The foreground of the view is generally screened by a central reservation and bridge/fencing on the road verge. In keeping with other VPs, views are fairly open towards the Project but the dominant features in the foreground are the overhead lines and pylons. The number of electrical cables and pylons forms the predominant vertical features of this view. The views experienced will be transient as there are no residential properties in this area. At this location distant views of the oil refinery and industrial facilities become visible in an east southeast direction. The visual value is considered to be **low**.
Viewpoint 6	<1 km west of the Project Site boundary	Residential receptors	The view is looking east towards the Project along a dirt track and includes a single farm property and road users who are likely to be resident of the nearest villages further to the west. The foreground of the view is flat, open with wide angle views, comprising of areas of steppe, with areas of small shrubs but with pylons and overhead

Viewpoint ID	Location	Representative Receptors	Description
			lines in the whole view. The middle ground comprises of a continuation of steppe rising to a higher point in the middle ground before dropping down the M37 and becoming hidden from view at this VP. The background of this view is framed by distant hills. The pylons and overhead lines are the primary focus of the view due its contrasting colours and vertical height with the surrounding flat, open landscape and therefore the visual value is considered to be **low**.
Viewpoint 7	5 km north of the Project Site boundary	Residential / recreational receptors	The view is representative of residents of Khazara and tourists visiting the Deggaroni mosque or ruined fort along a minor tarmac road which is in poor condition. This illustrates views to the north of the Project. The foreground of the view is relatively flat, open and rising in elevation, comprising of overgrazed steppe vegetation. The elevated ground creates a ridge in middle ground which effectively screens views of the Project. The key features at this location are the pylons and overhead lines however the ruined fort and Deggaroni are visible at this location but behind the viewer. The comparable scale of the vertical structures tends to focus views to immediate foreground and with the screening effect of topography the visual value is considered to be **low.** Views of cultural sites are in the opposite direction of the Project therefore the Project would not alter the views experienced of those sites.

Figure 7-18. Viewpoint 1

Figure 7-19. Viewpoint 2

Figure 7-20. Viewpoint 4

Figure 7-21. Viewpoint 5

Figure 7-22. Viewpoint 6

Figure 7-23. Viewpoint 7

7.5.3.3 Receptor Sensitivity

Landscape sensitivity to change has been determined by employing professional judgement to combine and analyse the identified value and susceptibility and has been defined with reference to the three-point scale outlined in Table 7-6.

Table 7-6. Sensitivity of Landscape Receptors

Classification	Criteria
High	Landscape of national or regional value with distinctive elements and characteristics, considered to have a limited ability to absorb the type of change proposed without fundamentally altering the key characteristics.
Medium	Landscape of regional or local value, or rarity, exhibiting some distinct elements / features, considered tolerant of some degree of the type of change proposed without fundamentally altering the key characteristics.
Low	Landscape with few distinctive elements / features or valued characteristics and considered tolerant of a large degree of the type of change proposed without fundamentally altering the key characteristics.

Visual sensitivity to change has been determined by professional judgement to combine and analyse the identified value and susceptibility and has been defined with reference to the three-point scale outlined in Table 7-7.

Table 7-7. Sensitivity of Visual Receptors

Classification	Criteria
High	Locations where receptors experience an impressive or well composed view containing few detracting elements, with limited ability to absorb change.
Medium	Locations where receptors experience a valued view which generally represents a pleasing composition but may include some detracting features and is tolerant of a degree of change.

Low	Locations where the view is incidental or not important to the receptors and the nature of the view is of limited value or poorly composed with numerous detracting features and is tolerant of a large degree of change.

Based on the above criteria, sensitivity of the receptors is summarised in Table 7-8.

Table 7-8. Project Landscape and Visual Receptor Sensitivity

Receptor	Sensitivity
Landscape Character Areas	
LCA01	Low
LCA 02	Low
LCA 03	Low
LCA 04	Low
Human Receptors	
Residential receptors	Low
Recreational receptors	Low
Highway receptors	Low

7.6 Biodiversity

7.6.1 Overview

The project site is dry steppe but is surrounded by irrigation canals, lakes and watercourses which have the potential to attract a wide range of species. In particular, the likelihood of the Project site being used as a stopover site for migrating birds has been investigated. This section documents the ecological importance of the Project site and identifies species or habitats that may be subject to further mitigation during construction, operation and decommissioning of the Project.

7.6.2 Site Survey Methodology

The ecological baseline (habitat identification, floral survey, terrestrial fauna and avifauna survey) was established by AECOM ecologists during site surveys on 3rd, 4th, 5th and 6th March 2020 and by local biodiversity specialists[32] on 23rd, 24th, 25th, 26th and 28th June 2020 (referred to as the 'March 2020 and June 2020 surveys' herein). A further series of surveys took place in October 2020 specifically aimed at identifying hibernating Central Asian tortoise. These surveys included:

- Walkover transect surveys for birds, reptiles, mammals and rare and endemic species of plants within the proposed project site;
- Walkover transect survey for habitat assessment categorization within the proposed project site;
- Drive-over and point count surveys for the aforementioned ecological features adjacent to the proposed project site.
- Destructive searches for hibernating Central Asian tortoise.

The site footprint (being relatively small) was surveyed on foot with a series of transects running from east to west and north to south directions. The area was traversed in a regular pattern in order to reduce the chances of missing any important biotic features.

A full species list has been provided in Appendix B.

7.6.2.1 Vegetation Study

The aims of the March and June 2020 vegetation study were to:

- Determine the species present at and around the proposed Project site and highlight any protected or IUCN Red Data listed species.
- Identify any exotic or potentially invasive flora species.
- Describe the potential direct or indirect impacts, whether they are beneficial, adverse or neutral, on the current vegetation communities or protected species as a result of the construction and operation of the proposed Project.
- Provide feasible mitigation strategies as counter measures for the potential impacts.

Plant species were identified, and distributions were checked using relevant literature. The conservation status of each of the plant species documented was researched using the IUCN data bases. This was cross checked against the Uzbek Red List to determine the presence of species of conservation importance.

7.6.2.2 Terrestrial Fauna Study

The aims of the faunal study were to:

- Carry out field work to identify the terrestrial fauna that may reside or range within the region of the proposed Project.
- Provide detailed lists of the mammal, reptile, and amphibian fauna in the region.

[32] Fazlullo Agzamov, Research Specialist on Biodiversity, Research Institute of Ecology and Environmental Protection, Tashkent City Department of the State Committee on Ecology and Environment Protection and Abdusalom Normatov, Senior Researcher, Forestry Scientific Research Institute, Tashkent

- Provide the IUCN Red Data rating and protected status in Uzbekistan for each of the fauna species determined to be present or potentially occurring at the site.
- Identification of any direct or indirect impacts, whether they are beneficial, adverse or neutral, on the current terrestrial biodiversity and provide relevant mitigation measures.

Considering that the activity patterns of many terrestrial species are hugely variable (i.e. many are nocturnal), it is possible that certain small species (particularly small mammals, reptiles and amphibians) could have been overlooked during the daily site surveys.

7.6.2.3 Avifauna Survey

The aims of the March and June 2020 avifauna surveys were to:

- Carry out field work to identify the micro-habitats within the proposed Project's footprint and identify the avifauna that may reside or frequent the area.
- Provide a detailed list of avifauna that occur in the region.
- Provide the IUCN rating for each of the fauna species determined to be present and protected status in Uzbekistan for each of the avifauna species determined to be present or potentially occurring at the Project site.
- Identify direct or indirect impacts to the local avifauna that could be the result of the construction and operation of the proposed Project.
- Determine relevant mitigation measures.

There are numerous factors that could influence the presence of avian species within the region such as season, weather conditions, and food availability. In order to account for this the bird distributions were researched to formulate an index similar to that used for terrestrial fauna species. In addition, the breeding and migratory habits were researched using Bird Life International databases to derive the species lists. Birds that could potentially frequent the proposed Project site have been classified according to their migratory, breeding and resident statuses. This scale uses the following terms:

Residence status:

- **Resident**: These birds reside and breed within the local areas on a more or less permanent basis though may move within their distribution zone
- **Non-breeding migrant:** These birds do not breed in this area however may be found in the region during certain periods/ seasons as they either use this area as a temporary or seasonal home range. This includes Eurasian wintering migrants.
- **Breeding migrant:** These birds frequent the region specifically to breed and raise their young, however following the breeding season will move on to other areas.

7.6.2.4 Consultations

The following organisations were consulted as part of the biodiversity assessment:

- Emirate Centre for the **Conservation** of the Houbara (March 2020)
- Uzbekistan Society for **the** Protection of Birds (USPB) (8 July 2020)
- birds.uz (3 July 2020)

7.6.3 Potential 'Lake Effect' of Solar Panels

A number of unsubstantiated or unverifiable concerns have been raised in relation to the potential of solar PV arrays to mimic waterbodies resulting in bird collisions with the solar panels. The potential ornithological impacts of solar PV installations are poorly understood and there is no coherent guidance worldwide on the potential ecological effects of new and existing solar PV developments.

To date there are no experimental studies in the peer reviewed scientific literature that attempt to quantify the direct impact of PV solar farms on birds purely from an ecological perspective. The attraction of birds to solar PV

installations was recognized as a concern by a focus group held to determine the potential hazards of large-scale PV development at airports (Wybo, 2013)[33]. The main attractant for birds recognized by Wybo (2013) was the potential for solar arrays to be used as nesting grounds; however, this claim was not supported with evidence. DeVault *et al.* (2014)[34] examined whether birds were more likely to use habitat at PV installations than nearby airfield grassland. The study stated that birds were rarely observed foraging on or near PV arrays. In terms of collision risk, DeVault *et al*. (2014) observed no obvious evidence for bird casualty caused by solar panels, despite conducting 515 bird surveys at solar PV sites.

Toral and Figuerola (2010)[35] state that the installation of solar farms on land used for rice cultivation would be detrimental to some water bird species. This claim is based on the study's findings that land used to cultivate rice in south west Spain is used as habitat by some migratory water bird species, rather than any specific impact of solar farms. It is also suggested that the construction of solar farms will result in the loss of wetlands in southern Europe; however, no citation providing evidence of a negative impact of solar farms is presented. It is AECOM's view that the negative impacts reported are a result of changes to habitats and land use rather than the specific impact of any particular technology.

Photovoltaic panels have been shown to reflect polarised light that is attractive to polarotactic aquatic insects, which confuse solar panels with water and attempt to lay eggs on the surface, resulting in mortality and reproductive failure (Horváth *et al*., 2010[36]; Blahó et al., 2012[37]). Insectivorous predators have been recorded feeding on polarotactic insects attracted to sources of polarised light such as vertical glass windows, horizontal black plastic sheets and dry asphalt roads (Kriska *et al*., 1998[38]; Bernáth *et al*., 2008[39]; Horváth *et al*., 2009[40]). Bernáth *et al*. (2001)[41] describe birds such as Black Kite (*Milvus migrans*), Great White Egret (*Ardea alba*) and Swallow (*Hirundo rustica*) attempting to drink from plastic sheets, hypothesising that this behaviour may be due to an attraction to surfaces reflecting polarised light. The study also describes the mortality of birds at a waste oil lake in Hungary, again attributing this to the direct attraction to polarised light or to insects attracted to polarised light. As solar PV panels are solid, if this hypothesis is correct, there is unlikely to be a significant hazard to perched birds attempting to drink, however Swallows and related birds could be presented with a collision risk as hirundines are known to drink 'on the wing' (Bryant *et al*., 1984)[42].

In summary, little scientific evidence exists that demonstrates a direct impact of solar PV on birds. It is likely that different avian species are likely to be affected differently by solar developments, dependent on the habitat within and around a solar PV development, the spatial requirements of a given species (e.g. flocking species that require large areas to host the flock) and the foraging behaviour of a given species.

A review was commissioned by Natural England (Harrison et al. 2017[43]) to gather evidence from scientific literature to provide a comprehensive report on current understanding of the potential ecological impacts of solar PV developments. The conclusions reached in the Natural England study has been referred to and the Solar Park was considered in terms of:

1) the habitat available prior to the development,

[33] Wybo, J.-L. (2013) 'Large-scale photovoltaic systems in airports areas: safety concerns. Renewable and Sustainable Energy Reviews, 21, May, pp. 402–410.
[34] DeVault, T. L. *et al*. Bird use of solar photovoltaic installations at US airports: implications for aviation safety. Landsc. Urban Plan. 122, 122–128 (2014).
[35] Toral, G. M. and Figuerola, J. (2010) 'Unraveling the importance of rice fields for waterbird populations in Europe.' Biodiversity and Conservation. Department of Wetland Ecology, Doñana Biological Station, Avda. Américo Vespucio s/n 41092, P.O. Box 1056, 41080 Seville, Spain, 19(12) pp. 3459–3469.
[36] Horváth, G., Blahó, M., Egri, Á., Kriska, G., Seres, I. and Robertson, B. (2010) 'Reducing the maladaptive attractiveness of solar panels to polarotactic insects.' Conservation Biology, 24(6) pp. 1644–1653.
[37] Blahó, M., Egri, Á., Barta, A., Antoni, G., Kriska, G. and Horváth, G. (2012) 'How can horseflies be captured by solar panels? A new concept of tabanid traps using light polarization and electricity produced by photovoltaics.' Veterinary parasitology, 189(2-4) pp. 353–65.
[38] Kriska, G., Horváth, G. and Andrikovics, S. (1998) 'Why do mayflies lay their eggs en masse on dry asphalt roads? Water-imitating polarized light reflected from asphalt attracts Ephemeroptera.' The Journal of experimental biology, 201(Pt 15) pp. 2273–86.
[39] Bernáth, B., Kriska, G., Suhai, B. and Horváth, G. (2008) 'Wagtails (Aves: Motacillidae) as insect indicators on plastic sheets attracting polarotactic aquatic insects.' Acta Zoologica Academiae Scientiarum Hungaricae. Hungarian Natural History Museum, Budapest, 54(1) pp. 145–155.
[40] Horváth, G., Kriska, G., Malik, P. and Robertson, B. (2009). Polarized light pollution: a new kind of ecological photopollution. Frontiers in Ecology and the Environment. Volume 7, Issue 6. August 2009. pp 317-325
[41] Bernáth, B., Szedenics, G., Molnár, G., Kriska, G. and Horváth, G. (2001) 'Visual ecological impact of a peculiar waste oil lake on the avifauna: dual choice field experiments with waterseeking birdsusing huge shiny black and white plastic sheets.' Arch Nature Conserv Landsc Res, 40 pp. 1–28.
[42] Bryant, D. M., Hails, C. J. and Tatner, P. (1984) 'Reproductive Energetics of Two Tropical Bird Species.' The Auk. American Ornithologists' Union, 101(1) pp. 25–37.
[43] Harrison, C., Lloyd, H. and Field, C. (on behalf of Natural England (2017)). Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012). 1st edition - 9th March 2017

2) the habitat that will co-occur with the development; and
3) the potential for attraction to polarotactic insect species (i.e. is the development close to a water body).

In the case of the Solar Park site being considered, there are no features nearby that would suggest that the habitat is particularly sensitive or attractive to migrating birds. There are two drainage canals close to the site that may attract polarotactic insect species and hence attract insectivorous bird species. However, only a limited number and type of species were recorded during site surveys. It is not considered that the Solar Park would result in an increase in species diversity. As a result, no features have been identified that could potentially increase the collision risk of migrating or resident species colliding with the solar panels. As noted in DeVault *et al*. (2014) no obvious evidence was identified of bird casualty caused by solar panels after conducting 515 bird surveys at solar PV sites. Therefore, it is AECOM's opinion that the Solar Park will not result in a 'lake effect' and poses no direct risk to migrating or resident birds. This suggested effect has not been considered further.

7.6.4 Habitats

The vegetation of Uzbekistan is divided into four main ecosystems (Belolipov *et a*l, 2013)[44]; the proposed Project site is located in the Chal zone (arid plain, desert).

The March 2020 AECOM surveys confirmed that *Artemisia* associations predominate in the proposed Project site (referred to as 'wormwood steppe' herein). Wormwood steppe communities are ubiquitous within the arid zones of Uzbekistan. The survey coincided with early spring germination and the period for early flowering species, such as plants which develop from bulbs or corms; occasional tulip (*Tulipa buhseana*) was recorded during the March 2020 field survey. A key aim of the June 2020 surveys was to identify any plant species listed on the Uzbekistan Red List and invasive non-native species during the main growing season. Further narrative on the vegetation characteristics and the flora recorded during the survey is provided below.

The vegetation may have some affinity to the *Artemissia terra alba* association on gypsum soil with dominant white-earth wormwood (*Artemisia terra alba*) throughout, as described in Kapustina *et a*l (1998)[45], although the typical community constants (*Anabasis salsa*, *Salsola orientalis*, and *Haloxylon ammodendron*) are absent. There is dominant isirik (*Peganum harmala*), Acanthophilium (*Acantophilium pungens*), hamadweed (*Convolvulus hamadae*) and hare barley (*Hordeum leporinum*), with abundant yantak (*Alhagi pseudoalhagi*), *Malcolmia turkestanica*, viviparous bluegrass (*Poa bulbosa*) and desert daisy (*Microcephala lamellata*). Desert Moss (*Tortula desertorum*) is a locally abundant component of the ground flora. Scarcer species that were recorded include frequent karelinia (*Carelinia caspica*), *Zugofolium oxianus*, *Convolvulus fruticosus*, *Onopordum acantium*, *Ceratocarpus utriculosus*, poppy (*Papaver pavoninum*), Cousinia (*Cousinia* sp.) and goose onion (*Gagea* sp.). Occasional species include iris dzhungarsky (*Iris songarica*), *Eremopyrum bonaopartis*, *Roemeria refracta*, azhrik (*Aeluropis littoralis*), *Cynodon dactylon* and the tamarisk shrub (*Tamarix laxa*).

The wormwood steppe within and adjacent to the site is heavily influenced by grazing by goats. The relatively high abundance of *Tortula desertorum* and *Peganum harmala* is indicative of a degraded sagebrush pasture due to overgrazing[46]. This habitat is the dominant habitat type within the proposed project site boundary and is considered to be degraded Natural Habitat as defined in PS6.

There are localised areas of the wormwood steppe immediately adjacent to the northern, southern and eastern boundary of the site which have been modified by historic cultivation. The cover of *Artemisia* is reduced and the saline soils which typify these areas support frequent Yantok (*Alhagi maurorum*) and rare tamarisk (*Tamarix* spp.). This stand of wormwood steppe is generally outside the project site boundary with two small encroachments into the site area. This considered to be Modified Habitat (recently or currently used for agricultural/farming/pastoral activities).

The wet irrigation ditches immediately adjacent to the proposed project site support linear stands of dominant common reed (*Phragmites australis*).

[44] Belolipov, I.V., Zavrov, D.E. and Eisenman, S.W. (2013). The Geography, Climate and Vegetation of Uzbekistan. *Medicinal Plants of Central Asia; Uzbekistan and Kyrgystan, pp.5-7*
[45] Kapustina, A.L., Torrell, M. and Valles, J. (1998). Artemisia Communities in Arid Zones of Uzbekistan (Central Asia)
[46] Bekhzod, A., Tashkhonim, R., Nodira, R., Rano, A., Mirqosim, S. and Yusuf, V. (2016) Present State of Pasture Types of the Central Kyzylkum. *American Journal of Plant Sciences*, **7**, 677-683.

The proposed project site and adjacent areas do not fall into Critical Habitat category (as defined in the PS6). None of the plant species recorded during the March 2020 and June 2020 field surveys are included on the Uzbekistan Red List and the flora does not include any invasive non-native species.

The areas of Modified Habitat are shown in the figure below.

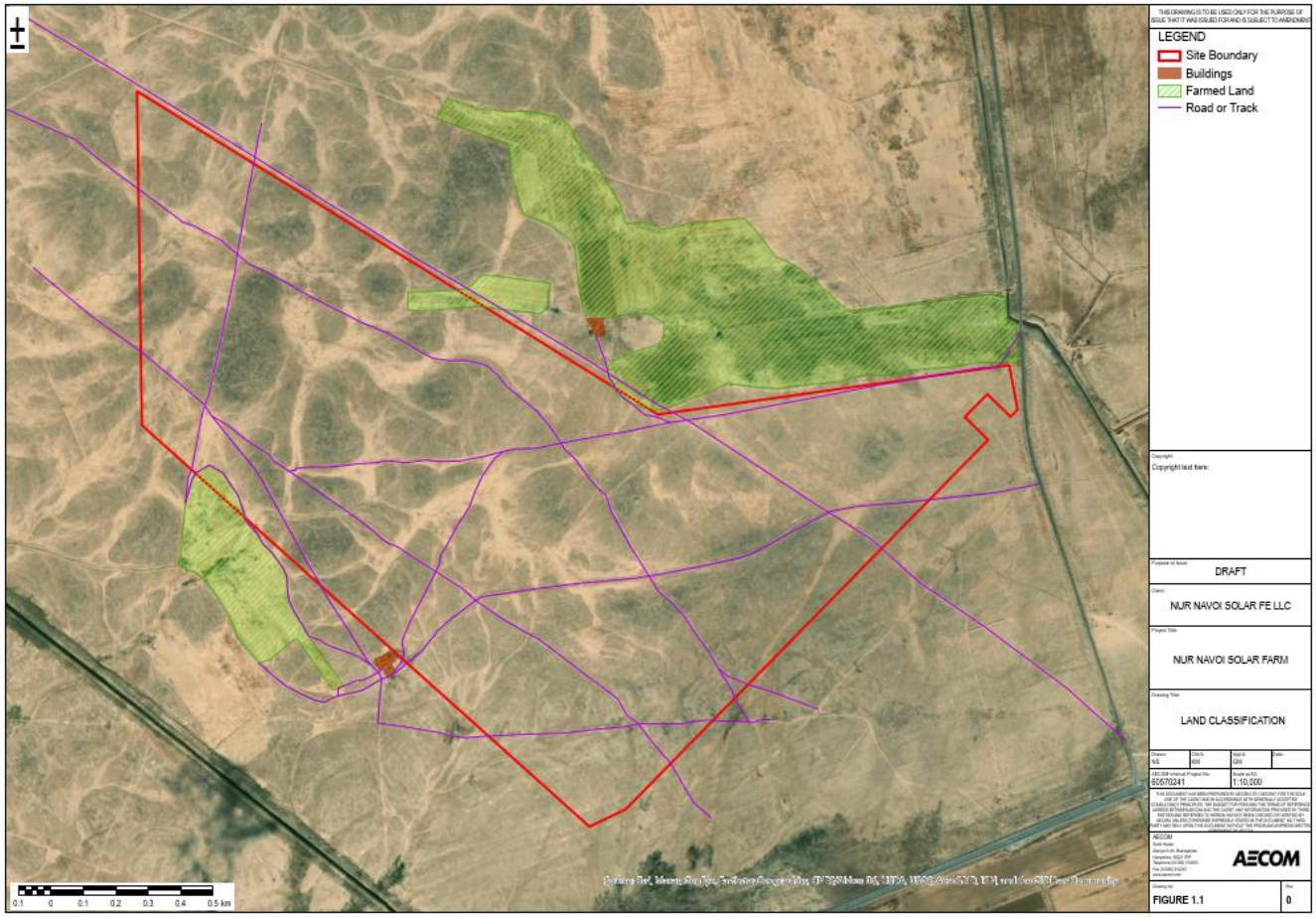

Figure 7-24. Areas of Modified Habitats on and adjacent to the site.

7.6.5 Protected Areas

There are several Key Biodiversity Areas (KBAs) within 50km buffer surrounding the project site. The closest of which is the Tudakul and Kumazar Reservoirs located 20km to the southwest of the project site.

- Tudakul and Kuymazar Reservoirs – ~20km SW of the proposed site
- Kagan Fish Farm – ~45km SW of the proposed site (adjoined to Tudakul KBA)
- Dzheiran Ecocentre – ~45km SW of the proposed site (adjoined to Tudakul KBA and Kagan Fish Farm KBA).
- Karnabchul Steppe – ~50km SE of the proposed site.
- Vardanzi IBA – ~45km W of the proposed site.
- Sarmish Nature Park – ~60km NE of the proposed site

Given the distance from the Protected Sites to the Solar Park it is considered that only the species using the Tudakul and Kuymazar Reservoirs may potentially be impacted by the Solar Park. It is considered that this impact would be a result of species listed in the KBA using habitats on site for breeding or feeding. No such species were encountered during the survey work completed.

The Tudakul and Kuymazar IBA is situated in the southwestern part of the Kyzylkum Desert and includes Lake Tudakul, a small swamp and Kuyu-Mazar Reservoir. Lake Tudakul is situated 23 km NE of the town of Bukhara and Kuyu-Mazar Reservoir 1 km NW of Tudakul. The water in Tudakul is saline. Kuyu-Mazar Reservoir was created to provide the areas situated in the arid zone with drinking water. the western and northern parts of Lake Tudakul are free of any shoreline vegetation; the south and eastern parts are overgrown with reeds and tamarisk, from 10-15 to 150-200 m in width. The lake is more or less spherical, its average width is 30 km, average depth reaches 5-8 m. The western part of the lake has a high and precipitous coast. Beyond it is a marshland with isolated waterbodies surrounded with reed. Several open islets rise in the central and northern parts of the marshland. The water is the reservoir is fresh. High islets and promontories occur in the central and northern parts, which shelter cormorants, gulls and birds of prey. The shores are mainly stony and precipitous; they are practically free of vegetation. Flat coasts are overgrown with halophytes and saltwort. Although only a few sites have been formally proposed under the A3 biome-restricted criteria (for biome CA04b Eurasian Desert and Semi-desert), many of the IBAs in the Kyzylkum Desert region support populations of biome-restricted species and, effectively, form a network of sites throughout the area.

No special studies of the avifauna of Lake Tudakul and adjoining areas have ever been carried out, but the fauna of the desert part of Bukhara province and its water bodies is well explored. More than 250 bird species have been recorded there. Both pelican species are recorded during migration and Dalmatian Pelican winters, as well as two species of Cormorant. In these seasons, five species of Podiceps; 4 species of Pelecaniformes; 12 Ciconiiformes; 1 Phoenicopterus; 23 Anseriformes; 18 Falconiformes; 5 Rallidae; 2 species of cranes; 29 shorebirds and 14 Laridae have been recorded. The wetland avifauna has developed comparatively recently with the development of reedbeds and formation of conditions suitable for habitation. Therefore, the numbers of nesting birds are on the increase but have not been evaluated fully. Three species of rare birds included in the IUCN Red List nest - *Oxyura leucocephala, Marmaronetta angustirostris and Aythya nyroca. Pelecanus crispus, Branta ruficollis, Anser erythropus, Haliaeetus leucoryphus* and *Chlamydotis undulata* are recorded on migration and wintering. There are also four species included in the national Red Data Book nesting - *Platalea leucorodia, Plegadis falcinellus, Egretta garzetta* and *Phalacrocorax pygmaeus*. *Pelecanus onocrotalus, Cygnus olor, Pandion haliaetus, Haliaeetus albicilla, Aquila nipalensis, Falco peregrinus* and *Larus ichthyaetus* are migratory and wintering Red Data Book species. This territory is of international importance for the sustainability of migratory and wintering waterbirds. In winter 2000, 55.345 birds were recorded during the aerial count. In 2003, during the terrestrial counts, were recorded 143.392 waterbirds in 2003; in 2004, 168.533 birds; in 2005, 96.358 birds.

The following mammals have been recorded: *Vulpes vulpes, Vulpes corsac, Felis lybica, Mustela eversmanni, Vormela peregusna, Meles meles*; of rodents, *Rhombomys opimus, Meriones tamariscinus, Ellobius tancrei, Nesokia indica, Allactaga elater, A. severtzovi and Spermophilus fulvus* are resident; *Lepus tolai* and *Hemiechinus auritus* are common. In recent years, the introduced *Ondatra zibetica* and *Myocastor coypus* have been noted. Amphibians are represented by *Rana ridibundus* and *Bufo viridis*. Reptiles are represented by *Agrionemys horsfieldi, Natrix tesselata, Coluber karelini, C. ravergieri, Erix miliaris, Psammophis lineolatum, Phrynocephalus helioscopus, Phrynocephalus interscapularis, Eremias lineolata, Eremias scripta, Trapelus sanguinolentus, Cyrtopodion caspius and Teratoscincus scincus*. The fish fauna is comprised of 10 species. The flora has not been studied in detail, but it includes species typical of wet parts of the desert areas of Bukhara.[47]

7.6.6 Flyways

A number of important flyways cross Uzbekistan with the Solar Farm lying on the Central Asian Flyway (CAF). The CAF covers a large continental area of Eurasia between the Arctic and Indian Oceans and the associated island chains. The Flyway comprises several important migration routes of waterbirds, most of which extend from the northernmost breeding grounds in the Russian Federation (Siberia) to the southernmost non-breeding (wintering) grounds in West and South Asia, the Maldives and the British Indian Ocean Territory. The birds on their annual migration cross the borders of several countries. Notable migratory species potentially using the CAF and flying over the Project area include the White-headed Duck and Sociable Lapwing (see further information under ‘Species of Concern’ below). Furthermore, the Asian–East African Flyway starts from the northern breeding grounds of water birds in Siberia and leads across Asia to East Africa. The larger African-Eurasian flyway covers a wider range of geographies starting from breeding grounds in Europe and Asia to wintering grounds in Africa.

[47] BirdLife International (2020) Important Bird Areas factsheet: Tudakul and Kuymazar Reservoirs. Downloaded from http://www.birdlife.org on 03/02/2020

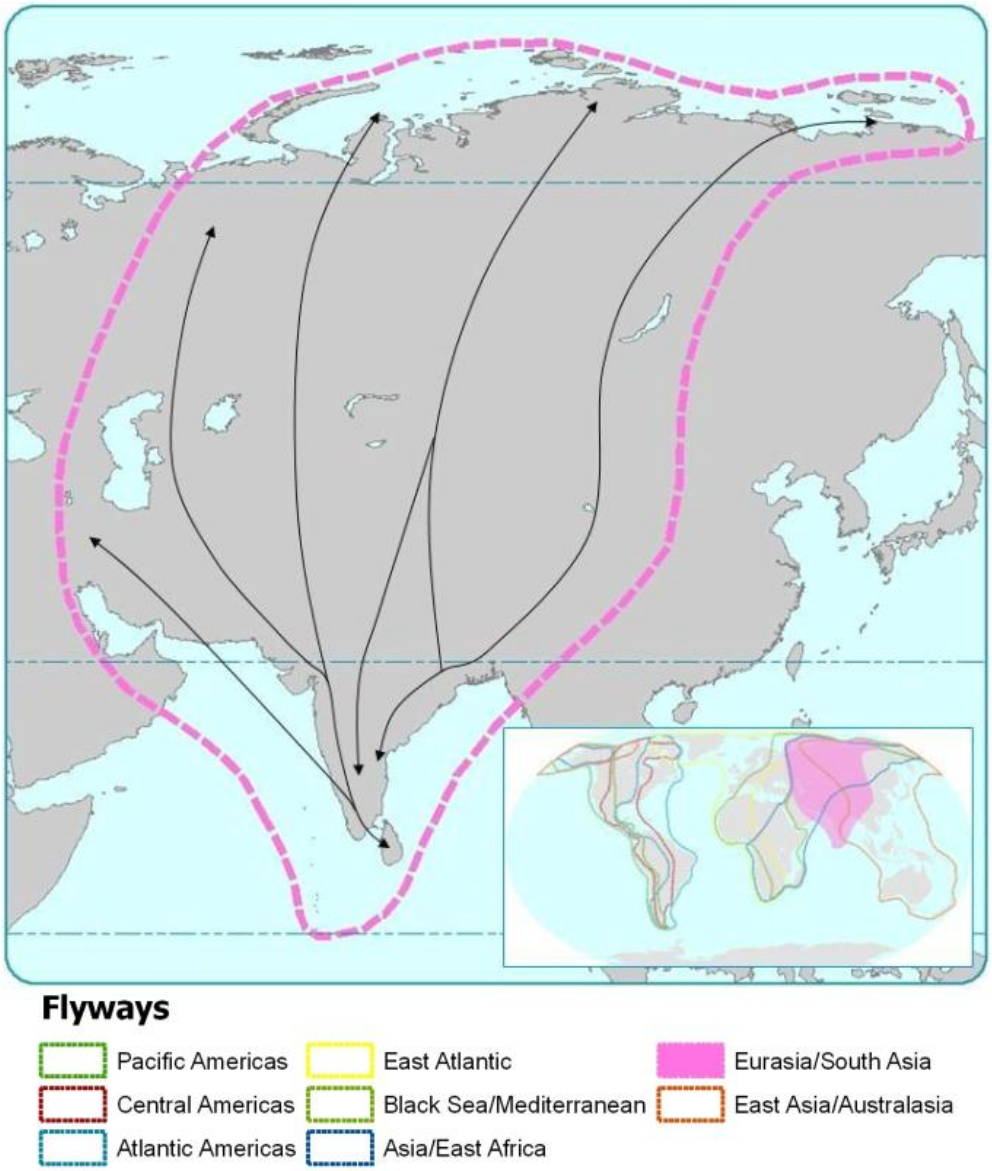

Figure 7-25. Important Flyways Relative to the Solar Park

Source: BirdLife International (2020) Central Asian Flyway

Geographically the CAF region covers 30 countries of North, Central and South Asia and Trans-Caucasus (including Uzbekistan).

There is an overlap between the CAF and the area of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), which was concluded in 1995, at The Hague, the Netherlands. Sixteen out of the thirty countries encompassed by the CAF are located in the AEWA Agreement Area (including Uzbekistan).

Uzbekistan's natural and artificial wetlands are important for migrating and overwintering waterfowl (Lanovenko 2006). More than 50 migratory waterbird species have been recorded on Uzbek wetlands, including at least nine which are globally threatened: Dalmatian Pelican *Pelecanus crispus*, Lesser White-fronted Goose *Anser erythropus*, White-headed Duck *Oxyura leucocephala*, Ferruginous Duck *Aythya nyroca*, White-tailed Eagle *Haliaeetus albicilla*, Red-breasted Goose *Branta ruficollis*, Marbled Teal *Marmaronetta angustirostris*, Pallas's Sea Eagle *Haliaeetus leucoryphus* and Pygmy Cormorant *Phalacrocorax pygmaeus*.

Notable migratory species potentially using the flyway in the vicinity of the project area include the White-headed Duck and Sociable Lapwing (see further information under 'Species of Concern' below).

The CAF is a broad front are there are no specific features within 20 km of the site which could attract migrating birds. The closest feature is Lake Tudakul which is attractive to migrating wildfowl (White-headed duck) but the project site does not contain any similar features that may attract such species. Similarly, consultation confirmed that the site does not contain features that would be attractive to Sociable lapwing.

7.6.7 Avifauna

Uzbekistan has a total of 352 bird species with 19 listed as globally threatened. 297 species are migratory with 55 resident species. The species that are most likely to be present, based on a review of desk based information, are shown in Table 7-9 below. No species are listed as country endemics.[48]

Of the species below, one avian species categorised as Critically Endangered has been identified (IBAT 7 tool – using a 50 Km buffer) - *Vanellus gregarious*. The Tallymerjan area on the Uzbekistan/Turkmenistan border (approx. 140 km south of the project area) has been highlighted as a key stopover site for the eastern flyway, with all birds monitored on the eastern flyway using this site as a stopover site during their migration. It is possible that birds fly over the proposed project site. It is also therefore possible that birds could use habitat surrounding the project as stopover sites during migration.

Table 7-9: Globally threatened bird species

Scientific Name	Common name	Family	IUCN Category
Oxyura leucocephala	White-headed Duck	Anatidae (Ducks, Geese, Swans)	EN
Anser erythropus	Lesser White-fronted Goose	Anatidae (Ducks, Geese, Swans)	VU
Melanitta fusca	Velvet Scoter	Anatidae (Ducks, Geese, Swans)	VU
Marmaronetta angustirostris	Marbled Teal	Anatidae (Ducks, Geese, Swans)	VU
Aythya ferina	Common Pochard	Anatidae (Ducks, Geese, Swans)	VU
Podiceps auritus	Horned Grebe	Podicipedidae (Grebes)	VU
Columba eversmanni	Yellow-eyed Pigeon	Columbidae (Pigeons, Doves)	VU
Streptopelia turtur	European Turtle-dove	Columbidae (Pigeons, Doves)	VU
Leucogeranus leucogeranus	Siberian Crane	Gruidae (Cranes)	CR
Otis tarda	Great Bustard	Otididae (Bustards)	VU
Chlamydotis macqueenii	Asian Houbara	Otididae (Bustards)	VU
Vanellus gregarius	Sociable Lapwing	Charadriidae (Plovers)	CR
Numenius tenuirostris	Slender-billed Curlew	Scolopacidae (Sandpipers, Snipes, Phalaropes)	CR
Neophron percnopterus	Egyptian Vulture	Accipitridae (Hawks, Eagles)	EN
Clanga clanga	Greater Spotted Eagle	Accipitridae (Hawks, Eagles)	VU
Aquila nipalensis	Steppe Eagle	Accipitridae (Hawks, Eagles)	EN
Aquila heliaca	Eastern Imperial Eagle	Accipitridae (Hawks, Eagles)	VU
Haliaeetus leucoryphus	Pallas's Fish-eagle	Accipitridae (Hawks, Eagles)	EN
Falco cherrug	Saker Falcon	Falconidae (Falcons, Caracaras)	EN

Further assessment was undertaken to determine the species of concern most likely to be present close to the Solar Park. These are listed below.

[48] BirdLife International (2020) Country profile: Uzbekistan. Available from http://www.birdlife.org/datazone/country/uzbekistan. Checked: 2020-02-03

7.6.7.1 Species of Concern

Sociable lapwing – *Vanellus gregarious*

The sociable lapwing is a strikingly patterned plover species listed as Critically Endangered (CR) by the IUCN.

It is listed as CR due to recent dramatic declines in population size across its range, with an estimated 5,600 pairs remaining globally. It is thought that illegal hunting during migration and on wintering grounds may now be the species primary threat, although the reasons for its recent decline are poorly understood (Birdlife International, 2018).

The species breeds in Northern Kazakhstan during the summer months, and a large percentage of the population flies south-west to spend the winter in Syria and Sudan between September and March. A recently discovered migratory population however migrate to the east to winter in Pakistan, crossing Afghanistan, Turkmenistan and Uzbekistan on their journey, and resting at stopover sites along their route (Birdlife International, 2018).

The Tallymerjan area on the Uzbekistan/Turkmenistan border (approx. 140km south of the project area) has been highlighted as a key stopover site for the eastern flyway, with all birds monitored on the eastern flyway using this site as a stopover site during their migration. This indicates that one third of the global population may be using this site.

Consultation with ecologists from the Emirate Centre for the Conservation of the Houbara (ECCH) at the Uzbekistan ECCH headquarters (to the east of Lake Tudakul) undertaken during the March field survey visit confirmed that low numbers of sociable lapwing utilise the steppe habitats associated with the hinterland of Lake Tudakul IBA as a stopover site during their migration (a single bird was recorded in 2019 and this species prefers wet steppe habitat [ECCH, pers comm]).

It is possible that birds fly over the proposed project site (see map below of tracked birds in 2015). It is also therefore possible that birds could use habitat surrounding the project as stopover sites during migration. However, there is no reasonable likelihood that the proposed site is a stopover site for this species considering the relatively small size of the steppe habitat present within the site and immediate surrounds. Higher quality steppe habitat is ubiquitous throughout the wider region and the relative remoteness from the known stopover site associated with Lake Tudakul IBA makes it highly unlikely that birds would use the project site as a stopover. Additionally, the dry steppe habitat within the proposed site is less favourable for this species compared to wetter areas of steppe and cultivated habitat in the wider landscape.

White headed Duck – *Oxyura leucocephala*

Listed as endangered by the IUCN, this duck species is known to occur in Uzbekistan. It usually occurs within larger wetland systems where there are semi-permanent freshwater, brackish or eutrophic lakes with a fringe of emergent vegetation (BirdLife International, 2019). Major threats include the drainage of appropriate habitat and hybridisation with the north American ruddy duck. It is noted to be present at the Tudakul and Kuymazar Reservoirs and Kagan Fish Farm KBAs. It is a migratory species.

Steppe Eagle - *Aquila nipalensis*

This species is widespread and occurs in Uzbekistan during its migration between breeding grounds further north and wintering grounds in Africa and on the Indian subcontinent. It is found predominantly in steppe and semi-desert habitats, feeding mainly on small mammals. It has been severely affected by the conversion of steppe habitat to agricultural lands and is adversely affected by power line and wind energy infrastructure. It is now listed as Endangered by the IUCN.

Saker Falcon - *Falco cherrug*

The Saker Falcon is listed as Endangered on the IUCN Red List due to electrocution from power lines, overexploitation for the falcon trade and habitat degradation. The estimated global population of the species is now between 12,200 and 29,600 individuals across its large range, with resident and breeding populations occurring in Uzbekistan. A specialist in hunting in open terrain landscapes such as semi-desert, steppe habitat and agricultural areas, it mainly hunts terrestrial rodents (BirdLife International, 2019). This species is listed as

present in the Karnabchul Steppe KBA and may therefore utilise habitats in or in close proximity to the proposed project site.

Pallas' Fish Eagle - *Halieetus leucoryphus*

The project area is within the native non-breeding range of this species displayed on the IUCN red list. The species is closely linked to wetland, reservoirs and lake habitats and nests in trees near these water bodies.

The eagle is listed as Endangered largely due to the continued loss and disturbance of wetland and breeding sites across its range, and there are now thought to be between 1000-2499 mature individuals globally. It is listed as a species that occurs at the Kagan Fish Farm IBA.

Egyptian Vulture - *Neophron percnopterus*

The project location is within the native breeding range of the Egyptian vulture. Across its large range it faces a variety of threats from lead poisoning, direct or secondary poisoning, electrocution from power lines, collision with wind turbines and reduced food availability due to habitat change and is listed as Endangered on the IUCN Red List.

Houbara Bustard - *Chlamydotis macqueenii*

Consultation with ecologists from the Emirate Centre for the Conservation of the Houbara (ECCH) at the Uzbekistan ECCH headquarters (to the east of Lake Tudakul) undertaken during the March field survey visit confirmed that houbara bustard occur Karnabchul Steppe IBA and adjacent areas. Birds associated with the ECCH reintroduction project are subject to a ringing and satellite tagging programme and individuals have been known to occasionally disperse from the re-introduction site to the wider Central Asia region, with the majority of birds residing within the IBA (ECCH ecologists *pers comm*). However, considering the small size of the habitat within the proposed project area, compared to the extensive areas of steppe which is ubiquitous throughout the region, the likelihood that this species is dependent on habitat within the proposed project area is considered to be negligible. Additionally, an elevated range of hills between the re-introduction site/IBA and the proposed project area has the potential to form a barrier to movement for this species.

Houbara bustard was not recorded within the AOI during the AECOM March 2020 ecological field survey visit. ECCH ecologists had commenced fieldwork to monitor the population of the breeding population within Karnabchul Steppe IBA in the first week of March (ECCH ecologists *pers comm*). Therefore, the timing of the AECOM ecological surveys in March 2020 are considered suitable in terms of detecting breeding populations of this species within the AOI. Consultation with USPB on 8 July 2020 reported that Houbara bustard had been recorded in the wider district adjacent to the site and suggested these the records might be associated with the ECCH re-introduction programme. However, this species was not recorded during the March and June 2020 field survey visits, confirming that this species is absent as a breeding species within the proposed project area. It is possible that habitats with the proposed development site might be utilised by foraging/resting migratory birds on very rare occasions but there is no reasonable likelihood that the site regularly supports significant populations of this species at a regional or district level. This species wasn't reported as having occurred within the site by the local shepherd and therefore the potential for this species to be present is considered to be negligible.

Following desk-based review and site surveys, it was clear that limited data exists for bird populations throughout Uzbekistan. The Solar Park provides an opportunity to gather additional data on bird movements during construction and operation. To support the work of ongoing conservation efforts, any sightings of the following four species of interest will be recorded:

- Sociable lapwing – *Vanellus gregarious*
- Steppe Eagle - *Aquila nipalensis*
- Saker Falcon - *Falco cherrug*
- Houbara Bustard - *Chlamydotis macqueenii*

With the exception of Steppe eagle, none of those birds were recorded during the ESIA surveys. Photographs of the important birds of concern are shown below.

Figure 7-26. Houbara bustard
Source: DAWN.com.

Figure 7-27. Sociable lapwing
Source: eBird.

Figure 7-28. Saker falcon
Source: Birds-in-flight.net.

Figure 7-29. Steppe eagle
Source: McAlister (2020). Site visit photos March 2020.

7.6.7.2 Survey Results for Breeding and non-breeding (migratory) birds

There are several Eurasian migrants that winter in Uzbekistan or migrate through the country as part of the African-Eurasian flyway on route to neighbouring countries. Data has shown that there have been successive declines in populations of many Afro-Palaearctic migrant birds (BirdLife International, 2018). Other species may not breed in Uzbekistan but may migrate to other regions within Africa to breed.

A single species of conservation concern was observed during the March 2020 field surveys: steppe eagle (*Aquila nipalensis*) [IUCN Endangered]. A total of eleven Steppe eagles were observed flying in a northerly direction over and immediately adjacent to the eastern boundary of the proposed site on 3rd March. Birds are migrating on a broad front within this general region as there are no specific geographic features that would concentrate migrating birds. Similarly, the proposed project site is not located on a major bottle neck or geographical feature that would concentrate migrating species. As a result, there is no reasonable likelihood that the site supports or witnesses significantly high numbers of migratory or congregatory species. Additional survey work that took place in June 2020 confirmed that the site is not important for breeding or migrating species.

Migratory species recorded during the field surveys, which may also breed within the proposed project area are: desert wheatear (*Oenanthe deserti*) and isabelline wheatear (*Oenanthe isabellina*). Several sightings of Western marsh harrier (*Circus aeruginosus*) [IUCN Least Concern] were recorded along the canals on east and west of the site. These species are not of global conservation concern (refer to section 6.5.6.4).

Figure 7-30. Steppe eagle migrating over site

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-31. Western marsh harrier on site

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-32. Desert wheatear on site

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-33. Isabelline wheatear on site

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-34. Great grey shrike on site

Source: McAlister (2020). Site visit photos March 2020.

7.6.7.3 Survey Results for Resident and Over-wintering Species

No resident species of global conservation concern were observed during the March 2020 field survey. A single species which may be sensitive to collision with power-lines was recorded: black-bellied sandgrouse (*Pterocles orientalis*) [a pair were recorded utilising the proposed project site for resting/foraging]. Crested lark (*Galerida cristata*) was commonly recorded within the proposed project site.

Possible prey remnants of Saker falcon (*Falco cherrug*) [feral pigeon feathers] were noted during the field survey, however this species was not observed during the field survey visit.

7.6.7.4 Survey Results for Breeding Birds

A total of twenty species were recorded within the proposed project site, with five of these confirmed to be breeding (isabelline wheatear, crested lark, white wagtail and house sparrow). The remaining species were recorded over-flying the site and were likely to be breeding in habitat outside the site boundary. An additional ten species were recorded only from areas adjacent to the proposed development site, including a single female black-bellied sandgrouse which was recorded approximately 1km to the north-east of the site and was considered likely to be indicative of a single breeding pair outside the proposed project area.

None of the species recorded during the June 2020 field surveys were of conservation concern; all are IUCN Least Concern] and non are included in the Red Data Book of Uzbekistan.

7.6.8 Flora

The vegetation was found to be in a desiccated form in line with the weather conditions following the summer and many ephemeral species were in an early growth stage (seedling). The species that were identified during the March 2020 AECOM surveys are detailed in Section 6.5.3.

7.6.8.1 Terrestrial Mammals

No mammal species were observed during the March 2020 field visit. However several burrow complexes were noted. Small rodents are known to have burrow complexes and this was confirmed by the local ecologist during the June 2020 field visit.

The following mammal species were confirmed to be present within the proposed project site during the June 2020 field visit (none of which are included within the Red Data Book [RDB] of Uzbekistan):

- Yellow ground squirrel (*Spermophilus fulvus*) [IUCN Least Concern] – observed within the proposed project site. The burrow density was estimated at 2-4 holes per hectare. This species was also recorded adjacent to the proposed Project site, to the south of the M37 carriageway, during the March 2020 field visit.
- Large jerboa (*Allactaga major*) [IUCN Least Concern] – a record of a single animal observed within the proposed project site
- Northern Mole Vole (*Ellobius talpinus*) [IUCN Least Concern] – active burrows/digging by this species were observed;
- Long-eared hedgehog (*Hemiechinus auritus*) [IUCN Least Concern] – recent field signs (digging) indicative of this species were observed within the proposed site and a hedgehog skin was observed adjacent to the site;

The following mammal species were considered likely to have occurred within the proposed project site, but no recent field signs were observed during the June 2020 field visit (neither species are included on the Uzbekistan Red List):

- Large gerbil (*Rhombomys opimus*) [IUCN Least Concern] – disused burrows were observed within the proposed project site that were considered likely to be associated with this species;
- Libyan jird (*Meriones libycus*) [IUCN Least Concern] - disused burrows were observed within the proposed project site that were considered likely to be associated with this species.

During the June 2020 field visit there were anecdotal reports provided during an interview with the local shepherd of the following mammal species: fox (*Vulpes vulpes*), jackal (*Canis aureus*), steppe cat (*Felis lybica ornata*) and badger (*Meles meles*). Reed cat (*Felis chaus*) was also reported as rarely present within the site, however the habitat within the proposed project is site is unsuitable for this species (this cat favours swamp and

wetland habitat and is more likely to utilize wetland habitat adjacent to the site). All of the aforementioned species are IUCN Least Concern and none are included on the Uzbekistan Red List.

Marbled Polecat (*Vormela peregusna*)

Listed as Vulnerable by the IUCN and included in the Red Data Book of Uzbekistan, this species is threatened by habitat destruction and degradation (eg. overgrazing) and widespread use of pesticides and rodenticides. Marbled polecat is a rare species which occurs in the sagebrush (*Artemisia* spp.) habitat of the central Asian ecoregion which includes the Navoi region of Uzbekistan. It is listed as known in the desert area around Kagan Fish Farm, although no spatial scales are given (Birdlife International, 2019). No evidence was recorded during site surveys and the degraded (grazed) habitat within the site represents sub-optimal habitat for this species and its prey (ie. yellow ground squirrel is generally scarce and other large rodents appear to absent).

Goitered Gazelle - *Gazella subgutturosa*

Listed as Vulnerable by the IUCN, the species is threatened by illegal hunting and habitat loss (agricultural conversion and increasing domestic livestock numbers). Known to inhabit a range of desert and semi-desert habitats across Central Asia, it is listed as known in the desert area around Kagan Fish Farm, although no spatial scales are given (Birdlife International, 2019). No evidence was recorded during site surveys.

Steppe Polecat - (*Mustela eversmanii*)

Listed as Least Concern by the IUCN but is included in the Red Data Book of Uzbekistan, the species is threatened by habitat destruction and widespread use of pesticides and rodenticides. Known to inhabit a range of desert and semi-desert habitats across Central Asia, it is listed as known in the desert area around Kagan Fish Farm, although no spatial scales are given (Birdlife International, 2019). No evidence was recorded during the site surveys.

Figure 7-35. Yellow ground squirrel on site

Source: AECOM (2020). Site visit photos June 2020.

Figure 7-36. Large jerboa on site

Source: AECOM (2020). Site visit photos June 2020.

7.6.8.2 Bats

Common pipistrelle (*Pipistrellus pipistrellus*) [IUCN Least Concern] was recorded foraging/commuting within the proposed project site and this species is considered likely to be utilizing the farm buildings within the project site for roosting.

7.6.8.3 Reptiles

During the March 2020 field survey, two reptile species were observed: Central Asian tortoise (*Testudo horsfieldii*) and Sunwatcher toad-headed agama (*Phrynocephalus helioscopus*).

Central Asian tortoise

Listed as Vulnerable by the IUCN, the species is threatened by habitat loss (e.g. due to agricultural development) and long-term collection for the pet trade. This species is widely distributed in Uzbekistan and is widespread in semi-desert of the central Kyzylkum e.g. north-central Bukhara and southern Navoi (Showler, 2018).

Two individuals were observed during the March 2020 field surveys; an adult and a juvenile which were emerging from winter hibernation burrows. This species is active between March and May and from late May onwards it hides in burrows. The field survey was undertaken in the early stage of the active season and therefore the population within the proposed Study Area may have been under-recorded. Suitable burrows for sheltering tortoises were noted within the Study Area.

Central Asian tortoise was not observed during the June 2020 survey because the survey coincided with the summer hibernation period for this species (when the animals were below ground). However, an assessment of the numbers and density of tortoise burrows was made. This can provide a crude estimate of the number of individuals within the proposed project site, although an individual tortoise can excavate several burrows within its territory and therefore this method for assessing population can therefore result in an over estimation of the size of the population. The June 2020 surveys estimated approximately 1-3 residential holes per hectare within the proposed project site. Additional surveys and destructive searches took place in October 2020 on a 15ha area that has been identified for clearance work. A total of 5 tortoises were recorded suggesting a much lower density on site of 0.2 per hectare.

The occurrence of Central Asian Tortoise does not trigger critical habitat in terms of IFC Performance Standard 6 (PS6); it is not listed as CR or EN on the IUCN Red List, nor is a restricted range species or endemic to Uzbekistan.

Bondarenko *et al* (2017)[49] suggest that the areas with the highest densities of Central Asian tortoise within the Republic of Uzbekistan support populations of >10 animals per hectare; this exceeds the estimated density within the site (i.e. maximum of 3 animals per hectare). Therefore, the results of the March and June 2020 field surveys suggest that the population density of tortoises within the proposed project site is low. There is insufficient secondary data to determine the population within Navoi Region, however considering the relatively small population of tortoises within the proposed Project Site and when applying the 1% rule for national assessments in the UK (and with consideration of the relatively small size of the modified steppe habitat within the Study Area compared to the ubiquity of more natural steppe vegetation within the wider region), there is no reasonable likelihood that the Project area is of regional value for Central Asian Tortoise (i.e. supporting more than 1% of the Navoi Region population). Nevertheless, this species is listed as IUCN VU and small populations are confirmed to be present within the Project area.

Figure 7-37. Central Asian tortoise on site

Source: McAlister (2020). Site visit photos March 2020.

[49] Bondarenko D. A., Peregontsev E. A. (2017) *Distribution of the Central Asian Tortoise (Agrionemys horsfieldii) In Uzbekistan (Range, Regional and Landscape Distribution, Population Densities*). Current Studies in Herpetology, 2017, vol. 17, iss. , pp. 124-?.

Sunwatcher toad-headed agama

Listed as Least Concern by the IUCN. At least two individuals were observed during the field surveys in March 2020.

Figure 7-38. Sunwatcher toad-headed agama on site

Source: McAlister (2020). Site visit photos March 2020.

Other reptiles

Burrows which have the potential to support reptiles (for example lizards, snakes) were observed during the field March 2020 field visit, however this survey visit was not undertaken in the active season for many reptile species. However, the June 2020 field surveys were carried out during the active season for most reptiles. Two reptile species were observed within the proposed project site: steppe agama (*Trapelus sanguinolentus*) [IUCN Least Concern] was observed at approximately 2-3 per 100m transect and rapid racerunner (*Eremias velox*) [IUCN Least Concern] was recorded at approx. 5 per 100m transect.

No snakes were recorded during the June 2020 field surveys, although field signs (tracks) were observed at several rodent/tortoise burrows. An interview with the local shepherd suggested that the following snake species may occur within the site:

- Tatar sand boa (*Eryx tataricus*) [IUCN not yet assessed];
- Gamma snake (*Boiga trigonata*) [IUCN Least Concern, RDB of Uzbekistan];
- Sand racer (*Psammophis lineolatus*) [IUCN not yet assessed];
- Saw-scaled viper (Echis carinatus) [IUCN not yet assessed].

A single species was recorded in habitat adjacent to the proposed project site: desert monitor (*Varanus griseus*) [IUCN Not Yet Assessed, RDB of Uzbekistan], an individual was observed approximately 0.7-0.8km to the north-west of the proposed project site.

Amphibians

The proposed Project site is unsuitable for amphibians. However, the wet drainage channels bordering the proposed Study Area represent suitable aquatic habitat for amphibians, however no observations of vocalising frog or toad species were noted.

7.7 Archaeology and Cultural Heritage

7.7.1 Approach to Assessment

The scope of the archaeology and cultural heritage baseline studies follows the definition set out in EBRD and IFC cultural heritage policy and guidance.

EBRD PR8 defines cultural heritage "as 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 (physical) and intangible cultural heritage, which is recognised at the local, regional or national level, or within the international community. Its scope includes:

- Physical 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, 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." (EBRD 2019).

IFC Performance Standard 8: Cultural Heritage (IFC 2012) aims to protect cultural heritage from the adverse impacts of project activities and support its preservation. Its scope includes:

- Tangible cultural heritage with archaeological, paleontological, historical, cultural, artistic, and religious values.
- Unique natural features or tangible objects that embody cultural values, such as sacred groves, sacred trees and rocks.
- Intangible forms of culture proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.
- Critical Cultural Heritage, internationally recognised or legally protected cultural heritage areas, including proposed World Heritage Sites. Heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes.

The baseline study considers palaeontological sites and archaeological and cultural heritage sites ranging in date from the prehistoric to the modern period and considers both tangible and intangible heritage.

7.7.2 Desktop Study Methodology

The aim of the desktop study is to determine, as far as is reasonably possible from existing records, the nature, extent and significance of the archaeological, historic and cultural heritage within the Study Area. The desktop study describes the historical development of the Study Area and the wider area, placing it in context in order to predict its archaeological and cultural heritage potential; anticipate the type, date, and character of remains; and broadly indicate areas with higher archaeological potential based on factors such as geology, topography, past and present land use, known archaeological remains and vegetation cover.

Historical and modern mapping, aerial and satellite imagery, as well as topographic mapping and geological and soil mapping, was assessed during the preparation of the desktop study.

Available archaeological excavation and survey records were consulted, including regional atlases, academic studies, studies undertaken in association with environmental or development projects, relevant regional and period archaeological and landscape studies, dissertations and readily available historical evidence (see References).

Key data sources include papers on archaeology, anthropology and history in a range of journals, including

proceedings of Soviet state archaeology and palaeontology institutes, History of Material Culture of Uzbekistan, Archaeological Research in Uzbekistan, Nature Institut Français d'Études sur l'Asie Centrale and key synthetic works such as the UNESCO History of Civilizations of Central Asia and Encyclopaedia Iranica.

7.7.3 Stakeholder Consultation

Consultation has been undertaken to obtain information on known archaeological and cultural heritage sites, including the State Register and the national digital inventory of objects of cultural and archaeological heritage created pursuant to Presidential Decree No. R-5181 (16 January 2018). Advice has been sought regarding the organisation of:

- State expertise (field reconnaissance survey, historical and cultural examination of archaeological heritage sites);
- Fieldwork permitting and open list procedures; and
- Chance find procedures and on-call archaeologists. It should be noted that there is no requirement to implement a chance find procedure under the OVOS.

7.7.4 Cultural heritage baseline context

7.7.4.1 Site Location, Palaeontology and Palaeoclimate

Geology, topography and soils

The Project is located in Navoi Region, Karmana district. It is located in a relatively arid pastoral area verging on the Kyzylkum Desert, c.3.7km south of the Zarafshan River. The Aktau and Nuratau Mountains rise c. 25km to the north.

The eastern and western boundaries of the block of land in which the Site lies are formed by irrigation channels of the Zarafshan River. The fertile Zarafshan Valley, located between the Oxus (Amu Darya) and the Jaxartes (Syr Darya), has long been a key communication corridor across central Eurasia, through an arid landscape characterised by agricultural oases. A number of limestone springs (*kuturbulak*) are present to the south of the site, south of M37 road. At this stage it is not known if these are a viable source of water for the Project.

The Site is located immediately north of part of the Silk Roads trading route between Bukhara and Samarkand, which broadly followed the course of the M37 road.

Prior to the construction of large-scale irrigation canals in the 20th century, the sedentary population cultivated fertile land close to the river or oases at Bukhara, c.60km to the west and Samarkand, c.175km to the east. Historically, intermediate areas of desert and semi-desert, such as the Site, were used by pastoral nomads.

The geology of the Site, and the plains of the Zarafshan Valley, comprise deep deposits of Quaternary alluvial and wind-blown deposits, deluvial downhill flood outwash and proluvial mudflow accumulations. These were deposited in four main erosion and accumulation cycles – the Nanaian (Lower Quaternary), Tashkentian (Middle Quaternary), Golodnostepian (Upper Quaternary) and Syrdarinian (Holocene). These form a series of river terraces along the river valley, parts of which have been eroded out and exposed by channels of the Zarafshan River, and correspond to the Lower, Middle and Upper Pleistocene)[50].

Although there are Cretaceous outcrops in the Nurata Mountains and earlier potentially fossiliferous deposits in the immediate vicinity of Navoi, the Site has very limited palaeontological potential and this aspect has therefore been scoped out of assessment.

7.7.4.2 Previous archaeological investigations

An archaeological survey of the Zarafshan Valley was undertaken in the 1930s and 1940s, identifying ancient, early medieval and medieval sites[51]. Large-scale studies of the Neolithic and Bronze Age monuments in the lower

[50] Kostenko, N. P. (1958). Geomorfologicheskij analiz rechnyh dolin gornyh stran (The geomorphological analysis of mountain river valleys). Bulleten Komissii po izucheniyu chetvertichnogo perioda 22: 73-90; Szymczak, K. 2000. Kuturbulak Revisited. A Middle Palaeolithic Site in Zeravshan River Valley, Uzbekistan. Swiatowit Supplement Series P: Prehistory and Middle Ages, II. Central Asia Prehistoric Studies, I. Institute of Archaeology, Warsaw University.
[51] Yakubovsky, A. Yu. (1950) Itogi rabot Tadžikskoj arheologičeskoj èkspedicii za 1948-1950 gg (Results of the work of the Tajik archaeological expedition for 1948-1950). Materials and Studies in the Archaeology of the USSR. No. 15, 9-20; Yakubovsky, A. Yu. (ed.)

reaches of the valley were carried out in the 1950s and 1960s[52]. These studies focussed on known areas of archaeological potential and upstanding monuments. Investigations were led by the Palaeontological Institute and the Institute of History of Material Culture (later the Institute of Archaeology) of the USSR Academy of Sciences (Central Asia and the Caucasus Section, Leningrad; Uzbek Branch) and the Institute of History, Archaeology & Ethnography of the Academy of Science of the Uzbek Soviet Socialist Republic.

The Site has not yet been subject to archaeological investigation (State Expertise). This will be undertaken as part of the national OVOS assessment process.

7.7.4.3 Archaeological and Historical Background

Palaeolithic (100,000 BP to c. 20,000 BP)

Past climates may have influenced the location and extent of past human occupation. The Last Interglaciation in Central Asia (130-75,000 BP (Before Present)) was followed by the First Glacial Maximum (74-60,000 BP), then a warm early phase of the OIS 3 interstadial (59-44,000 BP), finishing with the local Last Glacial Maximum in Central Asia (43-28,000 BP).[53]. Studies suggest that during late Pleistocene and Holocene glacial-interglacial transitions in Central Asia, hominin populations did not abandon the area, but may have aggregated in areas with the least seasonal temperature variations, or found other suitable niches such as caves[54]. This could indicate that the climate was not as hostile as traditionally considered, that populations adapted rapidly to a changing climate, or that in some cases, populations – of both Neanderthals and anatomically modern humans – sought refuge in the milder deserts and plains of the continental steppe during glaciations, perhaps resulting in hybridisation[55].

There are no known archaeological remains of this period in the vicinity of the Site.

Mesolithic (15,000-6000 BCE) and Neolithic (6000-4000 BCE)

During the late Pleistocene, the climate was cold and arid, which is assumed to have constrained human populations to lowland areas. Between c.8000 and 7000 BCE, the climate became milder and more humid[56]. Stray finds of stone tools have been found across the region. Mesolithic and Neolithic tools, animal bone, hearths and ceramics have been recovered from two sites in the foothill plain at Sazagan (Samarkand District), between 900m and 1000m above sea level, dating to c. 6 to 8 thousand years ago[57]. The Neolithic period is characterised by the development of arable agriculture and the domestication of animals, the development of new tools such as sickle blades and polished axes and the extensive use of ceramics. During the Neolithic, populations seem to have focussed on the foothills, around mountain rivers and rock outcrops with springs and raw materials for making stone tools. However, investigations at sites such as Ayak-Agitma in the Kyzylkum Desert[58] indicate once-extensive settlement, foraging and farming in areas which are now arid desert.

There are no known archaeological remains of this period in the vicinity of the Site.

(1950) Trudy' Sogdiysko-Tadjikskoy arheologicheskoy e`kspedicii (Proceedings of the Sogd-Tajik Archaeological expedition). Vol. 1. 1946–1947. Moscow; Leningrad: Academy of Sciences of the USSR.

[52] Gulyamov Ja.G., Islamov U., Askarov, A.A. (1966) Pervobytnaja kul'tura i voznik- novenie orošaemogo zemledelija v nizov'jah Zarafšana (The primitive culture and the emergence of irrigated agriculture in the lower reaches of Zarafshan). Tashkent; Askarov, A. 1962. Pamjatniki andronovskoj kul'tury v nizov'jah Zeravšana. (Monuments of Andronovo culture in the lower reaches of Zeravshan). History of material culture of Uzbekistan (IMKU, IMKUz), Vol. 3. Fan, Tashkent/ Samarkand

[53] Meese, D.A., Gow, A.J., Alley, R.B., Zielinski, G.A., Grootes, P.M., Ram, M., Taylor, K.C., Mayewski, P.A. & Bolzan, J.F. (1997) The Greenland Ice Sheet Project 2 depth-age scale: methods and results. Journal of Geophysical Research: Oceans, 102: 26411-26423; Glantz, M. (2010) The history of hominin occupation of Central Asia in review. Asian paleoanthropology: from Africa to China and beyond (ed. by C.J. Norton and D.R. Braun): 101-112. Springer, Dordrecht

[54] Beeton, T.A., Glantz, M.M., Trainer, A.K., Temirbekov, S.S., Reich, R.M and Temibekov, S.S. 2014 The fundamental hominin niche in late Pleistocene Central Asia: a preliminary refugium model. Journal of Biogeography Vol. 41, No. 1, 95-110

[55] Glantz, M., Viola, B., Wrinn, P., Chikisheva, T., Derevianko, A.P., Krivoshapkin, A., Islamov, U., Suleimanov, R. & Ritzman, T. (2008) New hominin remains from Uzbekistan. Journal of Human Evolution, 55, 223-237; Mallol, C., Mentzer, S.M. & Wrinn, P.J. (2009) A micromorphological and mineralogical study of site formation processes at the late Pleistocene site of Obi-Rakhmat, Uzbekistan. Geoarchaeology, 24, 548-575; Kolobova, K.A., Krivoshapkin, A.I., Derevianko, A.P. & Islamov, U.I. (2011) The Upper Paleolithic site of Dodekatym-2 in Uzbekistan. Archaeology, Ethnology and Anthropology of Eurasia, 39: 2-21.

[56] Vinogradov, A.V. & Mammadov, E.D. (1975) Pervobytnyj Ljavljakan. Ètapy drevnejšego zaselenija i osvoenija Vnutrennih Kyzylkumov (Primaeval Lyavlyakan. Stages of the most ancient settlement and development of Inner Kyzylkum). Nauka, Moscow.

[57] Dzhurakulov M.D. & Kholmatov N.U. (1991) Mezolit i neolit Srednego Zarafšana (Sazaganskaja kul'tura). (Mesolithic and Neolithic Middle Zarafshan (Sazagan culture). Tashkent.

[58] Szymczak K., Gretchkina T. Ayakagytma (1995) a new Early Neolithic (Kelteminarian) site in SE Kyzyl-kum Desert, Neo-Lithics: Newsletter of Southwest Asian Lithics Research: 16-21.

Eneolithic/Chalcolithic (4000-3000 BCE) and Bronze Age (3000-900 BCE)

The Bronze Age is characterised by increasing aridisation of the climate, decreasing wild resources, the development of livestock breeding[59]. The Indo-Iranian Andronovo cultural complex flourished between c. 2000 and 900 BCE. The local Alakul sub-culture developed between the Amu Darya and Syr Darya Rivers in 1800–1500 BCE. The economy was based on herding horses, sheep and cattle, with seasonal camps and islands of agriculture; agricultural settlements were concentrated along small rivers and around lakes and oases. Technological developments include horse-drawn chariots, the spread of axes and spears, and burial mounds. Pit graves were marked by square or round mounds, low earthen embankments and sometimes had stone kerbs (kurgans). Burials were accompanied by food, pottery, flint arrowheads, bronze tools and weapons, copper and paste beads, and gold and copper earrings.

From the Bronze Age to the medieval period, rock outcrops, such as those at the Sarmishsay Natural and Archaeological Museum-Reserve (State Register, Archaeological monuments Nos. 87-89, Navbakhor District: World Heritage Tentative List Ref. 5307), were decorated with 'picture galleries' depicting images of people, animals, hunting and grazing[60].

There are no known archaeological remains of this period in the vicinity of the Site.

Sogdian City States (c. 700 BCE – 4th century CE)

In the 7th to 6th century BCE, the Zarafshan valley formed part of the Bactrian Kingdom, which traded gold and bronze objects with China, Persia and Europe, and practiced irrigated agriculture. By 700 BCE, a series of Sogdian city states had developed along the Zarafshan Valley, eventually merging to become Bukhara[61]. Bukhara was captured and annexed by the Persian Achaemenid Empire in the in 546–539 BCE, following the conquests of Central Asia by Cyrus the Great. Persian control weakened c. 400 BCE and Sogdiana became independent.

Known cultural heritage assets in the vicinity of the Site

A series of nomadic burial mounds were excavated in the vicinity of the village of Hazara, located c. 5km north-northeast of the Project area, in the 1950s.[62] These have been variously attributed to Sogdian pastoralists, Sarmatian tribes attacking Greco-Bactria, or Yuezhi passing through Sogdia.[63]

The Navoi Region State Register lists a series of settlement sites in the area of indeterminate date, including:

- Kitirbulok Tepe (Round Hill) at Duldul village (Archaeological Monument No. 76);
- Dormontepa, at Bobodogo/ Durmenanta rural area (Archaeological Monument No. 135); and
- Diggaron, at Katagan village (Archaeological Monument No. 20).

Hephthalite Empire and Turkic Kaganate (5th to 7th century CE)

Bukhara and Samarkand went on to became part of the multinational Hephthalite Empire, led by the trading city of Paikend, c. 40 km to the west of Bukhara. The Hephthalites expanded in the later 5th century CE, trading with Iran, Byzantium, India, and China. In 563-567 the Hephthalites were defeated by semi-nomadic Turkic tribes of Altai. Allied with Byzantium and exacting tribute from China, the Western Turkic Kaganate flourished in the 7th century CE. The caravan route between Merv, Bukhara, Samarkand and Chach (Tashkent) prospered, trading silk, metalwork, jewellery and spices with India, China and Persia.

[59] Askarov A. (1962) Pamyatniki andronovskoy kul'tury v nizov'yakh Zeravsha-na. (Monuments of Andronovo culture in the lower reaches of Zeravshan). IMKU. V'shch.Z; Guljamov, J.G., Islomov U., Askarov A. (1966) Pervobytnaja kul'tura i vozniknovenie orošaemogo zemledelija v nizov'jah Zeravšana (Primitive culture and the emergence of irrigated agriculture in the lower reaches of Zeravshan). Tashkent
[60] Tashkenbaev N.Kh. (1966) Naskal'nyye izobrazheniya Korongursaya i Sarmysha. (Rock Images in Korongursay and Sarmysh. Istoria materialnoi kultury Uzbekistana 8: 36–39; Khujanazarov, M. (2001) Petroglyphs of Uzbekistan. In Tashbaeva, K., Khujanazarov, M., Ranov, V., Samashev, Z. (eds) Petroglyphs of Central Asia. International Institute for Central Asian Studies, Bishkek: 80–121.
[61] De la Vaissière, E. (2005) Sogdian Traders: a History. Brill, Leiden; Boston.
[62] Obelchenko, O.V. (1956) 'Kuyu-Mazarsky mogil'nik' (The Necropolis of Kuyu-Mazar) Trudy IIA AN Uz. SSR VIII, Tashkent: 205-227; Obelchenko, O.V. (1963) 'Kurgany okolo sel. Khazara' (The Kurgans Near the Village of Khazara) IMKUz, Tashkent: 57-65.
[63] Benjamin, C. (2007) The migration of the Yuezhi through Sogdia. The Yuezhi. Origin, Migration and the Conquest of Northern Bactria. Brepols, Turnhout: 147-157

Arab conquest and Khanate of Transoxiana (Māwarāʿ al-Nahr/ Maveraunnakhr) (8th to 16th century)

The Muslim conquest of Sogdiana began in 674, establishing the rule of the Umayyad Caliphate in Maveraunnakhr – the land on the right bank of Amu Darya River. Bukhara was captured in 709 and an Arab garrison was installed to secure against rebellion. It became the capital of the Iranian Samanid Dynasty (819–1005), and was an Islamic cultural centre for art, architecture, literature, and thought. Sogdiana was incorporated into the Uighur Khaganate (744–840), selling Chinese silk on to the west. The Uighurs adopted the Sogdians' writing system and religious faiths, such as Zoroastrianism, Manichaeism, Buddhism, and Christianity. By the 10th century the largely Zoroastrian Sogdians had mostly converted to Islam.

Known cultural heritage assets in the vicinity of the Site

The course of the Silk Road connecting Bukhara and Samarkand is located immediately south of the Project, broadly following the course of the M37 highway from Navoi to Bukhara. The **Silk Roads Sites in Uzbekistan** (Ref.: 5500) are on Uzbekistan's Tentative World Heritage List.

The Navoi Region State Register lists a series of settlement sites in the area, including the **6th to 11th century settlement of Hazora/Khazara at Toshrabot** (Archaeological Monument No. 33) and the **Ganchtepa (Toshrabot-2) early medieval settlement at Saribosh village** (Archaeological Monument No. 134). Hazora was a centre of pottery production during the middle ages. The Panjakent Division of the Sogdian-Tajik Archaeological Expedition (1946) identified the remains of an ancient settlement, the walls of the city citadel and several small ribats (fortified inns); excavations recovered extensive pottery assemblages, including a ritual vessel from a Zoroastrian burial.

The **11th century Deggaron Mosque** (Navoi Region State Register Architectural Monument No. 44) is one of the one of the earliest preserved Islamic religious buildings, which may have been converted into a mosque from a Zoroastrian temple. The **Deggaron Complex** (State Register Architectural Monument No. 45) includes the *khanaka* (monastery/inn) and mausoleum of Shaykh Malono Orif Deggaroni (1313–1376) which has recently been restored. Deggaroni was a mentor of Bohauddin Naqshband (1318–1389), the founder of what would become one of the largest Sufi orders. The complex is a pilgrimage site and includes a museum, garden, wells, a cooking and dining area and a chillahona (prayer area).

Figure 7-39: Deggaron Mosque

Source: McAlister (2020). Site visit photos March 2020.

The **Sardoba Malik (Royal Well)**, an underground well under a domed structure, is located on the south side of the M37 highway immediately south of the caravanserai (State Registered Archaeological Monument, Navoi Region No. 42). It was built in the 11th to 12th century, supplied by the underground Narpai canal and irrigation channels from the Zaravshan River.

Figure 7-40: Sardoba Malik

Source: McAlister (2020). Site visit photos March 2020.

The **Rabati Malik (Royal Fortress) Caravanserai**, a State Registered Architectural Monument (Navoi Region No. 43) and Tentative WHS List site (Ref.: 5308), is located c. 12 km east of the Project, north of the M37 highway. Built in the late 11th century, and reconstructed in the 12th century, it was a palatial residence and headquarters of the Karakhanids. Following the Mongol invasions in the 13th century, it gradually became a roadside caravanserai on the main road from Samarkand to Bukhara. The caravanserai remained in use until the 18th century. The main facade was largely demolished in the 1940s and 1950s. With the exception of the 18m high portal, the caravanserai flanking walls were demolished by the earthquake of 1968. Archaeological investigations were carried out in the 1970s and 1997-2001; clarifying its layout and recording the caravanserai's cemetery. This is one of the largest caravanserais in Central Asia. Its building techniques are analogous with those noted in the contemporary Sulton-Saodat religious complex in Termez (Surxondaryo Region), the Samanid Mausoleum and Namazgoh Mosque in Bukhara (Bukhara Region) and buildings in the Karakhanid capital, Uzgen (Osh Region, Kyrgyzstan).

Figure 7-41: Rabati Malik Caravanserai entrance

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-42: Rabati Malik Caravanserai inside

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-43: Computer Generated Image of Rabati Malik Caravanserai

Emirate of Bukhara (16th to 19th century)

The Shaybanids (1500–1601) made Bukhara the capital of their state, the Khanate of Bukhara, from the mid-16th century. They were succeeded by the Astrakhanid dynasty (1602–1747) and the Uzbek Manghit dynasty (1753–1920). The area declined in prosperity, partly due to the reduction in caravan trade along the Silk Roads resulting from the rise of maritime trade routes.".

In the late 18th century, irrigation works began to be redeveloped in the Zarafshan valley during the reign of Manghit Emir Shah Murad (1785–1800), and continued under his son, Emir Haider (1800–1826). In the early 19th century, cattle breeding was common; Uzbek nomads spent their summers in yurts and their winters in cities and villages. The transition to settled agriculture was slow.

The Emirate, established in 1785, became a vassal protectorate of the Russian Empire in 1868, but the rule of the khans persisted until the Russian Revolution in 1917.

Known cultural heritage assets in the vicinity of the Site

In the 17th century, a fortress was built in the village of Deggaron (Hazora). Parts of the remains of the fortress wall survive.

Figure 7-44: Remains of Fortress at Hazora

Source: McAlister (2020). Site visit photos March 2020.

Figure 7-45: OHL Tower built on the remains of the fortress wall

Source: McAlister (2020). Site visit photos March 2020.

Soviet period (1920 – 1991) and Independence (1991–present)

In 1920, the Red Army captured Bukhara and extinguished the khanate of Bukhara. The Uzbek S.S.R. (now Uzbekistan) was created in 1924. Traditional pastoral nomadism was virtually abolished by Soviet forced collectivisation in the 1920s and 1930s. Irrigation projects were undertaken along the Zarafshan Valley to colonise the steppe and develop intensive cotton monoculture. Navoi City was founded in 1958 adjacent to the historic Silk Road settlement of Karman. Navoi was a gold and uranium mining centre, with a smelting plant in the area of Karman village. Uzbekistan declared independence from the U.S.S.R. in 1991.

The site location is indicated in red. Overhead power lines cross the south of the site. It appears to show a vineyard at Uzumzor [Узумзор] to the east; the place name means 'vineyard' in Uzbek.

Known cultural heritage assets in the vicinity of the Site

7.7.4.4 Tangible Cultural Heritage

Archaeological Sites

The Project site has not been subject to archaeological field survey. The wider area has not been subject to substantial or recent archaeological field research.

A review of the known archaeology and history of the wider Project area indicates that there is low potential for the presence of Palaeolithic, Mesolithic and Neolithic material. Throughout the later prehistoric, antique and medieval periods, it is likely that this semi-arid desert area was populated by mobile herders. There is some potential for the presence of stray finds (casual losses), travellers' campsites and for burial mounds (*kurgan*).

Any terrestrial archaeological remains within the Project Area are likely to comprise:

- In situ surface scatters or features identified on bare ground.

- Surface scatters identified in areas of disturbed ground or in up-cast spoil from groundworks.
- Buried features, which may have moderate depth and complexity.

The visibility of sites may be hampered by burial under wind-blown sands.

Natural Features and Tangible Objects with Cultural Values

Unique natural features or tangible objects that embody cultural values, such as sacred plants, rocks and watercourses can be significant aspects of cultural landscapes. Interviews with local communities do not indicate the presence of any natural features and tangible objects with cultural values.

7.7.4.5 Intangible Cultural Heritage

Intangible cultural heritage is defined as the practices, representations, expressions, as well as the knowledge and skills (including instruments, objects, artefacts, cultural spaces), that communities, groups and, in some cases, individuals recognised as part of their cultural heritage. It is sometimes called living cultural heritage and includes oral traditions and expressions, including language; performing arts; social practices, rituals and festive events; knowledge and practices concerning nature and the universe; and traditional craftsmanship (UNESCO, 2003).

UNESCO Representative List of Intangible Cultural Heritage

Uzbekistan's entries on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity comprise:

- Khorazm dance, Lazgi (2019). The movements of the dance reflect the sounds and movements of nature, flora and fauna. It is performed during national holidays and folk festivities and during community and family events.
- Margilan Crafts Development Centre, safeguarding of the atlas and adras making traditional silk textile production technologies (Register of Good Safeguarding Practices; 2017).
- NavUzbekistan New Year, March 21 (2016). A variety of rituals, ceremonies and other cultural events take place for a period of about two weeks.
- Palov culture and tradition (2016). Palov is a traditional dish of rice, meat, spices and vegetables.
- Askiya, the art of wit (2014). Askiya is often performed in folk celebrations, festivities, family-related rituals and get-togethers.
- Katta Ashula (2009). A type of traditional song that forms part of the identity of various peoples of the Ferghana Valley.
- Cultural space of Boysun District (2008). The Boysun District located in south-eastern Uzbekistan on the route from Asia Minor to India, is one of the oldest inhabited areas of Central Asia. With the diminishing importance of the Silk Road and the political changes in Central Asia, the region became quite isolated, which favoured the preservation of ancient traditions that show traces of several religions, including shamanistic beliefs, Zoroastrianism, Buddhism and Islam.
- Shashmaqom music (2008). The classical music tradition of Shashmaqom has evolved in the urban centres of present-day Tajikistan and Uzbekistan, fusing vocal and instrumental music, melodic and rhythmic idioms and poetry. Its origins date back to the pre-Islamic era.

It is not assessed that the continuation and transmission of any entries on the Representative List would be impacted by the Project.

Local intangible cultural heritage activities

Local crafts related to intangible heritage include silk production and weaving, rug and carpet-making and motifs; ceramics and varnished miniatures; wood-carving; metal chasing and embossing; silk and gold embroidery and tapestry; the Uzbek language; and culinary traditions.

Religious practices in the locality comprise Muslim 88% (mostly Sunni), Eastern Orthodox 9%, other 3%. Uzbekistan has experienced a resurgence in religious practice since the 1980s, with increased activities of religious schools, neighbourhood mosques and religious orders. The surrounding area has a number of Islamic

centres with their *maktabs* (primary schools) and *madrasahs* (seminaries) organized and supported by Muslim religious educators and their followers.

The town of Hazora, c.5km northeast of the Project, is the focus of pilgrimages to the Mavlono Orif Deggaroni Complex. The Mavlono Orif Deggaroni Mosque and Complex, are State Registered architectural monuments (Navoi Region State Register Architectural Monument No. 44 & 52), but no particular intangible heritage elements are designated or registered. The Mavlono Orif Deggaroni complex is associated with the Naqshbandi, a major Sunni spiritual order of Sufism, an active movement of international significance.

There are no associations with particular innovations, technical or scientific development.

7.7.4.6 Critical Cultural Heritage

Critical Cultural Heritage is defined as internationally recognized or legally protected cultural heritage areas, including proposed World Heritage Sites, or the heritage of communities who use, or have used within living memory the cultural heritage (IFC, 2012).

The Project site itself does not contain any internationally recognized or legally protected cultural heritage areas. Immediately south of the Project, the M37 road broadly follows the course of the Silk Roads, a Tentative List World Heritage Site (Ref. 5500). About 5km northeast of the Project site is the village of Hazora, site of the Malono Orif Deggaroni Mosque and Complex (Nos. 44 & 52), associated with the mentor of the founder of the Sufi Naqshband order and the site of pilgrimages.

Community Use of Cultural Heritage

A cemetery is located south of the Mavlono Orif Deggaroni Complex at Hazora (State Register Architectural Monument No. 52) [4.60km to NNE of Project: 40° 9'3.34"N 65° 0'44.04"E]. It is not clear whether the cemetery is included in this designation, and/or is subject to separate protection under statute law, religious law or customary practice.

Potential Significance of Archaeological Remains

No internationally recognised or legally protected cultural heritage areas have been identified within the Study Area. The Study Area has moderate potential to contain significant, stratigraphically intact archaeological remains; any remains present may have been impacts by erosion caused by physical, climatic and chemical weathering. It is anticipated that any superficial or buried archaeological sites within the Project area are likely to be classed according to IFC criteria as 'replicable cultural heritage' (IFC, 2012), and can be mitigated by appropriate archaeological investigation, recording and dissemination.

Internationally Recognised Cultural Heritage Areas

World Heritage properties

Uzbekistan has four cultural sites inscribed on the World Heritage List. The nearest is the **Historic Centre of Bukhara** (inscription date: 1993; ref: 602bis). Bukhara, which is situated on the Silk Route, is more than 2,000 years old. It is the most complete example of a medieval city in Central Asia, with an urban fabric that has remained largely intact. Monuments of particular interest include the famous tomb of Ismail Samani, a masterpiece of 10th-century Muslim architecture, and a large number of 17th-century madrasas.

Bukhara is located c. 60km southwest of the Site. Given its distance from the Site, the Project will not impact upon it.

Tentative List World Heritage Sites

A Tentative List is an inventory of those properties which each State Party intends to consider for nomination to the World Heritage List. There is one cultural Tentative List World Heritage Site located within or in the vicinity of the Study Area:

- **Silk Roads Sites in Uzbekistan** (Ref. 5500) facilitated trade in silk and materials such as precious metals and stones, ceramics, perfumes, ornamental woods, and spices in return for cotton and wool textiles, glass, wine, amber, carpets and horses. This trade was sustained by a system of caravanserais, commercial settlements, trade cities and forts, spreading ideas, scientific and technological developments. Components in the vicinity of the Project include the Rabati Malik caravanserai, the Vobkent Minaret, and sites in

Karmana including the Mir-Sayid Bakhrom Mausoleum and Qosim Sheikh complex. The course of the M37 road immediately south of the Site, between Bukhara and Samarkand, follows the course of the Silk Roads.

Table 7-10 Internationally Recognised Cultural Heritage Areas in the vicinity of the Project

International designation	UNESCO Reference No.	State Register	State Register No.	Description	Distance from Site	Latitude (N) DMS	Longitude (E) DMS
World Heritage State Party Tentative List	TL Ref. 5500	Architectural/ Archaeological monuments	Var	Silk Roads Sites in Uzbekistan	0.2km to S	In vicinity of Project, broadly aligned with route of M37 road	
World Heritage State Party Tentative List	TL Ref. 5308	Architectural Monument	No. 43	Caravanserai Malikrabot. Date: 11th century. «Sardoba» MFY. Karmana District.	12.35km to E	40° 7' 21.86''N	65° 8' 53.75''E
		Architectural Monument	No. 42	Sardoba Malikrabot (Well). Date: 11th century. «Sardoba» MFY. Karmana District.	12.40km to E	40° 7' 16.54''N	65° 8' 48.95''E
		Archaeological monuments	No. 30	Raboti-Maliktepa (Bekmehmontepa). Date: 6th – 12th century. Sardoba. Karmana District.	c.12km to E	Uncertain U	

Legally Protected Cultural Heritage Areas

State Register sites located in the vicinity of the Study Area are presented in Table 7-11. None of these protected areas are located within the Project area, and the Project would not impact upon them.

Table 7-11 Extract from the State Register sites on the National List of Immovable Property of the Intangible Cultural Heritage – Navoi Region, Karmana District & Kyzyltepa District

State No.	Name of the object	Date	Address	Right to real estate	Distance from Site	Latitude (N) DMS	Longitude (E) DMS
Archaeological monuments							
20.	Diggaron	Indeterminate	Hazora microdistrict, Katagan village	State property. Navoi Regional Cultural Heritage Department based on the right of operative management.	5.15km to NNE	40° 9'19.61"N	65° 0'41.21"E
30.	Raboti-Maliktepa (Bekmehmontepa)	6th – 12th Century	Sardoba	State Property. Navoi Regional Cultural Heritage Department based on the right of operative management.	c.12km to E	U	U
33.	Hazora	6th – 11th centuries	"Hazora" (Toshrabot) MFY, Livestock village	State property. Navoi Regional Cultural Heritage Department based on the right of operative management	U	U	U
76.	Kitirbulok Tepe (Round Hill)	Not specified	"Dul dul" MFY, Duldul village	State property. Navoi Regional Cultural Heritage Department	10.5km to NE	40°10'39.50" N	65° 4'41.55"E

State No.	Name of the object	Date	Address	Right to real estate	Distance from Site	Latitude (N) DMS	Longitude (E) DMS
				based on the right of operative management			
134.	Ganchtepa (Toshrabot-2)	Early Middle Ages	Hasancha MFY, Saribosh village	State property. Navoi Regional Cultural Heritage Department based on the right of operative management	7.70km to NW	40° 9'1.29"N	64°53'30.82" E
135.	Dormontepa	Not specified	"Bobodogo" MF, Durmenanta rural area	State property. Navoi Regional Cultural Heritage Department based on the right of operative management.	7.05km to N	40°11'2.55" N	64°58'48.41" E
Architectural monuments							
42.	Sardoba Malikrabot (Well)	11th century	"Sardoba" MFY	State property. Navoi Regional Cultural Heritage Department based on the right of operative management.	12.40km to E	40° 7'16.54"N	65° 8'48.95"E
43.	Caravanserai Malikrabot	11th century	"Sardoba" MFY	State property. Navoi Regional Cultural Heritage Department based on the right of operative management.	12.35km to E	40° 7'21.86"N	65° 8'53.75"E
44.	Mavlono Orif Deggaroni Mosque	11th century	"Hazora" MF, Katagon rural settlement	State property. Navoi Regional Cultural Heritage Department based on the right of operative management. The foundation is attached to the charitable public foundation on a free use agreement.	5.10km to NNE	40° 9'18.52"N	65° 0'39.05"E
52.	Mavlono Orif Deggaroni Complex	11th century	"Hazora" MF, Katagon rural settlement	State property. Navoi Regional Cultural Heritage Department based on the right of operative management. The foundation is attached to the charitable public foundation on a free use agreement.	4.9km to NNE	40° 9'13.55"N	65° 0'44.87"E

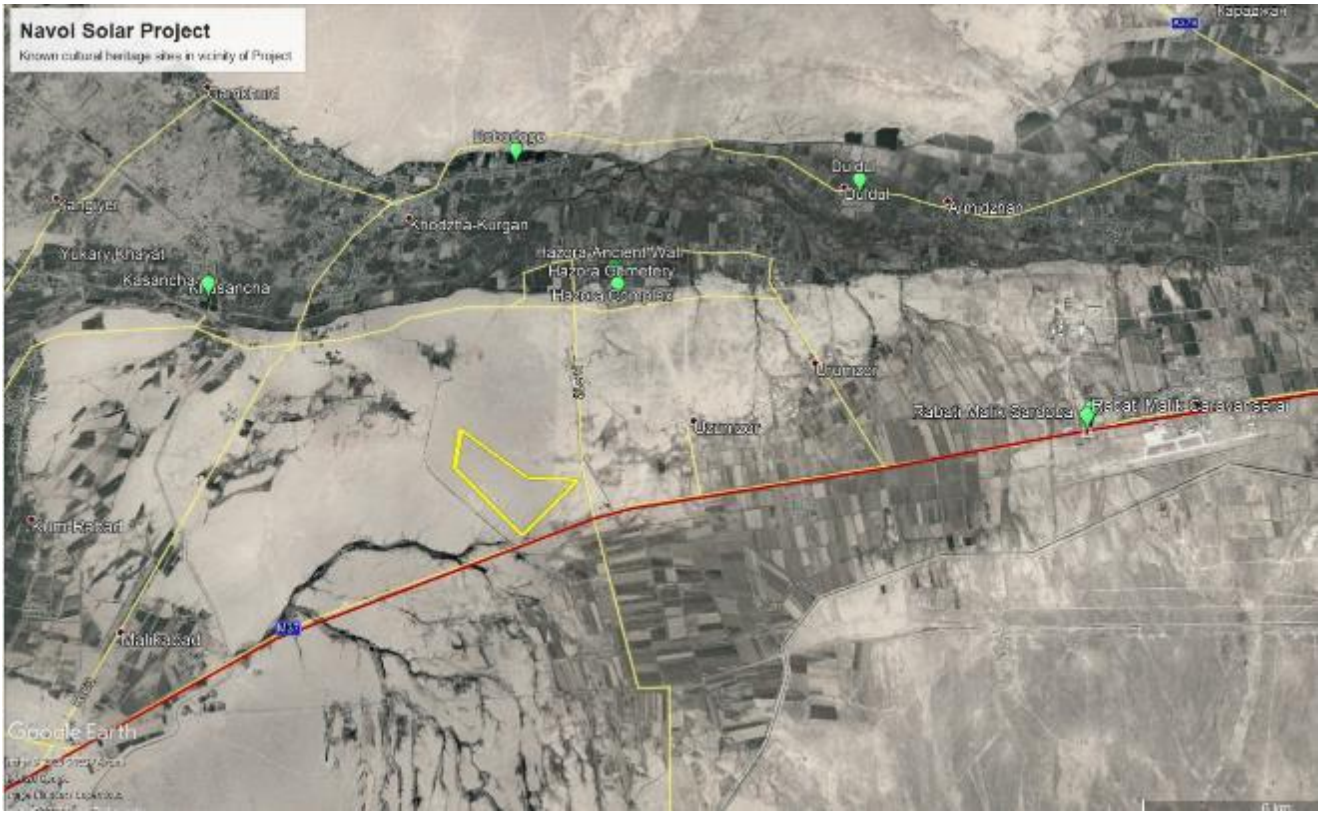

Figure 7-46 Location of known cultural heritage sites in the vicinity of the Project

7.7.5 Archaeology and Cultural Heritage Receptors and Receptor Sensitivity

The archaeological sites known from the wider area are considered to be typical of the region. Some have been designated according to local, national or international standards in terms of their outstanding aesthetic, artistic, documentary, environmental, historic, scientific, social, or spiritual value. The assessment of the scientific value of any archaeological sites may change following intrusive investigation and recording work.

Intangible cultural heritage activities are assessed as being of local significance and no particular elements are designated or registered, and consultation has not indicated any associations with particular innovations, technical or scientific developments, movements or specific individuals of regional or national significance. The Mavlono Orif Deggaroni Complex at Hazora, 5km north of the site, is a spiritually significant focus of pilgrimage associated with the Naqshbandi Sufi order, an active movement of international significance.

Livelihood issues related to traditional land use and land access are addressed in Section 7.8, Socio-economic Conditions.

7.7.5.1 Sensitivity Criteria

Receptor sensitivity is the degree to which a particular receptor is more or less susceptible to a given impact. Receptor sensitivity takes into consideration the receptor's resilience and value.

Receptor resilience or vulnerability describes the ability of the receptor to withstand adverse impacts. It takes into consideration activity-impact-receptor pathways, as well as environmental characteristics that might make it more or less resilient to change. As such, a receptor can be considered as existing within a spectrum of 'vulnerable' to 'resilient', with the former more likely to experience significant impacts as a result of a given change.

Receptor value takes into consideration its quality and its importance as represented, for example, by its conservation status, its cultural importance and/ or its economic value. The evaluation of receptor sensitivity employs a qualitative scale of negligible, low, moderate, and high for each of the sensitivity characteristics, resilience and value.

In the absence of any national or international consensus on archaeological impact assessment methods for non-designated resources, the criteria used to determine receptor sensitivity, magnitude, nature and significance of

impacts on cultural heritage are based on the International Commission on Monuments and Sites (ICOMOS) 2011 Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (appendices 3A and 3B)[64]. It is acknowledged that it contains much reference to World Heritage, but the assessment tools contained in its appendices are applicable to all cultural heritage assets.

None of the sites or objects have been previously recorded or designated, so there are no assigned national designation rankings to apply. The sensitivity of an archaeological or cultural heritage receptor also reflects how vulnerable or robust a site, monument, artefact, assemblage or complex is to damage or destruction by a number of factors, including:

- Natural conditions, such as erosion, flooding, wave movement and chemical deterioration.
- Environmental conditions, such as faunal and floral impacts.
- Human conditions, such as vandalism or interference, recreational use, vehicular damage.
- Project-related conditions, including construction and operational impacts.

The assessment of heritage value with regard to research agendas is important in establishing the significance and value of archaeological remains. The value of archaeological remains and sensitivity of archaeological sites, monuments and artefact find spots is judged upon the extent of survival, their current condition, rarity, representativeness, the importance of the period to which the remains date, fragility, connection to other monuments (group value), potential to contribute to knowledge, understanding and appreciation, potential for future research, the values assigned by local experts and the extent of documentation enhancing the monuments' value.

Table 7-12 presents the sensitivity criteria specific to the archaeology and cultural heritage study.

Table 7-12 Archaeology and cultural heritage sensitivity criteria

Sensitivity	Criteria
High	Sites of acknowledged international importance inscribed as World Heritage Sites. Individual attributes that convey Outstanding Universal Value. Nationally-designated archaeological monuments, sites, buildings or historic landscapes protected by national laws. Undesignated sites, structures or historic landscapes of demonstrable national value. Assets that can contribute significantly to acknowledged national or international research objectives, whether designated or not. Well or extremely well preserved historic landscapes with considerable or exceptional coherence, time-depth, or other critical factors. Intangible Cultural Heritage inscribed on national registers, or associated with movements or individuals of national or global significance.
Moderate	Designated or undesignated sites, landscapes or seascapes that can contribute significantly to regional research objectives. Designated or historic buildings that have exceptional qualities or historical associations, with important historic integrity and contributing significantly to historic character. Designated or undesignated historic landscapes or seascapes of regional value, which would warrant designation. Intangible cultural heritage areas in local registers, or associated with movements or individuals of local importance.
Low	Designated or undesignated assets of local importance. Assets compromised by poor preservation and/ or poor survival of contextual associations, or with little or no surviving archaeological interest. Assets with potential to contribute to local research objectives. Historic buildings of modest quality in their fabric or historical associations, or buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character. Undesignated historic landscapes or seascapes with importance to local interest groups, whose value is limited by poor preservation and/ or poor survival of contextual associations. Landscapes or seascapes of little or no significant historical interest.

[64] ICOMOS 2011 [under review] Guidance on heritage impact assessments for Cultural World Heritage Properties. International Council on Monuments and Sites. Paris. Available at: http://openarchive.icomos.org/266 /

Sensitivity	Criteria
	Intangible cultural heritage activities of local significance, or associated with individuals of local importance. Poor survival of physical areas in which activities occur or are associated. Areas with few intangible cultural heritage associations or vestiges surviving.
Negligible	Assets with little or no surviving archaeological interest. Buildings or urban landscapes of no architectural or historical merit; buildings of an intrusive character. Areas with few intangible cultural heritage associations or vestiges surviving.
Unknown	The importance of the resource cannot be ascertained.

Source: ICOMOS, 2011

7.7.5.2 Receptor Sensitivity

Table 7-13 presents the level of sensitivity for each receptor identified.

Table 7-13 Sensitivity criteria for archaeology and cultural heritage receptors

Receptor	Sensitivity
Tangible cultural heritage: archaeological sites (presently unknown) Assess impacts on any sites identified by State Archaeological Expertise	Unknown – anticipated to be low
Natural features/ tangible objects with cultural values	N/a
Intangible cultural heritage: cultural knowledge, living traditions & religious practices [Scope out Hazora pilgrimage – distant, no impact on access/practices/setting]	N/a
Critical Cultural Heritage: Assess impacts on TL WHS Silk Roads [large linear site, no impact on fabric, existing impacts on setting from modern infrastructure along course of M37] Assess impacts on any State Register sites identified in proximity to site in the course of consultation. [Scope out impacts on TL Rabati Malik Caravanserai, Vobkent Minaret via ZTV] [Scope out Hazora cemetery]	Very High (TL WHS) High (cemetery)

The sensitivity of any currently unknown archaeological remains that may survive within the Project Area cannot be accurately determined at the time of writing. Their sensitivity would be derived from their potential to contribute to our scientific understanding of past human activities and environments. However, based on the likely level of preservation of remains and the condition of remains from the wider area, it is assessed that their sensitivity would be low.

7.8 Socio-economic Conditions

7.8.1 Introduction and Methodology

The proposed project site is located in the Navoi Region, the largest of Uzbekistan's 12 regions (111.09 km^2), situated in the central part of the country. The Solar Park is located approximately 30 km west from the town of Navoi (the regional) administrative capital in the Navoi District (also called Karmana). Navoi District is one of the eight districts forming the Navoi Region. It lies south of the region and is directly bordering the districts of Kyzyltepa, Navbakhor, Kanimekh, Khatyrchi, and Nurata. Navoi District is also adjacent to the region of Samarkand and within it, to Pakhtachi District.

The closest residential areas identified around the Project are the villages of Uzumzor (2.6 km east from the site boundary) and Farkhod (2.2 km south from the site boundary). The area is characterised by desert conditions, with irrigated land and the Zarafshan river located approximately 4.3 km north from the site.

This section was developed using publicly available secondary sources and site surveys. The social surveys undertaken for the ESIA were carried out in March 2020 and again on 24-26 June 2020 in Uzumzor and Farkhod. Key social informants were selected based on the length of time they have lived in these settlements, as well as on their ability to convey information related to potentially vulnerable groups in the community, such as women,

children and the elderly. The information provided in these surveys has not been corroborated with official data because there is no official data available at this level.

The interviewees included residents (mostly men for Uzumzor and mostly women for Farkhod), as well as the farmers whose lands are in the Project area. Further details about land use in the Project area are provided in Section 6.7.9.

To allow surveys to take place during the COVID-19 pandemic, the survey team adopted the necessary precautions and safety measures. All meetings were held outdoors practising social distancing, and all participants were wearing face masks (see Figure 7-47). The survey team also had face masks and sufficient sanitiser. It is important to note that individual door to door surveys were not allowed at the time the ESIA was being prepared.

Figure 7-47. Survey at Farkhod Settlement (25 June 2020)

7.8.2 Social Area of Influence

Following the methodology described in Section 4.1.1, from the social perspective, the Area of Influence (AOI) would be initially defined by the same site-specific Project footprint, and complemented by potential social receptors (e.g. communities, workers, local private businesses). The spatial boundary of the AoI from a social perspective is determined by:

- A **Core AoI** comprised of the Project site location plus a 500 m buffer area around it. In addition to the Project site itself, it includes the following cattle-grazing farms:
  - Farm A located in the northern border of the Project site; and
  - Farm B located in the southern border of the Project site.
- A **Direct AoI** comprised of the local vicinity (approximate 2-2.5 km radius) of the Core AoI, which is linked to the local internal road of the expected Project entrance and highway M37. It includes the following communities:
  - Uzumzor, located approximately 2 km east of the Project site, in close proximity to an internal road and M37; and
  - Farkhod, located approximately 2.5 km south of Project site and linked to M37 by an internal road.

- An **Indirect AoI** comprised of the outer vicinity (approximate 5-6 km radius) of the Core AoI, which is not directly linked to both the local internal road and M37. It includes the following:
  - Khazara, located approximately 4.5 km north of the Project site, connected to the internal road and several other communication lanes, excluding M37;
  - Uzumzor, located approximately 6 km east of the Project site, connected to M37;
  - Two residential settlements ('Eastern Settlements') located approximately 4 and 6 km east of the Project site, connected to M37; and
  - Other potential industrial activities that are located along the M37.

7.8.3 Population

According to the State Committee of the Republic of Uzbekistan on Statistics[65], there are 34,022,853 inhabitants in the country as of 28 February 2020.

The Navoi Region has a population 992,500[66] (as of 1 October 2019), or about 3% of the whole population of Uzbekistan. This figure is almost equally split between the urban (483,300) and rural (509,200) population. Navoi is the second least populated region of Uzbekistan after Syrdarya. Within the region, the population of Navoi/Karmana District is estimated to represent around 129,300[67] people.

Data collected during the site visits indicate that there are approximately 700 residents in the vicinity of the Project: 600 residents (or approximately 100 families) in Uzumzor, and 100 residents (or approximately 50 families) in Farkhod.

Density[68]

With the lowest density relative to the countrywide average density of 72.2 people per sq. km, Navoi Region, home to the Kyzylkum Desert, has a population density of 8.6 people per sq. km. However, the Navoi/Karmana District itself has a density of 129.9 people per sq. km, a discrepancy in part explained by the presence of the administrative regional capital, Navoi (density of 2,712 people per. sq. km), within the district, pushing the average upwards. Outside of the capital, the rest of the district is then likely to be as sparsely populated as the region.

Ethnic composition

The population of Uzbekistan comprises a majority of Uzbeks (80%), as well as other ethnic minorities, i.e. Tajiks, Kazakhs, Russians and Karakalpaks.[69] Official regional data indicate a larger proportion of Uzbeks within the Navoi District (96.4%). During consultations in March and June 2020, no indigenous groups were identified in the area. In addition, key informants stated that the population of Uzumzor and Farkhod is Uzbek, 90% of which came from Khazara village, and 10% of which came from Bukhara Gijduvan.

Language and Religion

Consultation indicated that the language spoken in both Uzumzor and Farkhod is Uzbek.

Furthermore, respondents in both settlements noted the population is Muslim, which is in accordance with the most common religious practices in the locality, as noted in Section 6.6.4.5. However, according to the June 2020

[65] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Permanent population number. [online] stat.uz. Available at: https://stat.uz/en/open-data/2-uncategorised/7163-o-zbekiston-aholisi-en [Accessed 5 Mar. 2020].
[66] State Committee of the Republic of Uzbekistan on Statistics (n.d.). The number of urban and rural population by region. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=13.3%20The%20nuber%20of%20urban%20and%20rurel%20population%20by%20region.xlsx&lang=en [Accessed 5 Mar. 2020].
[67] Navoi region official website (n.d.). Навоий вилояти ҳокимлиги. [online] www.navoi.uz. Available at: http://www.navoi.uz/uz/menu/karmana-tumani-hokimligi [Accessed 5 Mar. 2020].
[68] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Diagramma va grafiklar. [online] stat.uz. Available at: https://stat.uz/uz/index.php?option=com_content&view=article&id=5742&catid=2&lang=uk-UA [Accessed 5 Mar. 2020].
[69] State Committee of the Republic of Uzbekistan on Statistics (2017). Analytical materials - DEMOGRAPHIC SITUATION IN THE REPUBLIC OF UZBEKISTAN. [online] stat.uz. Available at: https://stat.uz/en/435-analiticheskie-materialy-en1/2075-demographic-situation-in-the-republic-of-uzbekistan [Accessed 5 Mar. 2020]. However, there are some controversies among scholars around the number of Tajiks in the country. See Foltz, R. (1996). The Tajiks of Uzbekistan. Central Asian Survey, 15(2), pp.213–216.

surveys, there are no mosques in Uzmuzor or Farkhod. The mosque for both settlements is located in Khazara. In addition, there are no cemeteries in Uzumzor or Farkhod, while there is one in Khazara.

Vulnerable Families

During a meeting organised with local institutional stakeholders in March 2019, the representative from the local Council reported that there are over 21 families in need of social protection (six of which receive additional economic support from the government) located in Uzumzor.

Unfortunately, site work was curtailed by the Covid-19 pandemic. Consultation and further data gathering have not been possible to the extent that would normally be undertaken. In particular the planned household surveys to gain a full understanding of the resident's socio-economic status was not possible.

7.8.4 Economy

Uzbekistan is a lower middle-income country, defined by the World Bank as economies with a GNI per capita between $1,026 and $3,995 USD[70]. The Uzbekistani Som (UZS) is the currency of Uzbekistan – as of 5 March 2020, $1 USD was equal to 9,513.84 UZS[71].

According to the IMF, in 2019, the Gross Domestic Product (GDP) of Uzbekistan was at $60.490 billion USD[72]. Navoi Region occupies the fourth place of contribution to the formation of the GDP of Uzbekistan, with a share of 7.2% – just below the neighbouring Samarkand Region (7.3%). Navoi Region has the fourth largest GDP of Uzbekistan (36,685.2 billion UZS) and the largest GDP per capita, at 37,119.5 thousand UZS.

The national GDP composition by sector of origin is split between agriculture (28.1%), industry (36.4%) and services (35.5%). Navoi Region is characterised by its large industrial sector relative to other regions and the country. In 2019, Navoi Region held the largest share for industry (66.8%) within the sectoral structure of the regional GDP – or GRP. Correspondingly, it also held the smallest share recorded for agriculture (16.7%) and services (12%). Navoi Region is important in terms of industrial contribution to the economy of the country, estimating it at 10% of the total industrial production.

Navoi International Airport is the largest air cargo terminal in Central Asia. Noteworthy, the entire Navoi Region was designated as a free economic zone (FEZ) following the enactment of a Presidential Decree. The main goals of this decision are to attract direct investment to create innovative, high-tech, export-oriented and import-substituting enterprises producing high value-added products, as well as to develop transport and other infrastructure of the region to turn it into a major logistics centre. In order to finance relevant investment projects, the Ministry of Investments and Foreign Trade together with commercial banks have been instructed to develop proposals for attracting credit lines from international financial institutions and foreign export credit agencies.[73]

There is little data available at the Navoi/Karmana District level. According to the Navoi Region website, large industrial enterprises based in the district include CJSC Navoi TPP (electricity and isotope energy generation) and spare parts, THAEL POLYMER Synthesis JV (polymer products), JV "Kar-Rig trans" (transport services), JV "Gypsum Products" (production of building materials). Data related to agricultural production is available at the district level. Table 9 below shows agricultural production in tons, units or heads for Navoi Region and Navoi/Karmana District, as well as the contribution of the district to the total regional production. A large proportion of eggs, poultry and vegetables produced regionally originate from the district.

Table 7-14: Agricultural products in Navoi Region and Navoi/Karmana District, 2018[74]

Products	Navoi Region	Karmana District	% District in Region
Tons			

[70] World Bank (2019). World Bank Country and Lending Groups – World Bank Data Help Desk. [online] Worldbank.org. Available at: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups [Accessed 5 Mar. 2020].
[71] Central Bank of the Republic of Uzbekistan (n.d.). Ўзбекистон Республикаси Марказий банки — Бош саҳифа. [online] www.cbu.uz. Available at: http://www.cbu.uz/uzc/ [Accessed 5 Mar. 2020].
[72] International Monetary Fund (2019). World Economic Outlook Database October 2019. [online] Imf.org. Available at: https://www.imf.org/external/pubs/ft/weo/2019/02/weodata/index.aspx [Accessed 5 Mar. 2020].
[73] Dentons (2019). Uzbekistan has declared its largest region a free economic zone. [online] www.dentons.com. Available at: https://www.dentons.com/en/insights/alerts/2019/may/28/uzbekistan-has-declared-its-largest-region-a-free-economic-zone [Accessed 5 Mar. 2020].
[74] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Diagramma va grafiklar. [online] stat.uz. Available at: https://stat.uz/uz/index.php?option=com_content&view=article&id=5742&catid=2&lang=uk-UA [Accessed 5 Mar. 2020].

Products	Navoi Region	Karmana District	% District in Region
Meat (in live weight)	159,674	17,964	11.3
Milk	477,797	66,051	13.8
Honey	1,008	103	10.2
Wool	4,079	303	7.4
Cocoon raw material	801	75	9.4
Cotton	83,025	14,808	17.8
Grain	214,433	26,988	12.6
Potatoes	76,851	8,619	11.2
Vegetables	274,645	54,214	19.7
Melons	88,119	9,510	10.8
Fruits	100,417	10,399	10.4
Grapes	76,933	4,486	5.8
Units			
Eggs (per thousand)	276,584	74,514	26.9
Leather skin	261,474	7,824	3.0
Head			
Cattle	484,036	59,498	12.3
including: cows	199,549	22,391	11.2
Sheep and goats	2,060,239	116,996	5.7
Horses	17,878	407	2.3
Poultry of all kinds	2,595,191	706,295	27.2

During the meeting organised with local institutional stakeholders, the representative from the local Council (Uzumzor) reported that the local economy, regarding Uzumzor as well as Farkhod, relies mostly on agricultural activities, in particular cotton and wheat. Consultation with Farkhod residents confirmed the importance of agricultural activities for the settlement. According to the June 2020 surveys, there are six farmers' fields in the surroundings of Farkhod (four of which belong to local farmers and two of which belong to farmers from Khazara). The majority of Farkhod's residents work for farmers and are usually paid partly in money and partly in goods. Residents that work in wheat production therefore receive 100 kg of wheat per hectare as part of they pay, while those who work in cotton production receive dry stalks of cotton. In addition, farm lessors also allow their workers to graze their livestock around the farm fields. Reportedly, most households own livestock, as it is considered the main way to accumulate wealth and increase savings. However, respondents stated that it has become difficult recently to graze cattle in recent years for two main reasons. First, given that only farm workers are allowed to graze livestock on farmers' lands, this excludes a number of households from this arrangement. Second, residents noted that saxaul was planted north of Uzumzor, an area that is now guarded and where it is no longer allowed to graze cattle.

Unlike Farkhod respondents, residents in Uzumzor noted that the main sources of employment are the civil service, the local school, and in some cases Navoi airport. Agriculture plays a comparatively smaller role, which seems to be linked to the lack of irrigation sources. According to the June 2020 surveys, there is currently one farmer in Uzumzor who grows cotton and wheat for the state, and he provides employment to three to four people. respondents claimed the makhalla is negotiating the employment of three young people in the factories of the Navoi Free Economic Zone.

In both Uzumzor and Farkhod respondents stated that livestock products are generally for self-consumption, as there is no market to sell products and livestock is usually only sold to cover high expenses. Residents of both settlements collect camel thorn (alhagi pseudoalhagi) for sheep, cousin (cousinia sp) for cattle and azhryk for

donkeys. In addition, some residents in both settlements also grow fruits and vegetables in their home gardens; selling any excess production to neighbours.

Tourism

Tourism is a growing economic sector of national importance. The government is implementing measures to develop tourism as one of the strategic sectors of the economy[75]. According to the State Committee of the Republic of Uzbekistan for tourism development, while there were 437,265 visitors in January 2019, this number increased to 538,360 in January 2020, an increase of 23%[76].

The Navoi Region has a rich history with tourism activities to its various ancient monuments, including flint quarries, mines, old settlements, burial mounds, crypts and petroglyphs from the Middle Ages, early Iron Age, Bronze Age and Stone Age[77]. These sites are more detailed in Section 6.6.

To be noted, the Sokh Rokh (Shah Rah, or Royal Road), a major Silk Road thoroughfare which used to connect Bukhara and Samarkand, is located immediately south of the Project and is broadly following the course of the M37 highway from Navoi to Bukhara. A few monuments linked to the history of the Silk Road are touristic destinations. They include:

- The Rabati Malik (Royal Fortress) Caravanserai located 12 km east of the Project, north of the M37 highway. This is one of the largest caravanserais in Central Asia;
- Sardoba Malik (Royal Well) located immediately south of the Caravanserai; and
- The village of Hazora which includes the Deggaron Complex with the 11th century Deggaron Mosque, the Khanaka (monastery/inn) and tombstone of Sheikh Orif Deggaroni.

Access to M37, which gives access to archaeological remains along what used to be the Silk Road, and its existing traffic levels are an important baseline condition for these tourism activities.

7.8.5 Labour Market and Working Conditions

Labour Market

National statistics show an increase in the share of unemployment in recent years, ranging from 4.9% to 5.2% between 2009 and 2016 and reaching 9.3% in 2018. In 2018, the level of unemployment in Navoi Region was less significant (8.7%) than across the country (9.3%). In the district, 4,400 people are reported to be unemployed. A previous study by TYPSA in 2019 noted that there are high rates of unemployment (80% of the working age population) in Farkhod. Consultation indicated that residents of both Uzumzor and Farkhod consider that unemployment is the most significant challenge the settlements face. Respondents noted that Uzumzor and Farkhod do not attract migrant workers; on the contrary, locals often leave to find work (for example, women go to the Kyzyltepa district to find work in the cotton farming).

Women

During a meeting organised with local level institutional stakeholders, it was reported that women usually work in the textile and service industries as well as picking cotton, while men usually work in farming, mining or production. During this meeting, a representative from the Women's Issues Committee also reported that there are no obstacles for women to access the job market despite difficulties to access certain positions due to cultural and tradition reasons. Key informants indicated in the June 2020 survey that most women in Uzumzor and Farkhod are unemployed. Women are often hired for seasonal agricultural work by small-scale farmers (for weeding cotton in spring, harvesting cotton in autumn and other crops during the summer). In addition, some women in Uzumzor work in the local school and the nearby clinic. When women are not busy with seasonal work, they take care of children, look after livestock and grow vegetables in their private gardens.

[75] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Tourist flow. [online] stat.uz. Available at: https://stat.uz/uploads/doklad/2019/yanvar-dekabr/en/18.pdf [Accessed 6 Mar. 2020].
[76] State Committee of the Republic of Uzbekistan for tourism development (n.d.). Statistics. [online] uzbektourism.uz. Available at: https://uzbektourism.uz/en/research [Accessed 6 Mar. 2020].
[77] Anon, (n.d.). Navoi region | Travel guide for tourists and travelers | Uzbekistan.travel. [online] Available at: https://uzbekistan.travel/i/navoi-region/ [Accessed 6 Mar. 2020].

Working Conditions

There is little data available on working conditions in Uzbekistan. Given that the local district economy relies mostly on agricultural activities, this potential risk is relevant to understand the area background. The Labour Department is staffed with respectively six and two organisational health & safety and labour & working conditions inspectors. They follow an inspection schedule sent by the Ministry on a yearly basis to inspect a number of facilities in the region without prior notification

7.8.6 Public Health

According to the World Bank and national statistics, life expectancy at birth has continuously been increasing in Uzbekistan, from 58 in 1960 to 74.6 in 2018. On average, women live five years longer than men. Table 7-15 below compares life expectancy at birth between Uzbekistan, Navoi Region, and the adjacent regions of Bukhara and Samarkand. The Navoi Region has one of the longest life expectancies at birth in Uzbekistan, higher than the national average and Samarkand, but lower than across Bukhara. Overall, Navoi Region is performing better on health-related indicators than the average for the country. For example, 1.5% of children were underweight in Navoi in 2012, below the national average of 1.8%78. In a similar vein, Navoi has one of the lowest rates of infant mortality, with 7 per 1,000 births compared with 9.9 across the country. In general, infant mortality rate is higher in urban (11.6) compared with rural areas (3.5). However, the maternal mortality ratio for Navoi in 2018 is 27.8 per 100,000 births, which is higher than the ratio of 20.2 observed across the country and is the second highest in the country[79].

Table 7-15: Life expectancy at birth, 2018[80]

	Both genders	including:	
		women	men
The Republic of Uzbekistan	74.6	77.0	72.3
Bukhara	76.6	78.4	74.7
Navoi	75.8	77.6	74
Samarkand	74.8	77.1	72.5

In the June 2020 surveys, respondents estimated that life expectancy in Uzumzor and Farkhod was reported to be approximately 65-70 years old, which is lower than the regional and national averages. In Uzumzor, a key informant identified high blood pressure and diabetes as the most common diseases, and in Farkhod respondents (amongst which were many women) also pointed to high blood pressure as one of the most common diseases and noted that cancer was also an occurrence in the village.

Another reported disease was brucellosis, an infectious bacterial disease transmitted to humans by livestock. The most common means of infection has been reported to be eating raw or unpasteurised milk. According to the June 2020 surveys, Farkhod residents reported working with local farms and animals, using their cattle milk for self-consumption as no other means to transport or sell the product outside of the locality are available.

Health facilities

Data on the number medical facilities are available at the national and regional level. In 2018 across the country, there was an average of 46.6 hospital beds per 10,000 population compared with 55.9 in 2000. Overall, there has been a decrease in the number of health facilities available. For example, the number of hospitals went from 60 in 1991 to 29 in 2015.

Table 7-16 below provides some data regarding the number of hospitals, rural doctors' stations and the number of outpatient clinics in Navoi Region. In absolute numbers, Samarkand and Bukhara have more facilities than Navoi, which is explained by their larger population. To allow comparison, a rate of provision (RoP) per 100,000

[78] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Percentage of underweight children - Total. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=5.3%20OD_underweight_children_eng_total.xls&lang=en [Accessed 5 Mar. 2020].
[79] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Maternal mortality ratio - Total. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=6.1%20OD_Maternal_mortality_eng.xls&lang=en [Accessed 5 Mar. 2020].
[80] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Life expectancy at birth. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=13.8%20Life%20expectancy%20at%20birth.xlsx&lang=en [Accessed 5 Mar. 2020].

people was calculated. As such, Navoi has a higher of provision relative to its population. For example, there are 27 outpatient clinics per 100,000 population compared with 11 in Samarkand.

Table 7-16: Medical facilities in Navoi Region[81]

No.	Name	Specialities	No of beds	Distance	Contact	Address
1	"GEMOTEST"	Laboratory. Possibility to take a COVID test. Possibility for test at site. (300 test per day)	15	45km	(79) 2203015	Navoi region Navoi city, st.U.Yusupova 32A
2	"Ophthalmological hospital of the Navoi region"	- cataract - glaucoma - retinal detachment and vitreous pathology - refractive errors - squint - plastic surgery - lacrimal organ surgery	40	24km	(79) 5320482	Navoi region Navoi city, st.K.Karshieva 88
3	"Lorafon"	Laser surgery in otorhinolaryngology: a) Laser removal of nasal polyps; b) Laser removal of the nasal septum; c) Laser operation of sinusitis	25	42km	(79) 2252538	Navoi region Navoi city, st.Bulat 18A
4	"Navoi family clinic #4"	- Therapist; -Pediatrist - rheumatologist, cardiologist, arthrologist; -Pediatrist - neuropathologist -Serdologist; -LOR; -Gynecologist; -Urologist; Endocrinologist; -Endoscopist; -Dentist; -General surgeon; -Surgeon proctologist; Psychotherapist; -Dermatologist; -Cardiologist	N/A	37 km	(79) 224 85 81	Navoi region Navoi city, st.Memorlar 14
5	"Karmana region Medical Association"	-Gynecologist; -Urologist; Endocrinologist; -Endoscopist; -Dentist; -General surgeon; -Surgeon proctologist; Psychotherapist; -Dermatologist; -Cardiologist	328	26 km	(79) 5324486	Navoi region Navoi city, st.Tashkent 28
6	"Shifo Med Tibbiyot markazi"	Dental treatment	N/A	38 km	(95) 607 20 29	Navoi region Navoi city, st.Islam Karimov 20

[81] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Diagramma va grafiklar. [online] stat.uz. Available at: https://stat.uz/uz/index.php?option=com_content&view=article&id=5742&catid=2&lang=uk-UA [Accessed 5 Mar. 2020].

7	"NEYRO-AVICENNA"	Neurology	40	45km	(95) 6100303	Navoi region Navoi city, st. Galaba
8	“Eshmurod Denta Shifo maskani”	Possibility to take a COVID test -Pediatrist - neuropathologist -Serdologist; -Gynecologist; -Urologist; Endocrinologist; -Endoscopist; -Dentist; -General surgeon; -Surgeon proctologist	6	32km	(93) 4340333	Navoi region Navoi city, st. Navoi 7
9	“Center for the screening of maternal and child of Navoi region”	Development in children with inherited diseases of mental retardation, as well as for examination of pregnant women in order to detect congenital malformations of the fetus. this center has been operating since 1998.	N/A	42km	(79) 2253924	Navoi region Navoi city, st.Reshetnik 20
10	“Center for sanitary and epidemiological welfare of Navoi region”	Control over the implementation of sanitary legislation, sanitary and anti-epidemic (preventive) measures, instructions and orders of officials exercising state sanitary and epidemiological supervision.	N/A	45km	(36) 2203015	Navoi region Navoi city, st. A.Navoi 8
11	“Vagus”	Possibility to take a COVID test Modern laboratory services: a) clinical and biochemical analyzes, determination of the level of calcium and gland, blood, lipid profile: - Linoproteins of low density LDL; - Linoproteins of high density HDL. Doppler ultrasound ECG, EchoCG, Holter ECG (24-hour monitoring) Dentist Therapist, cardiologist, neuropathologistsurgeon, gynecologist, urologist, ENT Hospital Physiotherapy Hirudotherapy (leech therapy) Psychologist consultation	20	33km	(79) 2260328 (79) 2260461	Navoi region Navoi city, st.Memorlar 35
12	“Neyro-Korteks”	Neurology	20	35km	(79) 2232729	Navoi region Navoi city, st.A Timur 27a
13	“Navoi Regional Children Infection Hospital” This hospital is for COVID patients	The hospital has several infectious diseases departments, an anesthesiology and resuscitation Department, reception, diagnostic, physiotherapy departments, a diagnostic laboratory, and an x-ray room.	120	42km	(79) 2203253	Navoi region Navoi city, Ibn Sino St., 27A
14	“Regional Children's Hospital”	Treatment and prophylactic establishment for children	175	48km	(79) 2252724	Navoi region Navoi city, Avloniy St., 16
15	“Center of Emergency Aid of Navoi city”	- Therapist; -Pediatrist - rheumatologist, cardiologist, arthrologist; -Pediatrist - neuropathologist			(79) 2203488	Navoi region, Navoi, Ibn

	-Serdologist; -LOR; -Gynecologist; -Urologist; Endocrinologist; -Endoscopist; -Dentist; -General surgeon; -Surgeon proctologist; Psychotherapist; -Dermatologist; -Cardiologist	200	43km	Sino st, 27

According to the June 2020 surveys, there are no hospitals or clinics in neither Uzumzor nor Farkhod. The clinic serving both settlements is located in the Gulshan settlement, about 3-4 km from Uzumzor and 7 km from Farkhod. Uzumzor residents can also access a clinic in the Khazara village. Ambulances can reach Uzumzor and Farkhod inhabitants within 15 minutes and nurses visit both settlements twice a week.

Alternative/Traditional Medicine

According to the respondents of the June 2020 surveys, no alternative medical services are offered in the district. However, a certain number of families (10-15 families in Uzumzor and one family in Farkhod) collect harmala (P*eganum harmola*) and sell dry harmala during the flu season (at 15-25 thousand Soms per bag).

COVID-19 Coronavirus Pandemic in Uzbekistan

COVID-19 is the infectious disease caused by the coronavirus, SARS-CoV-2, which is a respiratory pathogen. While the health organizations are still learning about how COVID-19 affects people, older persons (e.g. persons over 60 years) and persons with pre-existing medical conditions, like high blood pressure, heart disease, lung disease, cancer or diabetes, appear to develop serious illness more often than others[82].

The virus was confirmed to have spread to Uzbekistan when its first case was confirmed on 03 January 2020. As per 18 October 2020, there has been 63,124 confirmed cases and 525 deaths. Uzbekistan occupies 128th rank position in number of cases per population, with approximately 1,886 cases per 1 million population. A peak in the number of new cases was observed in July and September, reaching approximately 800 new cases/day. Since this second peak, the number of cases per day has been decreasing and on 18 October 2020 only 315 new cases have been reported[83].

It has been confirmed that “Navoi Regional Children Infection Hospital” has now been converted into a dedicated COVID treatment hospital for adults and has 120 beds set aside for COVID patients. Furthermore, there are 400 beds in Yoshlik Stadium for COVID patients.

7.8.7 Education

According to the UNESCO Institute for Statistics, the gross primary school enrolment ratio of Uzbekistan was 104% in 2018. Uzbekistan has a high ratio, which has been increasing continuously since 2010, when it was at a lower percentage point of 92[84]. A slightly higher ratio for males (104.997) than for females (103.428) must be noted.

Site visits and meetings noted an enrolment rate of 100% for girls and boys in the Council. There is a secondary school in Uzumzor and there are no educational institutions in Farkhod. No pre-schools are available in the two villages. Children from Farkhod are taken to pre-school and school in the neighbouring settlement of Gulshan (7 km east of Farkhod). The limited number of educational institutions in these settlements is in accordance with the relatively low number of educational institutions in the Navoi/Karmana District in relation to some of the other

[82] https://www.who.int/emergencies/diseases/novel-coronavirus-2019
[83] https://www.who.int/countries/uzb/
[84] UNESCO Institute for Statistics (n.d.). UIS Statistics. [online] data.uis.unesco.org. Available at: http://data.uis.unesco.org/# [Accessed 5 Mar. 2020].

districts in the region (33 institutions against 88 in the Khatyrchi District and 56 in the Nurata District in 2019).[85] In addition, the Navoi Region itself has a relatively low number of educational institutions in the country, having only 358 against 1,225 in the Samarqand Region in 2019.[86] In the June 2020 survey, residents of Uzumzor and Farkhod noted that students finish school at 18 years old after completing 11 levels. This consultation also indicated that Farkhod residents consider the absence of a pre-school institution in the village as a significant issue.

7.8.8 Transportation

Automobiles are the most commonly used mean of passenger transport in Uzbekistan.[87]

The study area is accessible via a network of secondary roads which intersect the M37, a two-lane carriageway road connecting Navoi with Turkmenistan and Samarkand. A train station is identified south of Farkhod, about 10km south-east of the Project site. Navoi Canal is located directly south of the M37 and is linked with the town of Navoi. Other notable transport infrastructure within the district include the Navoi-Uchkuduk railroad and the Navoi Airport.

According to the ESSR, mobility in the study area mostly relies on taxis and minibuses. The June 2020 survey indicated that neither Uzumzor nor Farkhod have public transport connections with the centre of the district. Residents of both settlements usually walk to the M37 on foot (from Uzumzor the distance is 1 km and from Farkhod it is 1.5 km) and travel on passing vehicles (it was not specified if these vehicles were taxis or minibuses). The road from Uzumzor to the M37 is in average condition, and the road from Farkhod to the M37 is only half-paved, the remaining of which is in poor condition. The M37 is in good condition, and traffic is generally less than 20 vehicles per day. Traffic accidents are not common, except for the frequent death of birds and small animals such as jerboas (*allactaga major*), steppe agamas (*trapelus sanguinolentus*), and crested larks (*galerida cristata*).

Consultation indicates that residents consider that poor road conditions and the lack of public transport were some of the main issues they confronted in both Uzumzor and Farkhod.

7.8.9 Utilities

This section focuses mainly on access to sanitation and water utilities in Uzbekistan. The entirety of the population has access to some sanitation facilities. However, in rural areas, 19.1% of the population has access to unimproved water sources[88] and only 31.1% is using safely managed drinking water as shown in Table 7-17 below.

Table 7-17: Proportion of population using safely managed drinking water services[89]

Categories	%
People using safely managed drinking water services, urban (% of urban population)	86.5
People using safely managed drinking water services, rural (% of rural population)	31.1

Field surveys indicated that in both Uzumzor and Farkhod there is a central source of drinking water. In Uzumzor, water is provided two hours in the morning and two hours in the evening, while in Farkhod water is available only two hours per day, usually in the evening. Households are equipped with a well-like reservoir that is filled when water is available and is used throughout the day.

[85] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Diagramma va grafiklar. [online] stat.uz. Available at: https://stat.uz/uz/index.php?option=com_content&view=article&id=5742&catid=2&lang=uk-UA [Accessed 5 Mar. 2020].
[86] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Diagramma va grafiklar. [online] stat.uz. Available at: https://stat.uz/uz/index.php?option=com_content&view=article&id=5742&catid=2&lang=uk-UA [Accessed 5 Mar. 2020].
[87] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Passenger transportation and passenger turnover by transport type. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=12.5%20Passenger%20transportation%20and%20passenger%20turnover%20by%20transport%20type.xlsx&lang=en [Accessed 5 Mar. 2020].
[88] Unimproved drinking water - use of any of the following sources: unprotected dug well; unprotected spring; cart with small tank or drum; tanker truck; surface water, which includes rivers, dams, lakes, ponds, streams, canals or irrigation channels; or bottled water.
[89] State Committee of the Republic of Uzbekistan on Statistics (n.d.). Proportion of population using safely managed drinking water services. [online] Stat.uz. Available at: http://web.stat.uz/open_data/data.php?value=15.13%20safe_drinking_water_eng.xlsx&lang=en [Accessed 5 Mar. 2020].

Consultation in Uzumzor and Farkhod revealed that water scarcity (for household use but mostly for irrigation) was considered one of the main issues in both settlements. Residents also listed as issues the lack of street lighting.

7.8.10 Current Land Use and Resettlement

Preliminary work has identified that land in the Project area was predominantly used for grazing. The visit also revealed the existence of two farms within the Project area: Farm A and Farm B.

Farm B owns 200 heads of sheep and goats, but they also graze the sheep of Farmer A (i.e. 30 heads) and those of a family friend, thus grazing a total of 300 heads. They have been grazing on the farm for 10-15 years. Farmer A is not currently using the leased land and has an informal agreement with Farmer B, to graze his sheep while he is doing other work. Farmer A is the sole breadwinner of this family and has another business reselling cattle and meat.

Following consultation with the State Cadaster in March 2020 it is understood that the Government initiated the process of acquiring the land for the Project. The two users of these farms surrendered their lease of the land identified for the Project. The Cadaster confirmed that this was triggered by the call for tender. Both leaseholders have now had their land area reduced. During that meeting, AECOM were informed that the leaseholder of Farm B had subleased the farming land to a tenant who was continuing to use the land for grazing at the time of the March 2020 site visit. No further details were forthcoming. It has since been revealed that there was some level of misunderstanding and the land was not subleased.

Further analysis of existing records indicates that the two farmers (lessors) have returned certain land plots back in 2018. The land plots have been taken to the Karmana district Khokimiyat's land reserves and, further, jointly allotted for the Project purposes as a single land plot.

The original and reduced farm areas are shown below in Table 7-18 below. Note that the values of land area post optimisation are taken from the Typsa ESSR. The farm areas were calculated in ArcGIS by AECOM based on the coordinates provided by the Khokimyiat.

Table 7-18: Reduction in farming area

Farm	Land Size (before optimisation)	Land size (post optimisation)	% of original land remaining
Farm A	158 ha	73 ha	46.20 %
Farm B	330 ha	7.7 ha	2.33 %
First allocation of new land for Farm B	105.91 ha	-	-
Second allocation of new land for Farm B	247.95 ha	-	-

During the March 2020 site visit it was understood that Farmer B is still using the original land without a contract or agreement from the administration. This was confirmed in the June 2020 visit.

NNS engaged with the farmers and the Khokimiyat. From this exchange, it was confirmed that Farmer B applied for and was granted alternative land of 106.94 ha in August 2020. Alternative land has been provided adjacent to the original land and Farmer B now occupies this land. However, Farmer B was unhappy with the quality of the land provided and applied for a second portion of land. Farmer B selected the new land area and has now moved to the new land plot.

As of October 2020, Farmer A has not applied for land or communicated any complaints to the Khokimiyat. Farmer A has indicted that access to land does not form a significant part of his livelihood. AECOM has received copies of forms and amended land agreements which were signed by both farmers in 2018. Although Farmer A declared he was not pleased with the loss of part of his land during the June 2020 survey, no formal complaints have been raised by either of the two farmers.

On the basis of those discussions it was concluded that no physical displacement has taken place. Both farmers have experienced economic displacement due to the loss of available grazing areas. To compensate this, like for like compensation was offered. Farmer B has taken advantage of this offer and now has alternative land. Farmer A dd not require additional land and has therefore not requested any. In AECOM's opinion this issue is now closed.

The land acquisition and replacement process is summarised in the tables below.

Table 7-19: Farmer A

Date	Event	Comment
12 October 2018	Farmer A has lodged an application to the Karmana district Khokimiyat to voluntarily abandon 158.73 ha (mostly being occupied by pasture lands - 158.43 ha).	Application on the voluntary abandonment dated 12 October 2018
15 October 2018	Karmana district Khokim issues the Decision on land plot return and Farmer A's land plot size decrease.	Decision No. K-1280 dated 15 October 2018
18 October 2018	Farmer A and Karmana district Khokim executes a supplementary agreement to the existing lease agreement envisaging, among other things, that the land plot size has been decreased and Farmer A has no claims/objections (both in present and future).	Supplemental Agreement between Khokim and Farmer A dated 18 October 2018; Transfer-Acceptance Act dated 18 October 2018
Present	Following the discussions with the farmers, the representatives of the Khokimiyat state that the Farmer A has no objections/claims with regard to the Project land. He does not need to receive any alternative lands, as there is more than 70 ha of the land remaining in his use. Farmer A has never applied to the Khokimiyat with a request to provide any alternative land for pasture.	Supplemental Agreement between Khokim and Farmer A dated 18 October 2018 and Transfer-Acceptance Act mentioned above

Table 7-20: Farmer B

Date	Event	Comment
12 October 2018	Farmer B has lodged an application to the Karmana district Khokimiyat to voluntarily abandon 325.84 ha (mostly being occupied by pasture lands - 295.5 ha)	Application on the voluntary abandonment dated 12 October 2018 Note: The Application does not specify the reason for the abandonment.
15 October 2018	Karmana district Khokim issues the Decision on land plot return and Farmer B's land plot size decrease	Decision No. K-1282 dated 15 October 2018
18 October 2018	Farmer B and Karmana district Khokim executes a supplementary agreement to the existing lease agreement envisaging, among other things, that the land plot size has been decreased and Farmer A has no claims/objections (both in present and future).	Supplemental Agreement between Khokim and Farmer B dated 18 October 2018

Date	Event	Comment
3 July 2020	Farmer B has applied to Karmana district Khokimiyat asking for a land parcel to graze livestock in the amount of 300 heads. In response, the Khokimiyat welcomes Farmer B to participate in the competitive bidding, where the farmer receives an assistance with the document preparation.	Farmer B's Application for provision of an alternative land plots Note: It is very difficult to verify how many sheep the Farmer B actually has. As per his statement, he has 300 sheep, but the local municipality informs us that he has only 100. So, it is very difficult to define the accurate number.
7 August 2020	Farmer B is allocated with the pastureland, 106.94 ha in size for 49 years-lease to graze livestock	Decision of the Karmana district Khokimiyat No. K-418 of 7 August 2020
Present (October 2020)	Farmer B requested better quality alternative land. He seems not satisfied with the current allocation. He started the process of a new land allocation and obtained new Khokim's land allocation decision for a pre-agreed plot on 13-14 October.	Decision No. K-629 dated 26 October 2020.

The existing and new land allocations for Farmers A and B are shown with expanded figure and photographs of the two new Farm B allocations (August and October 2020) overleaf. The Project will continue to facilitate negotiations with relevant members of the Khokimyiat should new or unidentified outstanding issues be raised.

It is important to note that the land allocations were optimised on the basis of the full 600 ha plot and not the 268 ha currently used for the project (see overleaf).

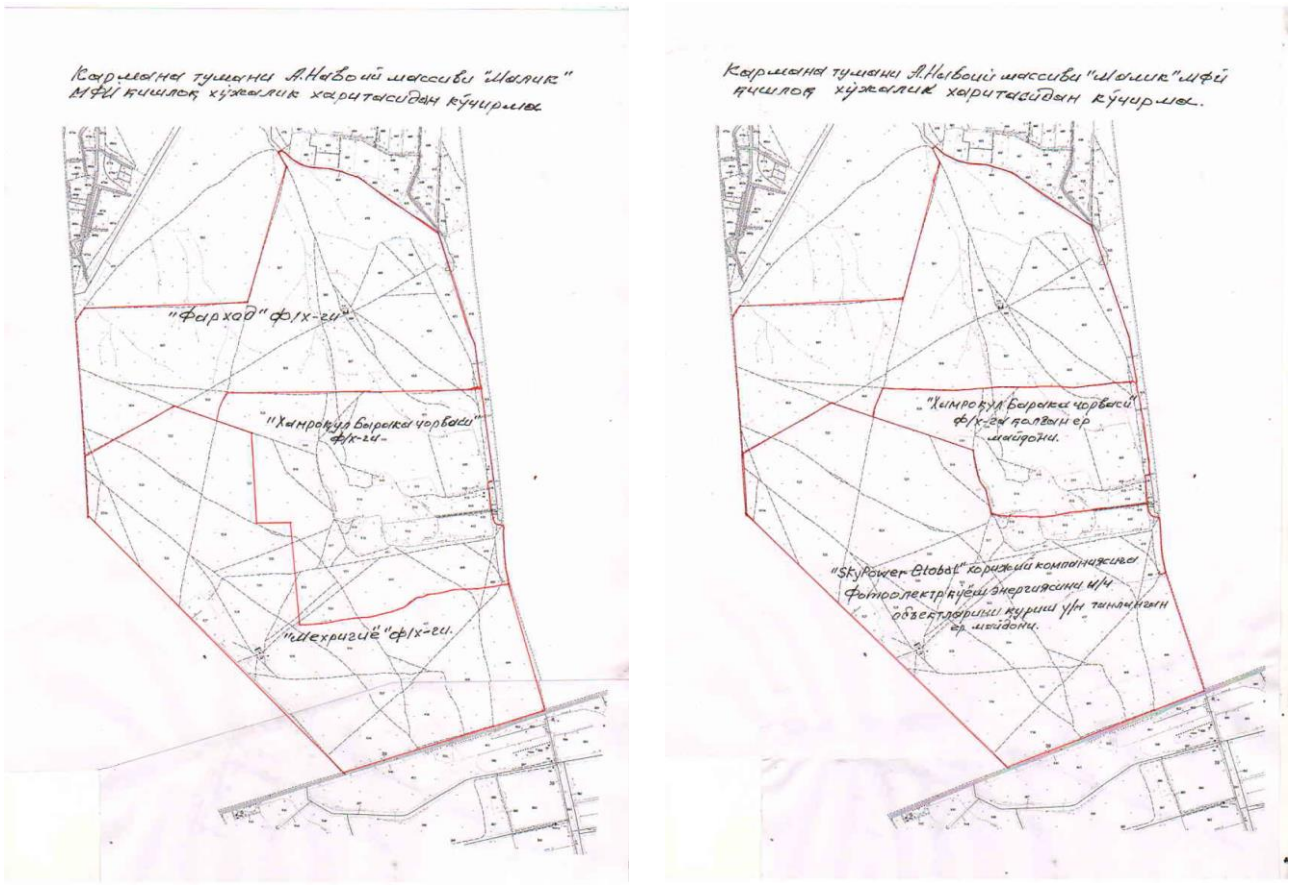

Figure 7-48: Farm plots before (left) and after (right) optimisation[90]

[90] Note that the southern land plot on the right hand map is now the solar park whereas it was Farm B previously

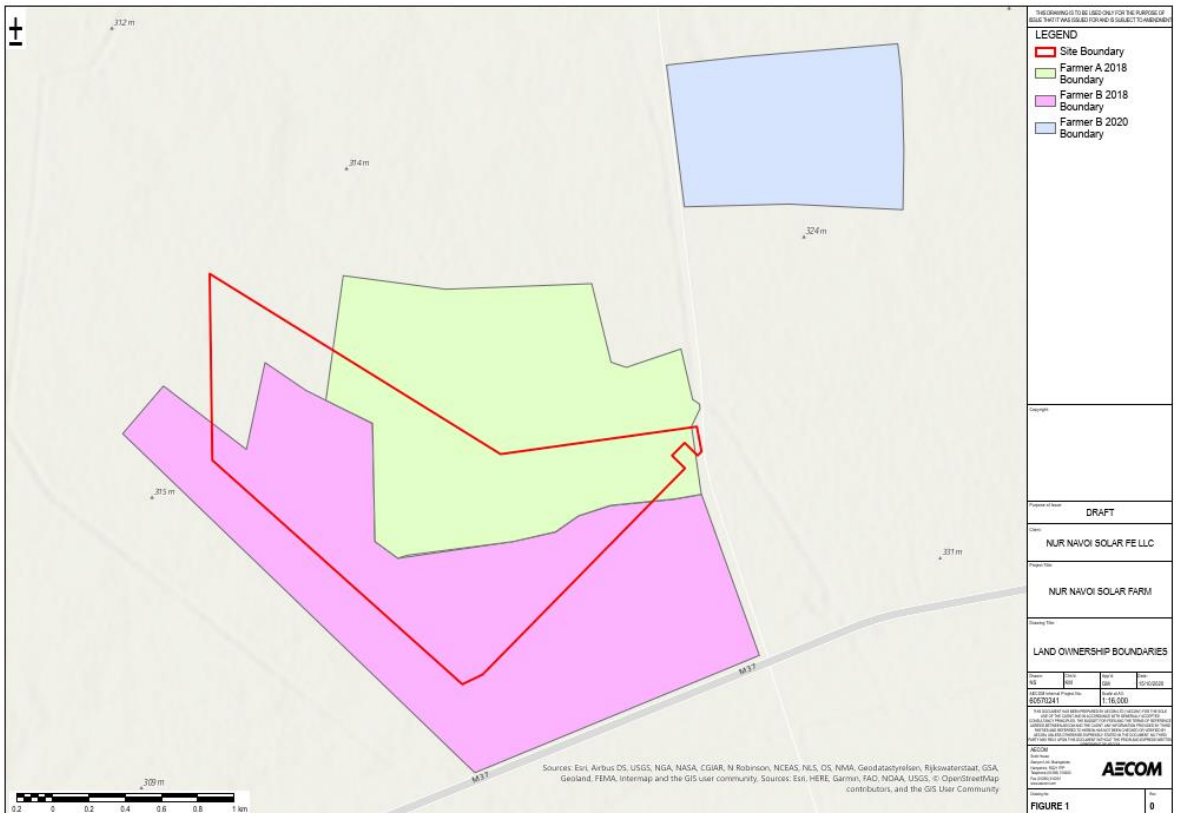

Figure 7-49: Land allocations (August 2020)

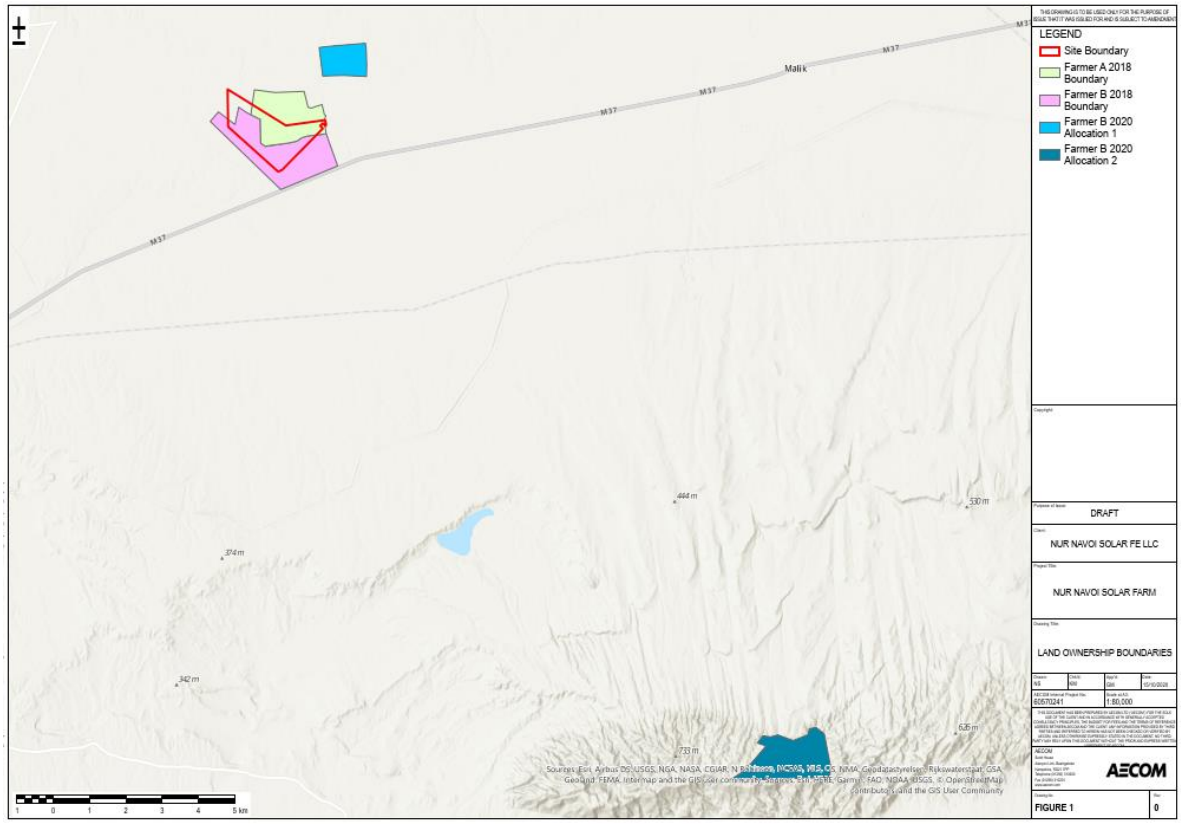

Figure 7-50: Additional Land allocation for Farmer B (October 2020)

Figure 7-51: New Farm B Land August (buildings)

Figure 7-52: New Farm B Land August (building inside)

Figure 7-53: New Farm B Land August (barn)

Figure 7-54: New Farm B Land August (grazing)

Figure 7-55: New Farm B Land October

Figure 7-56: New Farm B Land October (2)

7.8.11 Community Security

According to the June 2020 surveys, the district police inspector is located in Kaldirgoch settlement, where the Makhalla Committee also sits. Respondents did not identify any major security concerns, although cattle were reportedly stolen from a local resident in 2019 and March 2020.

A firefighting service is provided by the unit available at the Navoi airport and will support the project if required.

During the June 2020 survey, communities in the Direct AoI (Uzumzor and Farkhod, nearest to the Project site) reported that their administrative and security offices, including the Malhalla committee and district police inspector, were located outside their communities, in Khazora.

7.8.12 Potential Receptors

This section identifies the potential socio-economic receptors that exist within the Project AoI. For the purposes of the assessment, potential receptors are defined as elements of the socio-economic environment which may interact with the Project activities or perceive an effect or change to their life conditions / quality of life as compared to their baseline characteristics, as shown previously in this section. The following table lists the potential socio-economic receptors drawn from the baseline study.

Table 7-21: Potential socio-economic receptors

Receptor	Description
Project workforce	The Construction workforce will either be based on site in a workers camp. Operational workforce will likely be housed within the AoI. Associated risks of accident and ill health due to living or working conditions are relevant for this receptor, as well as their potential interaction with nearby communities.
Local economically active population	Project related employment and training needs may interact with the local economically active population. This receptor may encompass people living within the AoI.
General local businesses, services providers and equipment suppliers	Project related procurement needs during the construction and operation phases may interact with local businesses, services providers and equipment suppliers (e.g. limited use of the local shops, procurement of equipment and materials supplies).
Communities	Settlements in the AoI: Core AoI (Farms A and B), Direct AoI (Uzumzor and Farkhod), and Indirect AoI (Urumzor, Khazora and the Eastern Settlements), along M37.
Road users	Existing and future road users on M37, the road from the M37 to Khazara and the dirt roads within the Project area, including road capacity which may be subject to changes in traffic / vehicle load. As mentioned above, due to a lack of accurate traffic flow data, a qualitative approach from site visit observations was taken to account for estimated traffic changes.
Vulnerable groups	Groups with limited coping / adaptation capacities to external changes. Particular consideration is given to children, women and the elderly in the AoI. No indigenous peoples have been identified in the AoI but herders from Farms A and B may be considered as vulnerable due to their proximity to the site and due to the reduction of their respective lands resulting from the call for tender for the Project.

Source: AECOM 2020

7.8.13 Ecosystem services

The Millennium Ecosystem Assessment defined Ecosystem Services as “the benefits people derive from ecosystems”.[91] Besides provisioning services or goods like food, wood and other raw materials, plants, animals, fungi and micro-organisms provide essential regulating services such as pollination of crops, prevention of soil erosion and water purification, and a vast array of cultural services, like recreation and a sense of place.

[91] IUCN, 2018. *Commission on Ecosystem Management: Ecosystem Services*. Data viewed at: https://www.iucn.org/commissions/commission-ecosystem-management/our-work/cems-thematic-groups/ecosystem-services

Despite the ecological, cultural and economic importance of these services, ecosystems and the biodiversity that underpins them are still being degraded and lost. One major reason for this is that the value (importance) of ecosystems to human welfare is still underestimated and not fully recognized in every day planning and decision-making, in other words, the benefits of their services are not, or only partly, captured in conventional market economics.

Many of the most significant changes to ecosystems have been essential to meet growing needs for food and water; these changes have helped reduce the proportion of malnourished people and improved human health. Agriculture, including fisheries and forestry, has been the mainstay of strategies for the development of countries for centuries, providing revenues that have enabled investments in industrialization and poverty alleviation.

These gains have been achieved, however, at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes in ecosystems, the exacerbation of poverty for some people, and growing inequities and disparities across groups of people.

Ecosystem Services have been broadly categorised in accordance with the following:

- Supporting
  - Nutrient cycling
  - Soil formation
  - Primary production
- Provisioning
  - Food
  - Freshwater
  - Wood and fibre
  - Fuel
- Regulating
  - Climate regulation
  - Flood regulation
  - Disease regulation
  - Water purification
- Cultural
  - Aesthetic
  - Spiritual
  - Educational
  - Recreational

There are strong linkages between categories of ecosystem services and components of human well-being that are commonly encountered. Within the project site the function of the land is to accommodate grazing of livestock. No other services have been identified. The irrigation canals are outside the project boundary and no important plant species were encountered. All land has been previously leased to private individuals and has now been leased to the Project Company. As a result, the site is not deemed to provide any ecosystem services.

7.9 Transportation and Access

7.9.1 Introduction

It is currently confirmed that the Solar PV components will be transported to site by rail to Tashkent from a manufacturing plant in China, via Kazakhstan, and from Tashkent by road to the site. There is a second option to transport goods by road from the manufacturing site to the project site. Both options are described in more detail below.

- For conventional goods, the equipment that can be carried by railway containers is transported by railway containers; all goods are sent from the Xi'an Xinzhu Railway Port to Tashkent;

- Equipment that cannot be carried by railway containers (Box-type and HV transformers) will be exported from Xinjiang via Khorgos Port to reach its destination by truck.

The proposed road transport route from the China/Kazakhstan border is shown in Appendix A.

7.9.1.1 Baseline Data Collection

A desktop review and site visits (undertaken in March 2020) have been undertaken to identify any key issues with regard to accessing the site and to consider potentially suitable access routes from an appropriate port or main road. This high-level route assessment was based on existing maps, satellite imagery and information gathered during the site visit.

There has been no data available to estimate the current national traffic volumes on the proposed roads to be used for transportation of materials on the site.

7.9.2 Baseline Conditions

7.9.2.1 Transportation Route

The transportation study has considered a route from China where the parts will be delivered up to the Project site utilising the main transport network and avoiding built-up areas where possible.

The Chinese border crossing is located over 1,000 km east of the project site and it is understood to be key for importing and exporting goods in and out of inland central Asian countries, including Uzbekistan. The EPC Contractor will be required to confirm the suitability of the route and border crossing for delivering and handling the Project materials and, if necessary, propose an alternative route.

The Project site can be accessed directly from the M37 via a short dirt road thereby reducing the need for use of local, unpaved roads to any extent.

Given the importance of the route for trade between China and Central Asian countries, and review of satellite images, the road infrastructure between the border and the site will be of good quality and should not present any significant technical difficulties.

The proposed road route comprises the following key roads (distances noted are estimates):

- From border crossing at Khorgas leave the G312 from China and join the A535 in Kazakhstan.
- Continue west on the A353 to Saryokez – 250km.
- Take the route to the south of Saryozek and join the A3 at Dos – 5km
- Continue of the A3 to Almaty – 100km
- Before reaching Almaty turn right onto the P-19 and continue to Chapayevo.
- Turn right staying on the P-19 to Mezhdurechenskoye.
- Join the M-36 to Shamalgan, turn left then right and follow the M-37 to Kaskelen.
- Turn right on the A-2 and continue on the A-2 via Taraz and Shymkent to the Uzbek border at Yallama – 700km.
- Cross into Uzbekistan and turn right at Chinaz to join the M39.
- Continue west for 5km, bearing right to continue on the M-39.
- Continue on the M-39 crossing back into Kazakhstan for 10km before reaching Samarkand via Jizzakh – 150km.
- On reaching Samarkand turn right onto the M37 and continue to Navoi – 200km
- Continue on the M37 from Navoi to the junction to the unmarked road to Uzumzor.
- After 1 km take a right on the next junction on the unmarked road to the site entrance.

The proposed rail and road route comprise the following key roads (distances noted are estimates):

- Travel by rail from Xi'an Xinzhu Railway Port to Tashkent Chukursay Station.
- From Tashkent, transfer goods to truck then join the M39 towards Chinaz.

- Continue west for 5km, bearing right to continue on the M-39.
- Continue on the M-39 crossing back into Kazakhstan for 10km before reaching Samarkand via Jizzakh – 150km.
- On reaching Samarkand turn right onto the M37 and continue to Navoi – 200km
- Continue on the M37 from Navoi to the junction to the unmarked road to Uzumzor.
- After 1 km take a right on the next junction on the unmarked road to the site entrance.

Stopovers

A single stopover is planned between Tashkent and the site which is a distance of approximately 500km. For the transformers being transported by road from China to the site, a larger number of stopovers will be required and will be detailed further in the TMP.

Figure 7-57: View in the direction of the project site along the M37

7.9.2.2 Road Description

National Road A353

The road was not visited as part of the ESIA visits in March and June 2020. However, it is understood to be dual carriageway at least in sections and is used by HGV traffic. It is deemed suitable to use for delivery purposes and can accommodate HGV traffic.

National Road A3

The road was not visited as part of the ESIA visits in March and June 2020. However, it is understood to be dual carriageway at least in sections and is used by HGV traffic. It is deemed suitable to use for delivery purposes and can accommodate HGV traffic.

National Road A2

The road was not visited as part of the ESIA visits in March and June 2020. However, it is understood to be dual carriageway at least in sections and is used by HGV traffic. It is deemed suitable to use for delivery purposes and can accommodate HGV traffic.

M39 Highway

The road was not visited as part of the ESIA visits in March and June 2020. However, it is understood to be dual carriageway at least in sections and is used by HGV traffic. It is deemed suitable to use for delivery purposes and can accommodate HGV traffic.

M37 Highway

The M37 is dual carriageway between Navoi and the site. The road is used by HGV traffic and is the main road between Samarkand, Navoi and Bukhara. This is considered the most suitable road to use for delivery purposes and is deemed suitable of accommodating delivery HGV traffic.

Minor Road to Site

The Project site is accessed from the M37 via a short stretch of minor road. Further grading of this road may be required for larger vehicles to access the site. Most of the road does not allow for vehicular travel faster than 40 km / hr. The road is generally wide enough to allow for two vehicles to travel in opposite directions, however the road conditions would typically require vehicles to go on a narrower shared pathway.

7.9.3 Road Safety

Both Kazakhstan and Uzbekistan have relatively poor road safety records. According to the World Health Organisation (WHO) Road Safety Report, 2018[92], in 2016, there were 17.6 deaths per 100,000 population in Kazakhstan with the greatest proportion of these being drivers (60%) then pedestrians (31%). However, fatalities have more than halved in the past 10 years. In Uzbekistan, there were 11.5 deaths per 100,000 population which has increased slightly since 2007.

7.9.4 Roads Sensitivity Analysis

Table 7-22 sets out the level of sensitivity of the different sections of roads along the proposed route considering the type of road, current traffic volumes and the presence of any sensitive receptors.

[92] World Health Organization (2018). Global Status Report on Road Safety 2018. Geneva: World Health Organization.

Table 7-22: Sensitivity Analysis

Road	Receptor Details	Sensitivity
Road A353 (Kazakhstan)	Paved highway with medium daily traffic flows. Passing residential and commercial areas. Minimal traffic management measures in place. Highway suitable for all types of vehicles and volumes.	Low
Road A3 (Kazakhstan)	Paved dual carriageway road with moderate daily traffic flows. Passing residential and commercial areas. Minimal traffic management measures in place. Highway suitable for all types of vehicles and volumes.	Low
Route A2 (Kazakhstan)	Paved highway with moderate daily traffic flows. Passing residential and commercial areas. Minimal traffic management measures in place. Highway suitable for all types of vehicles and volumes.	Low
M39 (Uzbekistan)	Paved dual carriageway road with moderate daily traffic flows. Passing residential and commercial areas. Minimal traffic management measures in place. Road suitable for and regularly used by HGVs	Low
M37 (Uzbekistan)	Paved highway with moderate daily traffic flows. Recently upgraded and rehabilitated. Minor traffic management measures in place. Roads suitable for and regularly used by HGVs.	Low

7.9.5 Rail Transport

The railway shipments are all containerized. Goods will be loaded at the Xi'an Xinzhu Railway Station warehouse, China and the arrival point will be Tashkent Chukursay Station. The containers are then transported to the project site by road using customs supervision vehicles. The empty containers are returned to Tashkent.

The "Chang'an" train runs from Xi'an to Horgos Port, covering a total distance of 3,200km. It passes through three railway bureaus and 10 marshalling stations and arrives at Horgos Port within three days.

On leaving China, the railway transportation route is 1,600km in total, passing through four marshalling stations, the Kazakhstan Railway and Uzbekistan Railway - Almaty, Shimkent, and Tashkent. After reloading at Altynkol Station, the train reaches Chukursay station in Tashkent, where materials are then transferred by road to the Project site.

7.9.5.1 Assessment Methodology

The assessment is based on the use of a number of different types of vehicles used during the construction and operation of the Project. These include:

- Light Goods Vehicles (LGVs) – contractors' vans, minibuses, private cars etc.
- Heavy Goods Vehicles (HGVs) – vehicles with a maximum rigid length of 12 m and a maximum articulated length of 16.5 m.
- Abnormal loads – vehicles over 25 m in length or 3.6 m wide.

7.9.5.2 Guidance

The assessment has been carried out using the IEMA (2003) "Guidelines for the Environmental Assessment of Road Traffic". The guidelines suggest the following thresholds are adopted to assess whether particular links of the network are to be subject to assessment:

- Rule 1 – Include highway links where traffic flows will increase by more than 30 % (or number of HGVs increasing by more than 30 %).
- Rule 2 – Include any other specifically sensitive areas where traffic flows will increase by 10 % or more.

7.9.5.3 Assessment of Effects

The following sections set out the methodology which has been used to determine if the increased traffic flows during the construction phase of the Project are likely to be significant.

Sensitivity Criteria

The sensitivity of roads, their users and settlements along the proposed route has been assessed in accordance with the criteria set out in Table 7-23. The IEMA guidance details that sensitive locations are defined as receptors that are sensitive to traffic including amenities such as hospitals, places of worship, schools and historic buildings.

Table 7-23: Sensitivity Criteria

Sensitivity	Criteria
High	Large rural settlement containing numerous amenities. Traffic management measures in place such as controlled crossings, signalled junctions etc. Minor / unclassified unpaved roads with low traffic flow volumes. These may not be suitable for large HGV vehicles.
Medium	Rural settlement with a number of amenities. Minor traffic management measures in place. Local road (paved / unpaved) suitable for HGV traffic.
Low	Small rural settlement with few local amenities. Minimal traffic management measures in place. Paved road capable of large volumes of HGV traffic.
Negligible	Scattered dwellings with no local amenities. No / little traffic management in place. Highway suitable for all types of vehicles and volumes.

Magnitude of Change Criteria

The magnitude of impact on traffic flow is determined based on criteria set out in the IEMA guidelines. This is set out within Table 7-24 below.

Table 7-24: Magnitude of Change Criteria

Sensitivity		Criteria
Large	Above 90%	Above 90%
Medium	Between 60% and 90%	Between 60% and 90%
Small	Between 30% and 60%	Between 30% and 60%
Negligible	Under 30%	Under 30%

Assessing Level of Effect

Using these definitions, a combined assessment of sensitivity and magnitude has been made to determine the level of the predicted effect on a receptor i.e. Negligible, Minor, Moderate or Major. All direct and indirect impacts causing Moderate or Major effects, as identified within Table 5-3 are considered to be significant.

Where the identified thresholds above are exceeded, the IEMA guidance sets out a list of effects which should be assessed. This includes:

- Accidents and safety.
- Driver delay.
- Pedestrian amenity.
- Severance.
- Air pollution.
- Dust and dirt.
- Ecological effects.
- Hazardous loads.
- Heritage and conservation.
- Noise.
- Pedestrian delay.
- Vibrations.
- Visual effects.

A number of these effects are covered elsewhere in the ESIA and so those considered within this chapter include:

- Accidents and safety.
- Severance.
- Driver delay.
- Pedestrian amenity.
- Pedestrian delay.

Accidents and safety

IEMA guidelines do not recommend the use of thresholds for identifying significance of impacts due to numerous local causation factors involved in personal injury accidents. However, it is recognised that a significant increase in overall traffic volumes and abnormal loads may raise concerns over road safety. Therefore, measures to address road safety concerns will form a key part of the assessment methodology and development of mitigation options.

Driver delay

Driver delay occurs due to additional traffic present on the road network. IEMA guidelines note that additional delays are only likely to be significant if the traffic on the network is already at, or close to, capacity. Key areas where delays may occur include:

- At the site entrance due to turning of vehicles.
- On the highway passing the site.
- At key intersections along the highway.
- At junctions where the ability to find gaps in the traffic may be reduced, thereby lengthening delays.

Pedestrian amenity

This is broadly defined as the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width / separation from traffic. IEMA guidelines state that this may be significant where traffic is either halved or doubled.

Severance

IEMA guidelines state that severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance can also result from difficulty in crossing a heavily trafficked road. The guidance indicates that severance effects are considered 'slight' in cases that include:

- Pedestrian at-grade crossings on new roads carrying below 8,000 vehicles per day (AADT) (DoT, June 1993); or
- Changes of traffic flow of less than 30% (IEMA, March 1993).

Pedestrian delay

Changes in the volume and composition or speed of traffic on the road network may affect the ability of people to cross roads. In general, increasing traffic volumes will lead to an increase in pedestrian delay. Thresholds are not recommended for use to identify significance of potential effects due to the range of local factors and conditions which can affect delay.

7.9.5.4 Assumptions

It is assumed for the purposes of this assessment (and forecasted levels of traffic) that construction will commence in 2020/2021. Should this not be the case, it is unlikely that the change in forecasted levels of traffic will be of such a level as to change the assessment outcomes. The calculations are also based on a 100 MW (AC) solar plant.

As the details of how road stone and other materials will be supplied are not known at this stage, it is assumed that the routing of all materials will follow the route identified in the section below, thus presuming a "worst-case" scenario.

The construction schedule will be defined by the Project Developer. The assessment is based on an assumed construction phase duration of around nine to 15 months, taking consideration of potential delays in transportation of materials and weather conditions. It is also assumed that the Project will be constructed as one development rather than in a phased approach. The vehicle numbers and personnel requirements have been calculated based on these "worst-case" assumptions.

7.9.5.5 Traffic Generation

The Project will result in additional vehicles travelling to and from the site during construction. These will include heavy goods vehicles (HGVs) and light vehicles. Overall, the total number of vehicles required to travel to and from site is not expected to be significant. A worst-case scenario has been modelled where all materials are transported to site by road.

The first period of construction will be associated with the delivery of equipment to site and the construction activities that will be carried out on site. The second phase will involve set up and commissioning of all infrastructure and as such, this stage will have reduced vehicle requirements. The construction phase is expected to generate the traffic volumes detailed in Table 7-25 below. It should be noted that these traffic volumes are based on previous solar PV project experience and are to be confirmed once a construction strategy is available from the Project Developer. This assessment is limited to the expected amount of HGV movements and construction staff transportation requirements. The HGV movements estimated peak is expected to last one month

and to be 730 vehicles during this month. It is also likely that a larger bus would be provided for construction workers thereby reducing the number of vehicle movements. It is also considered that a large proportion of the staff will be accommodated at the workers camp, in the proximity of the project site.

Table 7-25: Potential Volume of Vehicle Movements during Construction

Vehicle Type	Activity	Total Vehicle Movements
HGV	Delivery of materials, plant, containers, concrete, aggregate material and welfare facilities	6,030
LGV (people carrier up to 6 people)	Transportation for construction workers to site.	1,400

It should be noted that this does not include movements of any abnormal loads or specialist vehicles (bulldozers, cranes etc) to the Project site. The amount of construction workers being transported to site is based on a typical on-site presence of 20 project staff at any one time with approximately 115 to 900 contracted site staff needed for the installation of the modules and civil construction. A detailed assessment of vehicle movements will be provided in the TMP.

Construction times can be arranged to avoid local peak times and routing arrangements, particularly for HGVs to minimise potential impacts

8. Impact Assessment

Following the identification of the main environmental and social baseline features, the likely impacts have been predicted. In all cases an assessment was carried out which measured the extent of the impact as a deviation from the baseline conditions. The significance of each impact was categorised and for significant impacts, further mitigation measures have been proposed. Mitigation measures are described in more detail in Section 9.

8.1 Construction Phase Impacts

The assessment has been undertaken in accordance with the criteria set out in Section 5 (Assessment Methodology). The impacts, including magnitude of change, are discussed in further detail below.

8.1.1 Geology and Soils

The main impact on soils during construction will be the potential for soil contamination from spills and leaks and increase in vulnerability to erosion. Soil compaction and the loss of the limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during higher periods of rainfall, when vehicle traffic is likely to cause the greatest damage. As noted above, surface water is likely to pond on site rather than discharging to the irrigation canals.

Where roads are un-surfaced, rutting and gully erosion eventually make the roads impassable so that vehicles drive off the track and the area affected by erosion continually widens. To mitigate this impact, tracks will be constructed and vehicles will be prohibited from driving off-road,

Soil compaction and loss of limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during the rainy seasons, when vehicle traffic is likely to cause the greatest damage.

The following types of construction activity could lead to potential soil compaction or erosion depending on the level of rainfall experienced at that time:

- Vehicle traffic along dirt tracks used during construction of on- and off-site roads, power lines, control centre and solar panels.
- Off-road vehicle traffic will damage vegetation.
- Any vegetation and some soil will be removed for the control centre, solar panel foundations, transmission towers, and both on- and off-site roads.
- The use of heavy equipment if used outside designated roads.
- Soil erosion from increased water run-off.

Soil compaction and loss of limited vegetation present increases in the soils' vulnerability to erosion. Soils will be particularly vulnerable during heavy rain, when vehicle traffic is likely to cause the greatest damage.

An additional potential impact during construction is the pollution of soils from chemical spills or oil leaks from machinery, as well as incorrect disposal of waste, including accidental discharge of sanitary or other wastewaters to the local environment. Incorrect disposal of waste can occur throughout the construction phase if appropriate disposal measures are not put in place.

Impact Assessment: Impacts on soil quality during construction					
Impact Nature	Positive			Negative	
	Reduction in local soil quality as a result of construction activities causing erosion related to increased water run-off, soil compaction and loss of limited vegetation. Soil quality can also be negatively affected by spillage of oils during maintenance of machinery, improper storage of hazardous materials, spillage during transfers of fuel and improper disposal of waste.				
Impact Type	Direct		Indirect	Reversible	Irreversible
	The impact is generally direct as soils / geology resources will be affected through construction activities.				
	Temporary	Short-term	Medium-term	Long-term	Permanent

Impact Assessment: Impacts on soil quality during construction					
Impact Duration	The impact is short-term as construction works are expected to continue for a period of approximately 12-15 months.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site and sedimentation/oil or chemical release would be at a local level only.				
Receptor Value / Sensitivity	Low	Medium	High		
	The sensitivity of soils in the Project area is assessed as Low. Whilst it is recognised that soils will be most vulnerable during spring, the limited geographical extent does not require higher sensitivity.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of the effect is predicted to be Low, given that there is potential for construction activities to notably change the resource, particularly during rainy season. Impacts of fuel spills are deemed to be highly localised.				
Impact Significance	None	Negligible	Low	Medium	High
	As a result, the significance of the impact is assessed as Minor. The extent of reduced soil quality due to construction activities is considered local, and the duration assessed as being temporary and short-term.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.2 Hydrology and Hydrogeology

8.1.2.1 Water Use

The main water requirement during construction would be water for concrete production and workforce consumption. We have assumed 0.2 m^3 of water for every 1.0m^3 of concrete. An additional supply of potable water will be required for the workforce. The water requirement during the construction period (estimated to last 12 to 15 months) has been estimated as:

Table 8-1: Water Requirements during Construction

Item	Number	Concrete Requirement	Water Requirement
Inverter bases (1.6 x 2.8 x 0.5m)	659	50m^3	300m^3
Substation and office building	1	1,200m^3	240m^3
Allow 30% extra for waste/washdown	-	-	75m^3
General construction water needs	-	-	2,985m^3
Total Construction Water			**3,600m^3**
Water needs for workers	365[93]	-	10,658m^3
Total Potable Water			**10,658m^3**

Water requirements during operation and maintenance will be largely focused on panel cleaning. Wet cleaning requires 0.275 l/m^2 of panel. For 131.5MW_{DC}, the total area is 660,000 m^2, and hence Total water requirement is 181.5 tonnes of water per cleaning cycle. It is assumed that cleaning would take place up-to a maximum of 24 times per annum therefore 4,356m^3 of water is required. In addition, back panel wet cleaning requires 131m^3 per

[93] Number of workers is a monthly average based on workforce requirements provided in Table 3-6

cleaning cycle. It is proposed that wet cleaning of the back panels would take place twice per annum, requiring 262m^3 of water. The total water requirement for wet cleaning is estimated as 4,620m^3 per annum.

The water requirements for the Project will be obtained from the public water pipeline adjacent to the site. No surface or groundwater abstraction is proposed. The water supply organization confirmed their capability of supplying 120 m^3/day during construction period; and 12 m^3/hr during operation period.

The average water consumption during the construction period (estimated to be 15 months) is approximately 37 m^3/day, amount considerably lower than the capacity available. The peak months of water consumption, however, may reach values close to 120 m^3/day. These months of peak consumption will coincide with the period where the workforce is at its highest, and is expected to take place during the winter when the pipeline's water demand is lower (see Table 3-4). In the other months the water consumption would be considerably lower. Water requirements during operation is expected to be 13 m^3/day, substantially lower than the available capacity.

Impact Assessment: Impacts on availability of surface water during construction					
Impact Nature	Positive			**Negative**	
	Impact is negative because construction activities will use water in a region were water resources have become an issue.				
Impact Type	**Direct**		Indirect	**Reversible**	Irreversible
	The impact is considered direct. The water will be supplied by a public water pipeline adjacent to the site. It is understood that water will come from SUV TA'MINOTI 300 km NW from the site. No surface water abstraction is anticipated in the proximity of the site.				
Impact Duration	**Temporary**	**Short-term**	Medium-term	Long-term	Permanent
	The impact is short-term as construction works are expected to continue for a period of approximately 12-15 months.				
Impact Extent	**Local**		Regional	National	
	The water for construction and operation is sourced from the municipal supply that serves nine nearby villages. There is no planned discharge or abstraction of surface water therefore the impact is assessed to extend to the local users of the municipal water supply only.				
Receptor Value / Sensitivity	Low	**Medium**		High	
	The sensitivity of water resource is assessed as Medium, recognising the sensitivities in the Aral Sea basis and that much of the area was formerly desert/semi desert prior to large scale irrigation.				
Impact Magnitude	No change	Negligible	**Low**	Medium	High
	The magnitude of the effect is predicted to be low given the relatively small volume of water that would be obtained from the public water pipeline during the project's lifetime. The water supply organization has confirmed capacity to supply the project demands.				
Impact Significance	None	Negligible	**Low**	Medium	High
	As a result, the significance of the impact is assessed as low, and does not require additional mitigation measures to be implemented.				
Residual Impact Significance post mitigation	None	Negligible	**Low**	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.1.2.2 Surface Water

The use of heavy vehicles during construction, could alter surface drainage within the Solar Park and create ponding of surface water. Earth banks would prevent the direct discharge of surface water to the irrigation canals. Compaction of soils will reduce the amount and rate of water that soaks into the ground and surface ponding will increase. The risk is greatest during periods of heavy rain in December. There is unlikely to be an increased volume of water flowing into drainage channels due to the earth banks running adjacent to the irrigation canals and hence there is unlikely to be additional soil erosion. Surface run-off will also contain higher concentrations of suspended sediments during construction than would otherwise be the case but as discharge to the irrigation canals is limited, surface water will pond in the small depressions on site. Other potential sources of pollution

during construction comprise leaks and spills of oils from machinery. There is no proposed discharge of sanitary waste and wastewater as waste will be collected in a septic tank for disposal.

Impact Assessment: Impacts on surface water during construction					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities may generate pollutants that reduce the quality of surface water used by local residents for crops and as a drinking water source for livestock.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is generally direct and potential sources of pollution to surface water during construction comprise leaks and spills of oils from machinery and discharge of sanitary waste and wastewater which may subsequently run off to nearby surface water bodies. Given the topography there is not expected to be surface water run-off. The localised nature of spills likely to be experienced can be addressed through standard construction practises including appropriate drainage and containment. Pollution risks will continue during the construction phase.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as construction works are expected to continue for a period of approximately 12-15 months.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site and run-off from potential spills or sediment would be at a local level only. Chemicals and fuels are not stored in sufficient quantities to result in a spill of regional importance.				
Receptor Value / Sensitivity	Low	Medium	High		
	The sensitivity of surface water is assessed as Low to Medium, recognising the fact that only small number of local residents use these two irrigation canals for vegetable farming and for drinking water for livestock. The irrigation canals are all man made and would provide a significant residence time allowing sediment to settle out prior to discharge back to the Zarafshan River.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of the effect is predicted to be low given the limited area of the Project site in relation to the overall catchment area.				
Impact Significance	None	Negligible	Low	Medium	High
	As a result, the significance of the impact is assessed as very low. The extent of reduced groundwater quality due to construction activities is considered local, and the duration assessed as being temporary and short-term . However, the depth of groundwater at 80 m below ground level result in a negligible magnitude of impact. In both cases a low significance of impact is predicted which does not require additional mitigation measures to be implemented. Nevertheless, mitigation in this case will be implemented through of the implementation of Good International Industry Practise pollution prevention measures.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.2.3 Groundwater

Groundwater will not be used to supply water for construction or operations. Water will be obtained from water pipeline adjacent to the site. Local communities within the vicinity of the Project use the drinking water mains supply for domestic use. Groundwater is poor quality with a high salt content.

Impact Assessment: Impacts on groundwater during construction					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities may generate pollutants that reduce the quality of groundwater used by local residents for domestic purposes.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is generally direct and potential sources of pollution to groundwater during construction comprise comprise leaks and spills of oils from machinery and discharge of sanitary waste and wastewater. During construction, sanitary waste will be collected in containers below portable toilets and transported to a registered waste disposal facility for disposal. Storage and handling procedures for oils and other chemicals will be required to minimize risk of pollution. Potential impacts on groundwater include: • Accident/ unplanned event: Groundwater could be contaminated through accidental fuel spills. • Accident/ unplanned event: Depending on the method of waste disposal, impacts could be felt on surface or groundwater, flora and fauna and/ or local communities. The localised nature of spills likely to be experienced can be addressed through standard construction practises including appropriate drainage and containment. Pollution risks will continue during the construction phase.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as construction works are expected to continue for a period of approximately 12-15 months.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site and run-off from potential spills would be at a local level only. Chemicals and fuels are not stored in sufficient quantities to result in a spill of regional importance.				
Receptor Value / Sensitivity	Low	Medium	High		
	The sensitivity of groundwater is assessed as Low given reported poor water quality, recognising the fact that local communities do not abstract groundwater for domestic use from boreholes located in surrounding villages.				
Impact Magnitude	No change	Very Low	Low	Medium	High
	The magnitude of the effect is predicted to be low, given that the soil and superficial deposits present in the area are expected to provide protection to the groundwater in the crystalline basement rock.				
Impact Significance	None	Negligible	Low	Moderate	High
	As a result, the significance of the impact is assessed as low. The extent of reduced groundwater quality due to construction activities is considered local, and the duration assessed as being temporary and short-term. A low impact does not require additional mitigation measures to be implemented. Mitigation in this case will involve the implementation of Good International Industry Practise pollution prevention measures.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.1.3 Landscape and Visual

8.1.3.1 Impacts on Landscape Character and Visual Amenity

The Solar Park will be only visible to a small number of people who live locally or are travelling through the area on the main highway. The equipment used to build the Park is not large but it is expected that the construction compound and worker accommodation will be visible from nearby settlements.

The completed Solar Park will include larger structures such as inverters, electrical substations, transformers and the Control Building. In all cases it is expected that on-site structures are no higher that the boundary fence which will be 2.5 m in height. The exception will be the substation connecting the Solar Park to the national grid. In all cases the height of the Solar Park will be significantly less than the height of the existing electricity pylons running in a west to east direction to the south of the Solar Park. The main impact to the LCTs during operation are the solar PV panels, boundary fence, and associated inverters and substation. The finished height of the Solar Park is low and it will only be visible to the nearby settlements. The majority of people will see the Park against the industrialised landscape of the Navoi region. The main source of impact to the LCTs during operation is the erection of the solar PV panels, and associated foundations, inverters and substation.

Other elements of operation of the Project that will affect the landscape comprise:

- Off-site features, including power lines that will be supported by transmission poles to transmit electricity from the Project site to the connection point.
- On-site roads, including access roads, and occasional vehicles that pass along the roads.
- Additional structures at the Control Centre, including the electrically sub-station.

Impact Assessment: Impacts on Landscape Character					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities will result in additional features within the LCAs. It is assumed that all Project related changes are negative in nature.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is generally direct and experienced within 5km of the Project site. The impact will continue for the duration of the Project and is therefore deemed to be irreversible.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The construction impact is short-term as construction works are expected to continue for a period of approximately 12-15 months. However, impacts will continue for the duration of the Project lifetime.				
Impact Extent	Local	Regional	National		
	It is assessed that only a small proportion of the local landscape will be affected by the presence of construction works, topsoil stripping and bare ground.				
Receptor Value / Sensitivity	Low	Medium	High		
	The sensitivity this LCT is assessed to be Low as it is not important in a local context, including visitors to the area who generally travel to this region to visit the Deggaron mosque or other sites on the Silk Road. It is noted that the LCT is not designated at the local or national level. The landscape in the wider area is industrialised which determines the overall character of the Navoi region as a whole.				
Impact Magnitude	No change	Low	Medium	High	
	The magnitude of the effect is predicted to be Low, as it is unlikely that construction works become the dominant feature in an area already impacted by human activity.				
Impact Significance	None	Negligible	Low	Moderate	High
	As a result, the significance of the impact is assessed as low. Although impacts will be visible in places, the surrounding features such as OHLs and pylons are of a larger scale in height and extent. Therefore, changes can be easily accommodated in all LCTs.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

Impact Assessment: Impacts on Visual Amenity					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities will result in additional features within the LCAs. It is assumed that all Project related changes are negative in nature.				
Impact Type	Direct		Indirect	Reversible	Irreversible
	The impact is generally direct and experienced within 5km of the Project site. The impact will continue for the duration of the Project and is therefore deemed to be irreversible.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The construction impact is short-term as construction works are expected to continue for a period of approximately 12-15 months. However, impact will continue for the duration of the Project lifetime.				
Impact Extent	Local		Regional	National	
	It is assessed that the views experienced will include OHLs and pylons, roads, substation and other man-made structures which reduce the quality of the views experienced.				
Receptor Value / Sensitivity	Low		Medium	High	
	The sensitivity of all VPs are assessed to be Low as they are not important in a local or regional context, including visitors to the area who generally travel to this region to visit the Deggaron mosque or other sites on the Silk Road. As noted, the landscape in the wider area is industrialised which determines the context of the views experienced.				
Impact Magnitude	No change	Low	Medium	High	
	The magnitude of the effect is predicted to be low, given that the soil and superficial deposits present in the area are expected to provide protection to the groundwater in the crystalline basement rock.				
Impact Significance	None	Negligible	Low	Moderate	High
	As a result, the significance of the impact is assessed as low. Although impacts will be visible in places, the surrounding features are often of a larger scale in height and extent. Therefore, changes can be easily accommodated in all LCTs. Views from the M37 will be transient in nature and again dominated by exiting vertical features in this location.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.4 Biodiversity

8.1.4.1 Avifauna

The proposed project site is not located on a major flyway or in a geographical feature that would concentrate migrating species. Survey work has confirmed that the site is not important for breeding or migrating species.

Construction impacts are likely to include habitat loss as well as disturbance impacts in the Project and adjacent areas. The existing habitat is considered to be degraded Natural Habitat as defined in PS6.The degraded nature of the project site and the relatively small number of birds encountered mean that there is not likely to be a significant impact on resident bird species.

Habitat loss associated with construction is unlikely to result in a significant impact to migrating birds as no major attractant features (e.g. lakes / wetlands) will be lost. As a result, there are not anticipated to be any impacts on resting or stopover sites for migrating birds.

Migrating Steppe eagle were recorded flying over the site in March 2020 although at a height of +100m. The installation of bird divertors will minimise the risk of collision with the 200m section of new OHL.

Large avifaunal species utilise large tree species and these are not present within the PV area of the site, thus the Project is not expected to affect successful breeding of local large bird species (such as raptors).

Impact Assessment: Impacts on ornithology during construction					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities may result in habitat loss and disturbance.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is generally direct as habitat will be lost through construction activities (e.g. ground clearance to accommodate infrastructure), this could include direct destruction or damage to bird nests (e.g. crested lark and isabelline wheatear). In addition, disturbance caused by construction activities may directly displace birds from breeding sites and/or foraging areas.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is permanent as there would be an irreversible change to the baseline within the Project site for the lifetime of the Project. Displacement impacts are temporary and short-term as construction works are expected to continue for a period of approximately 9 months.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site. No designated sites are in proximity to the site. There is potential for a number of species of conservation concern to frequent the area of the proposed project however this is deemed unlikely.				
Receptor Value / Sensitivity	Low	Medium	High		
	The PV footprint does not support a rich avian community and is restricted to five breeding species The proposed development site does not support populations of species of conservation concern e.g. houbara bustard and the likelihood of this species utilising the habitats within the proposed project site for foraging/resting on migration is negligible.. Sensitivity is determined as Low.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of the effect is predicted to be Medium given the area of the Project site that will require to be cleared and / or disturbed and that there is potential for loss/damage to eggs and nests of common ground nesting birds if site clearance occurs during the breeding bird season				
Impact Significance	None	Negligible	Low	Medium	High
	As a result, the impact is assessed as Low and not significant, however it is recommended standard mitigation measures are implemented to ensure impacts remain minimal.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.4.2 Terrestrial Ecology

Construction will cause the loss of habitat as well as disturbance in the adjacent areas. However, the natural vegetation at the project site has been substantially altered by farming and irrigation. Due to the high level of anthropogenic disturbance to the natural vegetation and limited diversity on the project site, there is little natural ecosystem function demonstrated by the site and it is therefore not considered a sensitive area.

The majority of the existing habitat is considered to be degraded Natural Habitat as defined in PS6. There are smaller pockets of Modified Habitat. It is expected that there will be limited removal of vegetation during construction as it mainly consists of low growing species. The total extent of site levelling work is approximately 97,867m^3 or 3.7% of the total site area. No vegetation removal is planned outside this area.

Direct impacts may occur in relation to Central Asian Tortoise mainly during site stripping activities. As stated above the total extent of site levelling work is approximately 97,867m^3 or 3.7% of the total site area. It is within this area where direct impacts may be encountered. Based on the results of the assessment of population density it is expected that 30 tortoises may be present in this area however the project ecologist will carry out a detailed survey pre-construction. Tortoises will be removed to a temperature-controlled facility to continue hibernation and will be released in spring 2021.

Impact Assessment: Impacts on terrestrial ecology during construction					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities may result in habitat loss and disturbance.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is generally direct as habitat will be lost through construction activities (e.g. removal of habitat to accommodate infrastructure), this could include direct destruction of flora or damage to fauna habitat. In addition, disturbance caused by construction activities may directly displace / disturb fauna. Construction vehicles and excavated areas can pose a risk of death or injury to fauna.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Initial topsoil stripping will take place during the first 1-2 months of construction. The impact is permanent as there would be an irreversible change to the baseline within the Project site for the lifetime of the Project. Displacement impacts are temporary and short-term as construction works are expected to continue for a period of approximately 12-15 months.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site. No designated sites are in proximity to the site. There is potential for a number of species of conservation concern to frequent the area of the proposed project however this is deemed unlikely.				
Receptor Value / Sensitivity	Low	Medium	High		
	The abundance and diversity of terrestrial fauna was found to be low. A single species of conservation concern was recorded: Central Asian tortoise (IUCN VU). However, there is no reasonable likelihood that the tortoise population occurring within the Project site is of regional importance as the degraded steppe habitats within the site support a small population of tortoises (the population density is significantly lower than for areas of Uzbekistan which support the highest population densities). It is assessed that between 10 and 30 tortoises may be at risk of direct impact and fatality during topsoil stripping and site clearance. A further 257 to 771 tortoises may be at risk of disturbance mainly during construction of the fence and piling work. However, results from the most recent surveys from October 2020 identify a density of 0.2 per hectare, reducing the potential number of tortoises across the whole site to 54. The March and June 2020 field surveys confirmed that the plant and animal species recorded within the proposed project site during the AECOM field surveys are not of conservation concern. A single desert monitor (*Varanus griseus*) was recorded within the wider area and there are anecdotal reports of gamma snake (*Boiga trigonata*); both species are included in the Red Data Book of Uzbekistan, however, although there is suitable habitat within the proposed project site, there is no reasonable likelihood that regionally significant populations occur. The sensitivity of the terrestrial habitat has therefore been assigned as Low in terms of faunal species. The *Artemisia* associations which predominate in the proposed project site is the dominant habitat type within the proposed project site boundary; it is a degraded Natural Habitat as defined in PS6. This wormwood steppe vegetation is ubiquitous within this region of Uzbekistan. The habitat within and adjacent to the site is heavily influenced by grazing by goats. The relatively high abundance of *Tortula desertorum* and *Peganum harmala* is indicative of a degraded sagebrush pasture due to overgrazing. Furthermore, the site is bounded on all sides by irrigation canals, highways, minor roads as well as wider areas of arable farming. It is considered that the site has limited linkages with the wider steppe habitat, the better examples begin immediately to the south of the Navoi Canal, approximately 6km south of the project. The project site represents approximately 15% of the land bounded by the two roads and drainage canals and any fragmentation of habitat is assessed to be at the local level only. The key species of concern would be Central Asian tortoise. A series of holes will be cut in the base of the site fencing to allow free passage of				

Impact Assessment: Impacts on terrestrial ecology during construction					
	tortoises in and out of the site. As a result, there is not assessed to be a significant fragmentation of habitat.				
Impact Magnitude	No change	Negligible	Low	**Medium**	High
	The magnitude of the effect is predicted to be Medium given the area of the Project site that will require to be cleared and / or disturbed.				
Impact Significance	None	Negligible	**Low**	Medium	High
	As a result, the impact is assessed as Medium and significant. A suite of both standard mitigation measures[94] and species-specific mitigation measures will be implemented to ensure impacts are reduced to Low significance or below.				
Residual Impact Significance post mitigation	None	Negligible	**Low**	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.5 Archaeology and Cultural Heritage

The Project is not deemed to have a direct adverse impact on any international or nationally recognised cultural heritage feature and consultation confirmed that there are no significant cultural resources within the Project site.

As a result of the absence of known archaeological, religious and aesthetic sites, the site sensitivity is assessed to be low.

There is the potential for the discovery of unrecorded buried archaeological remains during the construction phase as the Project will involve ground clearance activities such as levelling, grading and excavation works. These works have the potential to directly impact on unrecorded buried archaeological remains which may be present within the site boundary and may be of archaeological importance.

It should be noted that although there are no known archaeological or religious sites located within the Project footprint, the Rabat Malik Caravanserai and other Silk Road sites are located to the east of the Project adjacent to the M37. It was noted that the Caravanserai has been rebuilt to the extent possible and bears little resemblance to its original structure. Nevertheless, this site is of cultural significance. It is imperative that these sites are not disturbed further by the Project activities, such as transportation, or by the workforce. Given the distance from the site it is considered unlikely to be directly impacted by the Project.

Impact Assessment: Impacts on archaeology and cultural heritage during construction					
Impact Nature	Positive			**Negative**	
	Impact is negative because construction activities may result in physical disturbance to cultural heritage features.				
Impact Type	**Direct**		Indirect	Reversible	**Irreversible**
	The impact is generally direct as archaeology features could be disturbed by construction activities.				
Impact Duration	**Temporary**	**Short-term**	Medium-term	Long-term	**Permanent**
	The impact is permanent as impacts occur there would be an irreversible change to the baseline within the Project site.				
Impact Extent	**Local**		Regional	National	
	Any potential impact is expected to occur within the site. There are no known designated archaeology features within the site. Any impact would be on previously undiscovered remains.				
Receptor Value / Sensitivity	**Low**		Medium	High	
	There are no known archaeological or religious sites within the Project site and there is considered low potential for unknown buried archaeological remains to survive within the site due to the past attempt to develop arable farming on the land.				

[94] For example: NetRegs (2020). Guidance for Pollution Prevention (GPP). Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

Impact Assessment: Impacts on archaeology and cultural heritage during construction					
Impact Magnitude	No change	Low	Medium	High	
	Magnitude of change is anticipated to be Low as there is limited potential to disturb any existing features. Potential impacts on undiscovered archaeology are deemed to be of low magnitude.				
Impact Significance	None	Negligible	Low	Medium	Major
	The impact is assessed as Low and not significant prior to mitigation measures being implemented.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.6 Noise and Air Pollution

The closest house to the Project is around 1km away. The project layout includes a number of inverter and transformer locations toward the centre of the site which again are at a distance of over 1 km from the closest house. The construction of the substation building / transformers and inverters are expected to be the noisiest activities. Typically, associated construction activities within a 200 m distance from noise sensitive receptors have the potential to result in increased levels of noise at people's houses.

Noise pollution may result from the large workforce and construction activities, particularly the movement of trucks used to carry material to the site and removal of debris. Some heavy earth moving, and compacting machinery may be required for brief periods during construction, but it is expected that much of the civil work will involve manual labour.

Air pollution may also arise as a result of dust emanating from vehicle movements and other construction activity. However, this will be a temporary effect that can be mitigated by restricting vehicles to sealed access tracks and the use of dust suppression measures.

Impact Assessment: Impacts on noise and air pollution during construction					
Impact Nature	Positive	Negative			
	Impact is negative because construction activities may result in increased noise and air pollution.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct as construction activities would directly increase noise / air pollution.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as impacts would occur during the construction phase only.				
Impact Extent	Local	Regional	National		
	The impact is expected to occur within the site and adjacent areas.				
Receptor Value / Sensitivity	Low	Medium	High		
	No residential receptors are located within 2 km of the Project site therefore receptor sensitivity is determined to be low.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	Magnitude of change is anticipated to be Very low as there is unlikely to be any increase noise levels and increased dust / emissions to air associated with construction of the Project at nearby residential receptors.				
Impact Significance	None	Negligible	Low	Medium	High
	The impact is assessed as Negligible and not significant pre mitigation. Although no specific mitigation is required, standard good construction practice will be maintained to ensure no increase in predicted impacts during construction.				
Residual Impact	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

Impact Assessment: Impacts on noise and air pollution during construction	
Significance post mitigation	

8.1.7 Social Impacts

As has been described, the nearest residential areas identified around the Project are the villages of Uzumzor (2.6 km east from the site boundary), and Farkhod (2.2 km south from the site boundary). The area is characterised by desert conditions, with irrigated land and the Zarafshan river located approximately 4.3 km north from the site. The following sections will describe some of these interactions in order to frame the social impacts. Only two individuals will be directly, negatively affected by the development of the Solar Park.

8.1.7.1 Physical and economic displacement

As noted, only two householders will be directly, negatively affected by the development of the Solar Park. There has been no physical displacement and alternative land has been provided to Farmer B, who was using the project site for grazing. Farmer A has not applied for alternative land and indicted that access to land does not form a significant part of his livelihood.

Impact Assessment: Physical and economic displacement					
Impact Nature	Positive		Negative		
	Impact is negative because physical or economic displacement would negatively affect a person's livelihood.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct and indirect because the Project may occupy land previously used for farming/grazing.				
Impact Duration	Short-term	Medium-term	Long-term	Permanent	
	The impact is permanent as it would be in place for the full project lifetime.				
Impact Extent	Local	Regional	National		
	The impact may occur at a local level within the site boundary and immediate surroundings.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is low as although this is a perceptible change to some people, only two Project Affected Householders (PAHs) are affected and at a local extent.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value is low given that both PAHs have been compensated either on a like for like basis or have sufficient land still remaining and do not depend on access to the project site as their main source of livelihood.				
Impact Significance	Negligible	Low	Medium	High	
	The overall impact significance is Low. This is an adverse impact but does not require any specific mitigation.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.7.2 Community expectations of the Project

Local communities and the local economically active population may develop higher expectations on the direct or indirect benefits of the Project, specifically regarding work opportunities. Unmanaged expectations, particularly in terms of the number of jobs being created for the local community, can begin from the moment the Project is announced for development, before site preparation activities commence.

Impact Assessment: Community expectations of the Project				
Impact Nature	Positive		Negative	
	Impact is negative because unmanaged expectations may lead to heightened concerns / unmet expectations that may difficult the attainment of a social license to operate.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is both direct and indirect because the Project will be announced and presented as part of the regulatory process in the AoI. It is also indirect because local stakeholders may disseminate expectations about the Project before it is formally disclosed. It is, however, reversible with early stakeholder engagement.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as potential expectations will likely commence before construction works are expected to start but are not likely to continue beyond that.			
Impact Extent	Local	Regional	National	
	The impact may occur at a regional level in Navoi.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is medium as this is a perceptible change to some people, potentially in a regional extent.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor value is low given that local communities and local economically active population are not depending on this Project specifically as their main source of work. However, high levels of unemployment may cause this potential impact to increase unmanaged expectations among more vulnerable groups.			
Impact Significance	Negligible	Low	Medium	High
	The overall impact significance is Low. This is an adverse impact and the corresponding mitigation measures will be presented in Section 7. This impact should be continuously managed throughout the construction phase (and ongoing operation phase).			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.7.3 Increased Local Employment, Capacity Building and Supply Demand

As previously mentioned, the Project will employ up to 900 personnel including technicians and low-skilled personnel (approximately 600) who will receive various levels of training before staring work on the Project. This includes basic training on HSE, labour management and, where required for specific job profiles, vocational training. The construction workforce is expected to consist of a combination of nationals and expatriate workers, with the majority being local economically active population, preferentially sourced from the surrounding communities in the AoI. A Local Hiring Plan will be developed to maximise the number of local employees on the Project (see Section 8).

Additionally, the Project will positively influence the local and regional economy during construction from the direct procurement and supply of materials and services from companies based in the local and regional area. This includes the procurement of security, construction companies involved in civil works and the interconnection to the existing transmission lines, logistics, machinery, vehicles and from lodging and accommodation services provided to the workforce.

Impact Assessment: Increased local employment, capacity building and supply demand				
Impact Nature	Positive		Negative	
	Impact is positive because construction activities will generate economic growth at a local level through the procurement of workforce, services and materials. Experience from similar projects has indicated that whilst local employment is a positive impact due to increased household income, significant impacts can occur if the local recruitment process is not adequately managed.			
Impact Type	Direct	Indirect	Reversible	Irreversible

Impact Assessment: Increased local employment, capacity building and supply demand				
	The impact is both direct and indirect, given that labour will be sought from the local community and training provided for selected individuals, thereby creating direct and indirect employment opportunities. Individuals and their household members will benefit from increased income and from training and skill development opportunities. Similarly, the Project represents an opportunity for young people to increase their skills through vocational training that will be of use to them after their involvement in this Project is completed. Individuals who receive such training should be able to seek alternative work within the growing construction sector in the future. Nur Navoi will also pay taxes during the purchase of materials and services and generate indirect economic opportunities as Project suppliers procure materials and services from their own internal supply chain networks. The increased demand for business-to-business services to small-to-medium enterprises (SMEs) will generate increased revenue in the AoI, resulting in higher turnover for the small to medium enterprises involved.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as construction works are expected to continue for a period of approximately 12-15 months. The total number of the local workforce is expected to increase as site preparation activities commence. After the peak level has been reached, the local workforce will gradually be reduced leading up to the start of operations. Potentially, living standards and training provided can have longer term positive effects and duration. Experience has shown in similar projects that short-term employment provides an opportunity for households to pay off their debts, invest in the quality of their housing and increase access to education amongst young people.			
Impact Extent	Local	Regional	National	
	The impact is expected to occur at the local and regional levels.			
Impact Magnitude	Negligible	Low	Medium	High
	Local hiring could have a perceptible change in local household living standards. However, he magnitude of the impact is low because the total capital expenditure incurred during construction is expected to be a small contribution to the annual regional and City economic output.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor value is low to medium as local communities, the local economically active population, and regionally based SMEs will have different capabilities to adapt to this beneficial impact, as the Project will require both skilled and unskilled labour. It will vary depending upon the overall size of the business or economically active workforce. For some SMEs, their involvement in the Project may result in a significant increase in business turnover during construction. It is essential that the local recruitment process is adequately managed and seen to be transparent, involving the active participation of local and regional stakeholders.			
Impact Significance	Negligible	Low	Medium	High
	The overall impact significance is moderate. This is a beneficial impact and no mitigation is required. No residual impacts are expected to occur. Enhancement measures which could strengthen the positive effects are discussed in Chapter 7.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Medium positive and not significant.				

8.1.7.4 Capacity Strain Contribution to Local Public Services and Facilities

The Construction workforce will be based on site in workers camps.

The workforce camp will be designed in accordance with IFC/EBRD guidance and will include provision for all required services including bathrooms/showers, kitchen, laundry and medical facility. The EPC Contractor will prepare detailed Covid-19 management measures to manage the risk of up to 900 workers working on the

construction site and living together in the camp. A summary of these measures is included in Section 7.1.7.6 below. Detailed measures will be included in the CESMP.

Based on the current Covid-19 restrictions it is not deemed appropriate to house workers within the wider community.

Impact Assessment: Capacity strain contribution to local public services and facilities				
Impact Nature	Positive	Negative		
	Impact is negative, due to the potential saturation of local services and facilities, such as clinics if such services are not provided within the workers camp. This would be particularly important should there be a spike in Covid-19 infections. Construction activities may also result in reduced access to roads around the Project site during road upgrade work, increased traffic and the use of the M37 road by large construction vehicles.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is both direct and indirect because the individuals involved, and the local communities, may be impacted differently according to their dependence on those services. As an example, if no medical facilities are provided on site then local facilities may not have the capacity to deal with an outbreak of Covid-19 among a peak workforce of 900. The indirect effect could be that local people are denied access to medical services, increasing the likelihood of other illnesses going untreated. However the adverse impact is reversible and would end on completion of construction works.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	As noted, the majority of the positive and negative impacts are short-term as construction works are expected to continue for a period of approximately 12-15 months. Capacity strain will be more perceptible during the construction period.			
Impact Extent	Local	Regional	National	
	The impact will occur at a local level.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is Medium mainly in relation to the effect of Covid-19 and its ability of quickly spread within the workplace environment and hence potentially overwhelming medical services. Other impacts are not deemed to be as significant and services will be provided on camp to meet worker's basic needs.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The sensitivity medium as the access to public services is relevant to communities to sustain their livelihoods (such as crop irrigation) and the local workforce to develop their daily activities. Suspension or delay of services may be harder for some receptors to adapt than others, particularly regarding water shortages for domestic consumption and irrigation. Although all the houses reportedly have well-like reservoirs to store water during the day, during the June 2020 site visit, water scarcity was considered an acute issue in the area.			
Impact Significance	Negligible	Low	Medium	High
	The negative impact is assessed as Medium and requires additional mitigation in the form of an appropriate Worker Accommodation Plan and Covid-19 management measures. Nonetheless, this impact will require mitigation measures included in the ESMP.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant but will require careful and ongoing monitoring.				

8.1.7.5 Loss of Public Access and Reduced Mobility through Local Paths

The boundary fence line shall be installed at the start of construction activities to prevent the entry of unauthorised personnel into working areas to maintain public health and safety. From the moment the fences are erected, local people from the Core, Direct and Indirect AoI will lose access to footpaths inside the Project area. This will result in longer time periods being required to move between locations when the footpaths are generally used. The road to the east and south of the Project area shall continue to be available.

Impact Assessment: Impacts from a loss of public access to footpaths inside the project area				
Impact Nature	Positive		Negative	
	Impact is negative as there will be a loss of access to footpaths within the Project area.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct because local people shall no longer be able to access the footpaths. inside the Project area and alternative routes will need to be used.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is considered to be of very long term as the boundary fences shall be in place during both construction and operations. They may be removed as previous land use is reinstated after Project decommissioning.			
Impact Extent	Local	Regional	National	
	The impact will occur at a local level only as the restrictions to land shall most likely impact people from a single farm.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is low as the limited number of people who currently use the footpaths will be able to access alternative tracks or roads to reach their destination. No users of the footpaths across the site were recorded during site surveys.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The impact magnitude is medium as other roads shall remain open for use and therefore there are alternative routes available.			
Impact Significance	Negligible	Low	Medium	High
	The impact is assessed as low, primarily because the local farm users may adapt or readjust differently to their new timings and distances compared to baseline conditions.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.7.6 Reduced Access to Grazing and Pastoral Land

The loss of grazing land due to project construction works may result in a negative impact on the ability of the two farmers to maintain the same level of income. No additional impacts to land and livelihoods are expected to occur in relation to the upgrade of existing access roads which will connect the Project area to the main road (M37), as the width of the roads will not be widened. According to the results of fieldwork undertaken in March and June 2020, the land for the Project area was being used for pastureland for the grazing of livestock, mostly from Farm B who also grazes around 30 heads of goats and sheep for Farm A lessor. As was described in the Social baseline (Section 7.8.10), NNS engaged with the farmers and the Khokimiyat and confirm that Farmer B applied for and was granted alternative land of 106.94 ha in August 2020. However, Farmer B considered the alternative land unsatisfactory, and applied for a second portion of land which was selected by him and has been provided.

As of early October 2020, Farmer A has not applied for land or communicated any complaints to the Khokimiyat. Farmer A has indicted that access to land does not form a significant part of his livelihood.

The communities identified in the Core, Direct and Indirect AoI will be outside the area proposed to be fenced off for the Project. As a result, there will be no physical resettlement of any individual.

Impact Assessment: Reduced access to grazing and pastoral land				
Impact Nature	Positive		Negative	
	Impact is negative as existing land users shall experience a reduction of access to typical livelihood areas due to the restrictions in access to the land within the site boundary. No physical displacement will occur.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct because the local farms will no longer be able to access land inside the Project area during the Project life cycle. Resulting impacts are reversible after the Project's decommissioning stage.			

Impact Assessment: Reduced access to grazing and pastoral land					
Impact Duration	Short-term	Medium-term	Long-term	Permanent	
	The impact is very long-term as land users will not be able to conduct pastoral activities inside the Project area from the moment fences are installed along the site boundary until the Project is decommissioned. It should be noted that the land leases were modified since 2018.				
Impact Extent	Local	Regional	National		
	Impacts associated with a loss of access to land will occur amongst the two farms in the Core AoI.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is Low as alternative land has been provided to Farmer B. Farmer A has sufficient land left to not be at a disadvantage. No grievances have been raised. The impact is expected to result in some disruption due to Farmer B moving his animals to the new land however this would be a one-off impact of a few days. NNS will provide support to move livestock.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor's sensitivities is Low as Farm B has access to alternative land. Farm A is not using the area for livestock grazing. The lessor of Farm A has other businesses reselling cattle and meat and depends on the land to a lesser extent than Farm B users, who still depend on access to the land until alternative land is provided. It was our understanding from consultation in March 2020 that Farm B users are not the leaseholders of the land. However, it is now our understanding that Farm B were the leaseholders and inaccurate information was initially provided by the Khokimyiat. Nevertheless, Farm B was provided with alternative land adjacent to his current land. Farmer B raised concerns over the quality of replacement plan and has now been provided with a second land plot which he had chosen. The new land has been registered under the Farmer B.				
Impact Significance	Negligible	Low	Medium	High	
	The impact is assessed as Low on the basis that Farm A has a minimal reliance on land inside the Solar Park area for livelihood, and Farm B has been awarded alternative land. The developer will monitor the situation and provide support in helping move animals and equipment if necessary.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.1.7.7 Increased presence of workers and interaction with local communities

Community H&S may be at risk from worker migration and the presence of workers in the Project area, resulting in increased tensions between residents and newcomers, a possible increase in the local incidence of crime and changes in the local disease profile (increase of Covid-19). AECOM consider the management of Covid-19 transmission to be of primary importance. Workers will be housed within the project site to minimise contact with the surrounding population.

Impact Assessment: Increased presence of workers and interaction with local communities		
Impact Nature	Positive	Negative
	This is an adverse impact because of the potential for people from outside the local area to turn up seeking employment and other types of economic opportunities. This may result in an increased risk and exposure to spreading communicable diseases, increased tensions between residents and newcomers, and may result in an increase in the local incidence of crime. The EPC Contractor will prepare specific Covid-19 management measures. This will confirm the number of workers that are required and where will they come from. An assessment will be made in terms of the context of Covid 19 at the workers' home location and the likelihood of infection. All workers will be screened for Covid-19 before they leave	

	their home location and again on arrival at the site. Uzbek authorities are likely to screen workers prior to allowing entry into Uzbekistan. There will be a general assumption that workers remain within the camp and not interact with the local community. However, it is recognised that some travel would be required within the local community and in these cases, workers would wear face masks and adhere to appropriate social distancing guidelines. Should workers exhibit Covid-19 symptoms they will require to isolate and will not be able to mix with the wider workforce.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct and indirect because the Project will cause potential local employment that will attract indirect opportunities and other potential worker migration. This is largely reversible once the construction phase is concluded.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as community health and safety risks will be introduced from the start of the construction phase and although there will be residual risks throughout operation of the project, no long-term worker migration is expected.			
Impact Extent	Local	Regional	National	
	Risks will be generated at a local level within the Direct and Indirect AoI.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is medium because the potential for workers to travel outside their accommodation when they are not working and interact with local residents is perceptible to both Direct and Indirect AoI communities. Residents may be exposed to increased health and safety risks.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The sensitivity is medium as the local communities may be able to adapt to this change depending on the actual location of worker accommodation. Whereas Navoi city will have sufficient means to adapt, other localities such as Uzumzor or the Southern Settlement may not have the same resilience to intake a large workforce or prevent their vulnerable groups from this potential increase to community H&S risks. According to the June 2020 site surveys, there are no hospitals or clinics in neither Uzumzor nor Farkhod and the clinic serving both settlements is located in the Gulshan settlement. An increase in the demand for health services could potentially saturate the available clinics.			
Impact Significance	Negligible	Low	Medium	High
	The potential impact during construction is considered to be Medium, pre-mitigation.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant but will require careful and ongoing monitoring.				

8.1.7.8 Increased Presence of Security Personnel

This impact will commence at the start of construction as working areas are fenced off to prevent unauthorised entry inside the site boundary. In addition to the expected workforce, during the construction phase, private security personal shall be used to provide general security at construction working areas to ensure that there is no entry of unauthorised personnel and that construction equipment is safe and secure. There is the potential for security personnel to use excessive force that results in intimidation or even physical damage, acting as a trigger event to further potential conflicts and Human Rights risks.

Impact Assessment: Increased presence of security personnel		
Impact Nature	Positive	Negative
	This is an adverse impact because of the potential use of excessive force or intimidating presence of security guards that may interact with local herders or community members traveling near the Project site.	

Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct because the Project will employ security personnel as part of its planned activities and to avoid access from local community members to other OHS risks inside the site. It is largely reversible with the proper HR training.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term as the construction phase will lasting approximately 12 to 15 months. The same impact is evaluated for the construction phase appropriately.			
Impact Extent	Local	Regional	National	
	Risks will be generated at a local level within the Core, Direct and Indirect AoI.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is Medium because the potential for security guards to interact with local community members is a very perceptible change to the baseline conditions.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The sensitivity is Medium as the local communities may be able to adapt to this change depending on the timing of previous disclosure of Project starting activities.			
Impact Significance	Negligible	Low	Medium	High
	The potential impact during construction is considered to be Medium adverse, pre-mitigation. It is expected that HR training will reduce this to Low.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.1.7.9 Occupational health and Safety Impacts and Impacts to Project Workforce

During the construction phase, there will be occupational health and safety risks to workers from the various operation and maintenance activities expected to take place for the Project. Furthermore, these risks will exist during the upgrade to the access roads, and during the interconnection to the existing transmission line poles. Key risks could include (amongst others), collision with vehicles and the exposure to a variety of hazards such as electric shock from exposed cables and thermal burn hazards and exposure to chemicals, hazardous or flammable materials. Occupational risks could also involve the following:

- Equipment and activities will create noise and vibration during construction and demolition that could impact human health. This impact is covered in more detail in the corresponding section.
- Movement of materials and workers during construction could impact public safety.
- Dust and engine emissions created by construction activities could impact air quality and hence community health. This impact is covered in more detail in the corresponding Air Quality section.
- Working at height during the installation of transmission line cabling; and
- Heavy lifting during installation of the solar panels by the workforce.

Occupational health and safety impacts are considered of short-term duration throughout the construction phase and are expected to be of medium magnitude and high sensitivity as in extreme cases they could entail permanent impacts (e.g. permanent disability). As such, the impacts are considered to be qualified as major and appropriate mitigation has been proposed.

Impact Assessment: Occupational Health and Safety Impacts during Construction		
Impact Nature	Positive	Negative
	There will be some occupational health and safety risks through carrying out construction activities. This includes risk of electrocution, thermal burn hazards, exposure to hazardous chemicals and working in extreme temperatures.	

Impact Assessment: Occupational Health and Safety Impacts during Construction					
	Mismanagement of wastes (such as domestic solid waste, sewage and hazardous wastes) can also represent a health and safety risk to workers, such as disease, injury or death. The construction workforce will be based on site in a worker's camp. Associated risks of accident and ill health due to living or working conditions are relevant for this receptor, as well as their potential interaction with nearby communities.				
Impact Type	Direct			Indirect	
	The risks are predominantly associated with direct impacts on the construction and workers due to the operation of the Project. Health and safety risks associated with waste mismanagement are considered indirect impacts.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impacts will persist throughout the construction phase.				
Impact Extent	Local		Regional	National	
	The impacts will be limited to the local area.				
Receptor Value / Sensitivity	Low		Medium		High
	The receptors in this case are the workers. Each individual is of high value/sensitivity.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	Occupational health and safety impacts could result in disease, injury or death to workers and so the magnitude is high.				
Impact Significance	None	Negligible	Low	Medium	High
	Pre-mitigation, the impact is assessed as Major and significant.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant with full implementation of robust H&S management.				

8.1.8 Traffic and Transportation

The magnitude of change in traffic numbers cannot be quantified accurately at this stage for the majority of the roads due to the lack of traffic count data for the affected roads along the route. Due to the size of the Project however and the length of the construction period, the construction traffic on a daily basis is unlikely to be significant.

It is envisaged that the magnitude of change associated with Project generated traffic would likely to be Low.

Considering that the majority of the road network is of low sensitivity and the likelihood that the magnitude of change would not exceed Low, the overall level of effect is predicted to be Negligible during the construction process.

The impact on the local road network is therefore not anticipated to be significant during construction. Mitigation measures have been proposed to ensure that any impacts are limited.

Impact Assessment: Impacts on traffic during construction					
Impact Nature	Positive			Negative	
	Impact is negative because construction activities may result in increased traffic volumes.				
Impact Type	Direct		Indirect	Reversible	Irreversible
	The impact is direct as construction activities would directly increase construction traffic.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as impacts would occur during the construction phase only.				
Impact Extent	Local		Regional	National	

Impact Assessment: Impacts on traffic during construction					
	The impact is expected to occur within the site and on national roads in both Uzbekistan and Kazakhstan.				
Receptor Value / Sensitivity	Low	Medium	High		
	Although the transportation route passes a number of towns, the road is likely to have existing HGV traffic and the receptor sensitivity is determined to be low.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	Magnitude of change is anticipated to be Low as the increased number of HGV movements is not expected to exceed 30% above baseline.				
Impact Significance	None	Negligible	Low	Medium	High
	The impact is assessed as Negligible and not significant pre mitigation. Although no specific mitigation is required, standard good construction practice will be maintained to ensure no increase in predicted impacts during construction.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.2 Operational Phase Impacts

8.2.1 Geology and Soils

During this phase of the Project, the main impacts on soils would be from continued vehicle traffic. Vehicle movements will comprise:

- Movement of staff and materials to and from the site along the access roads.
- Movements between the control centre and across the site for operation and maintenance. Workers are expected to visit the site at least once per week for routine maintenance.

There should be no need for vehicles to travel off the improved roads, and this should be actively discouraged. As described with regard to the construction phase impacts, the main risk to soils would be where vehicles leave prepared roads and drive cross-country. If designated roads are not used, vehicle movements can cause damage over a wide area.

Impact Assessment: Impacts on soil quality during operation					
Impact Nature	Positive			Negative	
	The main operational impacts on soils would be from continued vehicle traffic. Vehicle movements will comprise: Movement of staff and materials to and from the site along the access roads. Movements between the control centre and across the site for operation and maintenance. Workers are expected to visit the site at least once per week for routine maintenance. Risk of pollution from solid, liquid and hazardous wastes and leaks and spills from maintenance activities.				
Impact Type	Direct			Indirect	
	These are indirect impacts associated with the operation of the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impacts will persist throughout operation and are therefore considered permanent.				
Impact Extent	Local		Regional	National	
	The impacts on geology and soils are primarily limited to the footprint of the Project.				
Receptor Value / Sensitivity	Low	Medium	High		
	The soils are a medium sensitive receptor given its agricultural use.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of the effect during operation is very low, since there will be much less frequent traffic than during construction, and only occasional use of heavy equipment. In addition, the use/handling of chemicals /oils/wastewater during operation will be limited.				
Impact Significance	None	Negligible	Low	Medium	High
	The impacts are assessed as Negligible and insignificant.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.2.2 Hydrology and Hydrogeology

The operation of the Solar Park is expected to have negligible impact on surface waters. Potential impacts to surface waters by operating activities would include pollution, increased runoff and erosion, primarily in existing or new erosion channels that receive run-off from roads.

The Project will not use groundwater for operational activities and therefore there will be no impact to groundwater resources.

The sanitary waste from employees will be treated using wastewater recycling equipment installed at the control centre. Recycled water will be used to water restored areas of any grassland and landscaping.

Impact Assessment: Hydrology and hydrogeology impacts during operation					
Impact Nature	Positive				Negative
	Impacts on surface water would include increased runoff and erosion, primarily in existing or new erosion channels that receive run-off from roads. Surface and ground water are also at risk of pollution from solid, liquid and hazardous wastes and leaks and spills from maintenance activities.				
Impact Type	Direct			Indirect	
	Pollution due to increased run-off, leaks, spillages and waste mismanagement are all considered to be direct effects of Project operation.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact will persist throughout operation and is therefore considered permanent.				
Impact Extent	Local		Regional	National	
	Impacts anticipated to be limited to the local area, primarily within or adjacent to the site area.				
Receptor Value / Sensitivity	Low		Medium	High	
	Due to the earth embankment between the site and the canals (used by local communities) to the east and west of the site, surface run-off will not be possible. Even in the event of run-off, the canals would provide significant settlement prior to discharge to the Zarafshan River. Therefore, the sensitivity of these canals to pollution and increase in suspended solids from erosion of surrounding ground surfaces, results in the sensitivity of surface water being considered to be Low. Sensitivity of groundwater is assessed as Low, recognising the poor water quality and fact that local communities do not abstract groundwater.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of the effect in relation to surface water is predicted to be low given, given that the soil and superficial deposits present in the area are expected to provide protection to the groundwater in the crystalline basement rock, and that the use/handling of chemicals /oils/wastewater during operation will be limited. The overall impact is therefore considered to be Negligible and not significant.				
Impact Significance	None	Negligible	Low	Medium	High
	Pre-mitigation, the impact in relation to ground and surface water is assessed as Low and not significant.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	With the implementation of standard mitigation measures in relation to fuel and waste storage and containment, the residual impact is predicted to be Negligible and not significant.				

8.2.3 Landscape and Visual Impact

The Project will cover approximately 300 hectares of land but the majority of the Solar Park is less than 3m in height and there is limited potential for the project to have a major impact on the people living in the local residential properties to the south and east of the project site.

Impact Assessment: Landscape and visual impacts during operation					
Impact Nature	Positive				Negative
	The introduction of large-scale infrastructure has potential for impacts that would be perceived by some as being detrimental.				
Impact Type	Direct			Indirect	
	Impacts can be direct (the introduction of the Project changes the landscape itself) or indirect (when the Project affects views from other adjacent or more distant landscapes).				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact will persist throughout operation and is therefore considered permanent.				

Impact Assessment: Landscape and visual impacts during operation					
Impact Extent	Local	Regional	National		
	Given the low height of solar arrays (approximately 2.4 m) and the screening offered by surrounding topography (particularly to the east) and vegetation, potentially significant effects will generally be restricted to the local area.				
Receptor Value / Sensitivity	Low	Medium	High		
	The local landscape is already altered due to the presence of man-made structures such as overhead power lines, main highway, existing electricity substation and other commercial structures. Sensitivity is also reduced by anthropogenically altered watercourses. However, receptors in proximity to the site are predominately related to residential settlement and include a mosque to the south of the Project site, with some associated importance of view toward the predominately rural nature of the Project site. Sensitivity is considered Low.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	The magnitude of change is assessed to be Low as the Project will introduce a notable change to the landscape, particular to receptors in closest proximity to the Project site but this will be on a very localised level.				
Impact Significance	None	Negligible	Low	Medium	High
	As a result, the effect is assessment as Low and not significant.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.3.1 Glare and Glint

The potential for glare and glint from the Project during operation is low. It is important to note that the PV panels work on the concept of absorbing sunlight rather than reflecting it as compared to other technologies that concentrate solar energy. The PV panels that will be used for the Project have very limited levels of either glint or glare and are substantially less reflective than most surfaces such as still water, glass or steel. Glint will be substantially reduced by the anti-reflective coating of the modules that is incorporated to maximise the light capture of the solar cells.

Previous studies have been undertaken to compare the reflectivity of solar panels with other materials. The most commonly referenced source is a Federal Aviation study focusing on solar panels located at airports. This study states that modern solar panels reflect as little as 2% of the incoming sunlight. Solar PV panels have a lower level of reflectivity than many commonly occurring features such as bare soil and vegetation.[95]

Impact Assessment: Glint and glare impacts during operation					
Impact Nature	Positive	Negative			
	There is a perception that solar PV panels (in a similar way to glass buildings and large metal structures) can cause significant solar reflections that can cause a distraction or nuisance. This can be an important concern for airports and highways particularly when located in the pilot's direct field of vision on approach to the runway.				
Impact Type	Direct	Indirect			
	This is a direct impact resulting from sunlight reflecting off the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Any glint and glare issues would persist throughout operation.				
Impact Extent	Local	Regional	National		
	Any impacts would be limited to areas in relatively close proximity to the site.				
	Low	Medium	High		

[95] Federal Aviation Administration (FAA), July 2015. Final Report: Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach.

Impact Assessment: Glint and glare impacts during operation					
Receptor Value / Sensitivity	There are obvious safety concerns with regard to any potential to distract aircraft pilots and vehicle drivers, causing accidents leading to potential injuries or deaths.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	PV panels work on the concept of absorbing sunlight rather than reflecting it as compared to other technologies that concentrate solar energy. Previous studies have been undertaken to compare the reflectivity of solar panels with other materials. The most commonly referenced source is a Federal Aviation study focusing on solar panels located at airports. This study states that modern solar panels reflect as little as 2% of the incoming sunlight. Solar PV panels have a lower level of reflectivity than many commonly occurring features such as bare soil and vegetation.				
Impact Significance	None	Negligible	Low	Medium	High
	The impact is assessed as Low and not significant.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.4 Biodiversity

8.2.4.1 Avifauna

The proposed project site is not located on a major bottle neck or geographical feature that would concentrate migrating species. As a result, there is no reasonable likelihood that the site supports or witnesses exceptionally high numbers of migratory or congregatory species. Additional survey work that took place in June 2020 confirmed that the site is not important for breeding or migrating species.

The habitat and species composition on the Project site are not deemed to be particularly sensitive or of conservation concern. The Project site is characterised by a high level of anthropogenic disturbance. There is, however, the potential that species of conservation concern could frequent the region, as the project footprint falls within their known distributions.

Impact Assessment: Ornithology impacts during operation					
Impact Nature	Positive	Negative			
	Potential impacts during operation of the Project are as follows: • Habitat loss and displacement. • Disturbance of birds from people and traffic. • Loss of birds from electrocution from perching on transmission lines. • Bird collision with power lines. AECOM do not assess there to be an impact as a result of the so-called 'lake effect' of solar panels. Routine inspections will record any bird fatalities in line with IFC guidance: Bird rescue protocol and monitoring at PV solar facilities.				
Impact Type	Direct	Indirect			
	The impacts listed above are all considered to be direct effects of Project operation.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impacts will persist throughout operation and are therefore considered permanent.				
Impact Extent	Local	Regional	National		
	The extent of potential impacts includes the Project footprint and the short length of the proposed new section of 220 kV overhead electricity line from the Project to the grid connection point.				
	Low	Medium	High		

Impact Assessment: Ornithology impacts during operation					
Receptor Value / Sensitivity	The habitat and species composition on the Project site are not deemed to be particularly sensitive or of conservation concern. However, there is potential for species of conservation concern to be present in the region, as the Project footprint falls within their known distributions. The value of the receptor is considered to be Low.				
Impact Magnitude	No change	Negligible	**Low**	Medium	High
	The Project site is already characterised by a high level of anthropogenic disturbance and the project impact is deemed to be Low.				
Impact Significance	None	Negligible	**Low**	Medium	High
	The impact is assessed as Low and not significant.				
Residual Impact Significance post mitigation	None	**Negligible**	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.2.4.2 Terrestrial Ecology

Given the lack of species of conservation concern [IUCN EN or CR], the sensitivity of the Project site is assessed to be low. Furthermore, the degraded nature of the site will reduce the magnitude of the impact to low. This results in a low impact (not significant) which does not require to be mitigated. There will be negligible direct impacts on Central Asian tortoise other than potential traffic impacts. The workforce will be fully briefed on the need to be aware of tortoises. Any drains or trenches will be routinely inspected and if tortoises are found they will be moved to an appropriate area within the site.

The ongoing site restoration will be actively managed to ensure the success of natural revegetation. This will include regular watering and if necessary manual seeding will be considered if suitable seeds are available commercially.

Impact Assessment: Terrestrial ecology impacts during operation					
Impact Nature	Positive			**Negative**	
	Disturbance of fauna from presence of people, machinery, traffic, and noise, primarily within the Project area.				
Impact Type	Direct			**Indirect**	
	These are indirect impacts associated with the operation of the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	**Permanent**
	The impacts will persist throughout operation and are therefore considered permanent.				
Impact Extent	**Local**		Regional	National	
	The impacts on terrestrial ecology are primarily limited to the footprint of the Project.				
Receptor Value / Sensitivity	**Low**	Medium	High		
	The abundance and diversity of terrestrial fauna was found to be low. A single species of conservation concern was recorded within the proposed project site: Central Asian tortoise (IUCN VU). However, there is no reasonable likelihood that the tortoise population occurring within the Project site is of regional importance. The sensitivity of the terrestrial habitat has been assigned as Low. Other plant and animal species recorded during the AECOM field surveys are not of conservation concern.				
Impact Magnitude	No change	Negligible	**Low**	Medium	High
	The area is degraded due to existing anthropogenic activity within the region. In addition, during operation there will be very limited personnel and vehicle movements within the site.				
Impact Significance	None	Negligible	**Low**	Medium	High
	The impact is assessed as Low and insignificant.				
Residual Impact Significance post mitigation	None	**Negligible**	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.2.5 Archaeology and Cultural Heritage

During the operational phase there will be no new impacts on existing cultural sites. The lack of visibility of the Project from these sites and the absence of a construction workforce will mean that no impact is predicted.

Impact Assessment: Impacts on archaeology and cultural heritage					
Impact Nature	Positive			Negative	
Impact Type	Direct			Indirect	
	These are indirect impacts associated with the operation of the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
Impact Extent	Local		Regional	National	
	The impacts on archaeology are primarily limited to the footprint of the Project.				
Receptor Value / Sensitivity	Low	Medium		High	
	No works will be taking place other than maintenance and security. There are a number of sites within 30km of the Project of cultural importance.				
Impact Magnitude	No change	Negligible	Low	Medium	High
	No ground works will take place therefore no impacts are predicted.				
Impact Significance	None	Negligible	Low	Medium	High
	No impacts are predicted.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	No residual impact is predicted.				

8.2.6 Noise

General EHS Guidelines sets out noise limits for industrial areas, commercial areas, residential areas and construction. The relevant limit is therefore shown as the residential limit of 45dB(A) for nighttime. At levels above these criteria the noise emissions from the Project would be considered to have a significant effect.

Solar PV panels themselves do not emit noise during operation, however inverter stations and transformers will emit low levels of noise during operation. While the Project will only be operational during daylight hours, the transformers are permanently energised, they may emit some noise by way of magnetostriction hum during night-time. The distance between the substation transformers and the nearest residential properties is approximately 1 km. It is noted that the closest receptor has been awarded alternative land is will no longer experience an impact.

No breach of the lower 45 dB limit has been identified.

Impact Assessment: Noise impacts during operation					
Impact Nature	Positive			Negative	
	Solar PV panels themselves do not provide a noise source, however equipment within the site (typically inverter stations and transformers) will emit noise during operation. While the Project will only be operational during daylight hours, as the transformers are permanently energised, they may emit some noise by way of magnetostriction hum during night-time.				
Impact Type	Direct			Indirect	
	Noise received at nearby receptors would be considered a direct impact of the operation of the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impacts will persist throughout operation and are therefore considered permanent.				
Impact Extent	Local		Regional	National	

Impact Assessment: Noise impacts during operation					
	Operational noise impacts will be restricted to an area immediately adjacent to the Project.				
Receptor Value / Sensitivity	Low	Medium	**High**		
	There are settlements in relatively close proximity to the Project, receptors are of high sensitivity.				
Impact Magnitude	No change	**Negligible**	Low	Medium	High
	The distance between the transformers and the nearest residential properties is considered sufficient to reduce any noise to an acceptable level, however the substation is located to the south of the site boundary in close proximity to receptors. Noise calculations have deemed operational noise to be within specified limits. A Very Low magnitude of change is therefore predicted.				
Impact Significance	None	Negligible	**Low**	Medium	High
	The impact is assessed as Low and not significant.				
Residual Impact Significance post mitigation	None	**Negligible**	Low	Medium	High
	The residual impact is predicted to be Negligible and not significant.				

8.2.7 Social Impacts

Potential impacts during operation of the Project are largely similar to the Construction phase, with reduced impact Magnitudes and Significance. The following potential impacts for the operation phase were considered as the most relevant for the AoI and the social receptors.

8.2.7.1 Physical and economic displacement

Two householders will be directly, negatively affected by the development of the Solar Park. There has been no physical displacement and alternative land has been provided.

Impact Assessment: Physical and economic displacement				
Impact Nature	Positive	**Negative**		
	Impact is negative because physical or economic displacement would negatively affect a person's livelihood.			
Impact Type	**Direct**	**Indirect**	**Reversible**	Irreversible
	The impact is direct and indirect because the Project may occupy land previously used for farming/grazing.			
Impact Duration	**Short-term**	Medium-term	Long-term	**Permanent**
	The impact is permanent as it would be in place for the full project lifetime.			
Impact Extent	**Local**	**Regional**	National	
	The impact may occur at a local level within the site boundary and immediate surroundings.			
Impact Magnitude	Negligible	**Low**	**Medium**	High
	The impact magnitude is low as although this is a perceptible change to some people, only two PAHs are affected and at a local extent.			
Receptor Value / Sensitivity	Negligible	**Low**	Medium	High
	The receptor value is low given that both PAHs have been compensated either on a like for like basis or have sufficient land remaining and do not depend on access to the project site as their main source of livelihood.			
Impact Significance	Negligible	**Low**	Medium	High
	The overall impact significance is Low. This is an adverse impact but does not require any specific mitigation.			
Residual Impact Significance post mitigation	None	Negligible	**Low**	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.7.2 Increased Local Employment, Capacity Building and Supply Demand

Operation of the Project shall generate up to 100 MW of renewable energy which shall be fed into the national grid. The Proponent shall also make annual tax payments to central government in parallel with the generation of revenue. During operations, there will also be an ongoing demand for general support from other national and regional businesses, such as consulting, legal, and accounting using small to medium enterprises.

There will be a maximum of 24 people employed during the operational period. These will be split into three shifts. As a result, the employment opportunities available are deemed to be low during operation. The small number of individuals employed and their household members, will benefit from increased income that is likely to increase their overall quality of life and access to healthcare, educational and other types of resources across a longer time frame.

Impact Assessment: Increased local employment, capacity building and supply demand				
Impact Nature	Positive		Negative	
	Impact is positive because the Project overall will generate economic growth at a local level through the procurement of workforce, services and materials. Although during operations the workforce will be reduced and as an indirect consequence the local supply of services will be reduced also. Community expectations of employment opportunities will be managed during the construction phase so the community is aware that only 24 positions would be available during operation. The impact has also been qualified as positive because the operation of the Project will generate energy, which is fed into the national grid, contributing towards the ongoing development of the country and contribute tax revenues.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is both direct and indirect because the individuals and their household members are expected to benefit from an increase in standard of living and reduced vulnerability to external shocks. The impact is reversible as the income generated from local employment shall cease at the end of the operational phase.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The period of employment, electricity generation and tax revenues will continue over the lifetime of the Project and is deemed to be permanent.			
Impact Extent	Local	Regional	National	
	The main impact will occur at a regional and national level as energy shall be exported to the national grid. Employment opportunities would be at the local level.			
Impact Magnitude	Negligible	Low	Medium	High
	Uzbekistan currently has generation capacity of 12.9 GWe. The Solar Park would represent an increase of 0.78% from the baseline. The impact magnitude is low as the workforce required during operations is 24 full time equivalent positions and is a small percentage when compared to the peak workers during the construction phase.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The sensitivity is medium as the countries' energy demand shall continue to increase during the lifespan of the project. Furthermore, a lack of employment opportunities has been identified by informants of the nearby settlements as one of the most pressing local issues, therefore the receptor could be particularly sensitive to the changes in employment rates dropping when the construction phase ends, and the operation phase begins.			
Impact Significance	Negligible	Low	Medium	High
	The overall impact significance is Low. This is a positive impact overall and it can be enhanced with appropriate measures. The negative aspects of this impact such employment drops can be mitigated by maximising, to the extent possible, employment			

Impact Assessment: Increased local employment, capacity building and supply demand					
	strategies during operations. However, the positive impacts of such strategies are likely to be Low significance at best.				
Residual Impact Significance post mitigation	None	Negligible	**Low**	Medium	High
	The residual impact is predicted to be Low positive with Negligible negative impacts and not significant.				

8.2.7.3 Loss of Public Access to Footpaths Inside the Project Area

As has been described for this impact in the construction phase, access to footpaths within the area of the Project will be lost. This impact will be asses below for the operations phase considering that the fencing on the area will have a long-term effect since Project operations are planned to last 20 years.

Impact Assessment: Impacts from a loss of public access to footpaths inside the project area				
Impact Nature	Positive		**Negative**	
	Impact is negative as there will be a loss of access to footpaths within the Project area.			
Impact Type	**Direct**	Indirect	**Reversible**	Irreversible
	The impact is direct because local people shall no longer be able to access the footpaths. inside the Project area and alternative routes will need to be used.			
Impact Duration	Short-term	Medium-term	Long-term	**Permanent**
	The impact is considered to be permanent as the boundary fences shall be in place during the lifetime of the project. They may be removed as previous land use is reinstated after Project decommissioning.			
Impact Extent	**Local**	Regional	National	
	The impact will occur at a local level only as the restrictions to land shall most likely impact people from two farms.			
Impact Magnitude	Negligible	**Low**	Medium	High
	The impact magnitude is low as the limited number of people who currently use the footpaths will be able to access alternative tracks or roads to reach their destination.			
Receptor Value / Sensitivity	Negligible	**Low**	Medium	High
	The impact magnitude is Low as other roads shall remain open for use and therefore there are alternative routes available. Local farmers have been provided with alternative land and do not require to access across.			
Impact Significance	Negligible	**Low**	Medium	High
	The impact is assessed as low, primarily because the local farm users will adapt or readjust to their new timings and distances involved compared to baseline conditions.			
Residual Impact Significance post mitigation	None	Negligible	**Low**	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.7.4 Reduced Access to Grazing and Pastoral Land

As has been described for this impact in the construction phase, reduced access to grazing pastoral land within the area of the Project will have a negative impact in the long term since Project operations are planned to last 20 years. AECOM understands from information provided by the Project developer that land users will be provided with alternative land by the Government of Uzbekistan.

Impact Assessment: Reduced access to grazing and pastoral land		
Impact Nature	Positive	**Negative**

Impact Assessment: Reduced access to grazing and pastoral land				
	Impact is negative as existing land users shall experience a reduction of access to typical livelihood areas due to the restrictions in access to the land within the site boundary. This restriction will begin in the construction phase and will exist all through the operation phase of the Project. However, no physical displacement residential properties will occur.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct because the local farms will no longer be able to access land inside the Project area during the Project life cycle. Resulting impacts are reversible after the Project's decommissioning stage.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is permanent as land users will not be able to conduct pastoral activities inside the Project area from the moment fences are installed along the site boundary until the Project is decommissioned			
Impact Extent	Local	Regional	National	
	Impacts associated with a loss of access to land will occur only to a single farms in the Core AoI, Farm B has been awarded alternative land and Farm A does not rely on the site area as an important source of livelihood.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is Low as the impact is perceptible to the local farm and will represent a change to their baseline conditions in terms of extent of local grazing areas.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor sensitivities is Low as farmer B has been awarded alternative land and will not be impacted during operation. Farm A has sufficient land available if required.			
Impact Significance	Negligible	Low	Medium	High
	The impact is assessed as Low and does not require any specific mitigation.			
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.7.5 Increased Presence of Security Personnel

As the Solar Park has a capacity of 100MW the Government of Uzbekistan may consider it to be a strategic facility of national importance. If this is the case then the Developer may be required to accept a small contingent of the National Guard (6 to 8) to provide security during operation. However this is not a mandatory requirement and the Company do not propose to use National Guard. Private security will be provided.

Impact Assessment: Increased presence of security personnel				
Impact Nature	Positive	Negative		
	This is a negative impact because of the potential use of excessive force or intimidating presence of security guards that may interact with local herders or community members traveling near the Project site.			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is direct because the Project will employ security personnel as part of its planned activities and to avoid access from local community members to other OHS risks inside the site. It is largely reversible with the proper HR training.			
Impact Duration	Short-term	Medium-term	Long-term	Permanent
	The impact is medium-term as changes in the area will start to settle down over time and the presence of security personnel is not expected to cause confrontations.			
Impact Extent	Local	Regional	National	
	Risks will be generated at a local level within the Core, Direct and Indirect AoI.			
	Negligible	Low	Medium	High

Impact Magnitude	The impact magnitude is low because the potential for security guards to interact with local community members is still perceptible but no as much as during the construction phase.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The sensitivity is medium as the local communities may be able to adapt to this change depending on the timing of previous disclosure of Project starting activities.				
Impact Significance	Negligible	Low	Medium	High	
	The potential impact during operations is considered to be moderate adverse, pre-mitigation. It is expected that HR training will reduce this to Low.				
Residual Impact Significance post mitigation	None	Negligible	Low	Medium	High
	The residual impact is predicted to be Low and not significant.				

8.2.8 Transportation and Access

The main transport impacts will occur during the construction phase. The number of vehicles during operation is likely to be very low, with access required only for maintenance and servicing. The majority of these will be light vehicles and, at the worst case, an HGV trip may be required to transport a replacement transformer to site. The effects of traffic movements stemming from the operational phase are therefore considered Negligible and so insignificant. The residual impact is predicted to be Negligible and not significant.

8.3 Decommissioning Phase Impacts

Decommissioning impacts are considered to be similar to construction phase impacts. The assessments outlined in Section 8.1 should therefore be referred to. A summary is provided below.

8.3.1.1 Occupational Health and Safety

Decommissioning activities will inevitably expose workers and the public to occupational health and safety risks. These risks will be similar to those at construction. Such impacts are considered to be of short-term duration as they are limited to the decommissioning phase only.

8.3.1.2 Air Pollution

The change in ambient air quality may arise at decommissioning as a result of fugitive dust and particulate matter emissions. However, such impacts are expected to be temporary and of short-term nature as they are limited to the decommissioning phase only. The impacts will similar to the construction phase.

8.3.1.3 Noise

Local noise levels will be affected temporarily by decommissioning activities such as equipment movement during building demolition and use of heavy machinery. The impacts will be similar to those experienced during the construction phase.

8.3.1.4 Hydrology and Hydrogeology

Effects on water resources during decommissioning are likely to be similar to those during construction, so sensitive features such as drainage channels would need to be avoided. Contaminated materials such as oil storage tanks would need to be removed from the site and taken to a suitable disposal site to prevent future contamination of surface and groundwater.

8.3.1.5 Biodiversity

Similar to construction, the main impacts during decommissioning are likely to comprise disturbance to birds. Following decommissioning, reinstatement will be important to re-establishing the ecosystem in areas previously occupied by solar panels, site roads and other structures. At the time of decommissioning, the sensitivity of some species, particularly those which are regionally rare, may have increased.

8.3.1.6 Terrestrial Ecology

Similar to construction, the main impacts during decommissioning are likely to comprise habitat loss, loss of small numbers of mammals, and disturbance to animals. Following decommissioning, reinstatement will be important to re-establishing the ecosystem in areas previously occupied by solar panels, site roads and other structures. At the time of decommissioning, the sensitivity of some species, particularly those animals which are regionally rare, may have increased.

8.3.1.7 Geology and Soils

Similar to construction, soils will be highly vulnerable to traffic and erosion during decommissioning. The movement of materials off-site may involve the construction of temporary roads and use of large vehicles. There is also potential for chemical or oil spills, or the incorrect handling/disposal of wastes during decommissioning. Similar measures to those outlined for the construction phase will need to be taken to minimize impacts on soils. Reinstatement of land and after-care will be critical to mitigating the damage to soils.

The panels and supports will be dismantled and steel and other useful materials will be recycled. Inert materials which cannot be recycled will be taken to a suitable disposal site. However, foundations and other inert belowground materials will be buried. This is not likely to have a significant impact on soils as it will not prevent re-vegetation or restoration of land.

8.3.1.8 Social Impacts

Similar to construction, the use of a workforce and decommissioning activities could potentially generate a variety of health and safety risks to the local residents, due to general site decommissioning activities (removal of site equipment and infrastructure) and the presence of project vehicles on local risks posing a risk to local residents and school children. A Community Health and Safety Plan, Traffic Management Plan and Emergency Response Plan will be in place for the decommissioning phase of the Project.

8.3.1.9 Transportation and Access

Decommissioning effects are likely to be similar to that during construction although reduced in magnitude. At this stage, it is not possible to quantify the traffic effect during decommissioning of the Project as it is considered to be too far in the future to estimate any baseline traffic flows. It is unlikely however to present any significant effects.

9. Principles of Mitigation and Enhancement

The proposed mitigation principles outlined below are deemed to be required for the Project based on the information available to date and have been developed in line with IFC Performance Standards and Guidance. All mitigation measures identified in the ESIA will be transposed into the project ESMMP and will be implemented through the project ESMS. Therefore, those documents contain the final agreed mitigation measures that will be implemented during the lifetime of the Solar Park.

9.1 Landscape and Visual

9.1.1 Design Phase

Landscape and visual mitigation for the Project was embedded in the design of the solar farm to centre around the selection of a layout which minimise the potential for significant impacts whilst achieving operational objectives.

9.1.2 Construction Phase

The best form of mitigation for landscape and visual impacts arising from construction is related to conservation of soils and vegetation.

Mitigation to reduce the adverse impact resulting from litter and rubbish (plastic bags, bottles etc.) include:

- Provision of adequate facilities for the disposal of rubbish.
- Training of the workforce in waste management.
- Reduce the amount of waste to the maximum extent possible.
- Collect all solid waste and store until transported to an appropriate waste disposal facility and disposed.
- Organization of clean-ups for existing rubbish.

9.1.3 Operational Phase

Vegetation around the Project that does not affect the performance of the Solar Park will be left in place or rehabilitated.

9.2 Flora and Fauna

9.2.1 Pre-Construction / Site Clearance

The first stage of mitigation will ensure that the Project site is prepared in such a way as to discourage animals from using the Project area. If possible, the aim of this work is to make the areas of roads and hard-standings unsuitable for species (e.g. ground nesting birds), minimising the likelihood of impact.

A pre-construction survey will be completed prior to works commencing primarily to identify the presence of hibernating Central Asian tortoise. Where suitable burrows are found, destructive searches will be carried out and it tortoises are encountered they will be removed to a temperature-controlled facility to continue hibernation and will be returned to the site in spring 2021. It is noted that construction works are scheduled to take place from November 2020 onwards, outside the bird breeding season. As a result, no such surveys are anticipated.

All areas to be cleared will be precisely demarcated and work carried out only within those areas. Appropriate training will be provided to workers regarding the identification of wildlife in the instance of chance encounters during site clearance.

Any areas outside of the footprint of the Project, that are cleared as a result of construction activities (storage areas etc.) will be rehabilitated following the completion of construction phase.

9.2.2 Construction Phase

Likely mitigation during construction includes the following measures:

- Project staff require environmental toolbox talks during construction to raise awareness, limit conflict and reduce additional disturbance to fauna and avifauna.
- Destructive searches for reptiles (including Central Asian tortoise, gamma snake, desert monitor) will be undertaken during site clearance under the supervision of a suitably experienced ecologist.
- Staff will be briefed on risks of exposure to scorpions, spiders and snakes as well as the preventative measures. Workers in the field will wear protective clothing; long trousers, closed shoes and leather gloves. Information regarding nearest location of treatment for any bites and stings will be made available.
- Any snakes encountered at the site must not be handled or harmed by Project workers. Animals must be relocated by appointed personnel.
- Construction vehicles must remain on the access roads and not drive in the un-cleared bush.
- Tortoise holes will be cut in the perimeter fence to allow free movement.

9.2.3 Operational Phase

Operational mitigation measures are set out below:

- During routine maintenance any invasive flora species will be removed.
- Natural revegetation of the excavated areas will take place. The success will be monitored and if necessary additional measures will be undertaken such as watering of those areas and removal of invasive weeds.
- Routine inspections will record any bird fatalities in line with IFC guidance: Bird rescue protocol and monitoring at PV solar facilities.

9.3 Hydrology and Hydrogeology

9.3.1 Site Preparation

To reduce the potential for erosion of drainage channels during road construction, routes will be selected to avoid ephemeral drainage channels where possible. Culverts or other drainage control features will be installed where crossings of drainage routes are unavoidable. Stormwater run-off onto roads and uncontrolled flow from roads will be minimized.

9.3.2 Construction Phase

The risk of contamination through temporary storage facilities will be reduced through the storage of all materials within designated areas. Supplies will also be provided for the clean-up of minor spills. A Pollution Prevention Plan will be drawn up to prevent accidental spillage of fuels, chemicals or other substances.

To reduce the risk of soil and water pollution from leaks and spills through storage of oil it is recommended that:

- A designated storage area is established with an impervious base and impermeable bund walls. Capacity must be sufficient to contain the full volume within a bund and secured area.
- All fuel, oil and chemical storage is stored in a designated secure area.
- Hoses and valves are checked regularly for signs of wear and ensure that they are turned off and securely locked when not in use.
- Diesel pumps and similar items are placed on drip trays to collect minor spillages. Trays will be checked regularly and accumulated oil removed.

With regards to potential impacts associated with the construction workforce, it is proposed that sanitary waste is collected in containers below portable toilets and transported for disposal. The waste will be disposed at a location to be agreed with Local Government respective officer or environmental officer.

9.3.3 Operational Phase

The potential for soils and groundwater contamination associated with waste disposal will be reduced through the reduction of wastes to the extent possible whilst maximising the re-use and recycling of materials. All waste and

rubbish will be collected and stored before disposal in at a location to be agreed with the Khokimiyat respective officer or environmental officer.

Mitigation measures associated with maintenance and use of oils and other chemicals include:

- Establish a designated storage area with an impervious base and impermeable bund walls and protected from precipitation. Capacity must be sufficient to contain the full volume within a bund and secured area.
- Store all fuel, oil and chemical storage in the designated secure area.
- Do not leave vehicle unattended during refuelling, never leave open a delivery valve.
- Check hoses and valves regularly for signs of wear and ensure that they are turned off and securely locked when not in use.
- Place diesel pumps and similar on drip trays to collect minor spillages. Check trays regularly and remove any accumulated oil.

9.4 Geology and Soils

9.4.1 Site Preparation

To reduce damage to soils and risks of soil erosion, the length and width of the on-site and off-site roads will be optimized to reduce the need for cut-and-fill material. Run-off and erosion control features will be included in all civil designs by the Project Developer.

Design parameters for foundations, access roads and drainage constructed at the site will need to be developed to account for erosion. These design parameters are required to be adhered to by the contractor to reduce the potential impacts detailed above.

9.4.2 Construction Phase

9.4.2.1 Soil strength and foundations

It was noted that it is not advisable to rely on the strength of the soil to support any foundation but to go through it and lay foundations on underlying sandy and gravelly layers. The most appropriate construction technique will be confirmed by the EPC contractor.

9.4.2.2 Trenches and earthworks

To ensure the stability of roads it may be necessary to support the road surface by means of piles, mortar column type, or to improve the ground under the road by means of mortar injection or similar. The most appropriate construction technique will be confirmed by the EPC contractor.

9.4.3 Operational Phase

Several measures are recommended during operation of the Project to reduce damage to soils. These include:

- Confine all vehicles to roadways.
- Monitor road condition regularly; then repair damaged and rutted roads rather than bypassing damaged sections.
- Monitor erosion controls and repair as needed.

9.5 Noise

9.5.1 Construction Phase

In order to reduce the impact of noise during construction, best practicable means will be followed to ensure that the quietest available plant and construction techniques will be used in order to limit noise output as far as practically possible. The initial noise assessment has concentrated on the two farms located in close proximity to the project site. The larger settlements at Uzumzor to the east and the small settlement located at Hazara Degaron Masjidi to the south are of sufficient distance from the site to ensure that construction impacts are not likely to be

significant. AECOM anticipate that the highest magnitude noise impacts will be experienced during piling operations.

Construction will generally be undertaken during normal working hours although some works may be required outside of this time. Where appropriate, micro siting will be undertaken to ensure construction noise impacts are minimised and equipment is located as far as possible from Noise Sensitive Receptors (NSRs). Mitigation measures will also include the use of a sufficient buffer between the Project and local properties to reduce noise to an acceptable level at those locations.

In addition, Project construction traffic routing through community areas will be minimised wherever possible.

9.5.2 Operational Phase

The initial noise assessment has concentrated on the two farms located in close proximity to the project site. The larger settlements at Uzumzor to the east and the small settlement located at Hazara Degaron Masjidi to the south are of sufficient distance from the site to ensure operational impacts are not likely to be significant.

Should additional mitigation be required during the operational phase, the following will be considered if required following detailed noise assessment:

- Installation of acoustic enclosures for equipment causing radiating noise (this would typically give 3 dB attenuation).
- Improving the acoustic performance of constructed buildings, through employing sound insulation.
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier. Barriers will be located as close to the source or to the receptor location to be effective.
- Installing vibration isolation for mechanical equipment.

In addition, the Project Community Grievance Mechanism developed under IFC PS 1 will be implemented during both the construction and operational Project phases. This will be utilised to record, monitor and respond to / mitigate any noise related impacts raised by the local community and ensure compliance with noise limits is achieved at NSRs.

9.6 Social Mitigation and Enhancement

The following sections provide indicative measures to mitigate the negative effects and enhance the positive effects of the Project according to the impacts listed in Section 6.1 and 6.2. The systematic approach for mitigation development will consider policy and procedure instruments, training and capacity building, and economic investment. The mitigation and monitoring measures identified within this section will be further developed within the Project's ESMMP and associated sub-plans.

9.6.1 Construction Phase

9.6.1.1 Community Expectations of the Project

- Communicate employment estimates, timeframes and skills requirements clearly to the community on a continuous basis.
- Develop and disclose a Labour and Local Content Management Plan in consultation with the community and in a way that meets long term operational needs of the Project as well as the short-term construction needs, taking into account the relatively low skill base of the local population when it comes to solar power related jobs. This Plan will outline the recruitment strategy and processes, including the promotion of equal opportunities. It will be developed on the basis of a social survey and will include a clear local content target. The Plan will also describe how women and Project Affected People will be given priority, alongside with residents of Uzumzor and Farkhod, for recruitment and training before the start of construction activities (also included in the following section).
- Stakeholder Engagement Plan to be developed and implemented.

9.6.1.2 Increased local employment, capacity building and supply demand

To enhance the direct and indirect economic opportunities during the Project construction a Local Hiring Plan will be developed and implemented. The objective of the Plan will be to develop a workforce, preferably, of a combination of nationals and expatriate workers that meets long term operational needs of the Project as well as the short-term construction needs, taking into account the relatively low skill base of the local population when it comes to solar power related jobs. This Plan will consider the following activities:

- Investigation of local sourcing and procurement opportunities to promote sustainable small business and local training schools' partnerships that comply with the standards of the Project development.
- Investment in capacity building for small businesses to enable them to meet standards for procurement required by the company and to service the needs of influx populations and indirect employees (through service industries). This will be designed with a participatory and inclusive strategy between key stakeholders for economic development and the local people.
- Identification and monitoring procedures for compliment with IFC PS2 and ILO standards.
- Communication of job openings in the commonly used media identified in previous consultations through the Stakeholder Engagement Plan.
- Development of a transparent recruitment process, according to IFC PS2, which clearly communicate labour benefits (e.g. Health insurance), salary and contract length. The Plan will also describe how women and Project Affected People will be given priority, alongside with residents of Uzumzor and Farkhod, for recruitment and training before the start of construction activities.
- Communication with local vocational training schools to develop curricula which will qualify local students to meet the project needs in further phases of the project and the solar industry locally, if possible.

9.6.1.3 Capacity strain contribution to local public services and facilities

A Worker Accommodation Plan is developed for the workforce. The Plan will identify the proper necessities of infrastructure, health and safety policies, and a clear strategy for the peak employee demand. Given the current assessment, the accommodation could be developed in Navoi and surrounding towns and villages, but further evaluation might be developed. If a local accommodation is selected, the Plan must consider a clear communication with stakeholders about on Project schedule and necessities of accommodation according to PS2 and PS4.

An Occupational Health and Safety Plan and a Community Health and Safety Plan will be developed to ensure that all Contractors are provided with adequate health care (for work related injuries and off the job-related health issues) that is independent of the local health care system.

The Plans related to capacity strain will be communicated to key stakeholders, in order to promote transparency and avoid conflict related to community concerns or investment expectations. The information provided will be appropriate to demographic and cultural characteristics of the AoI.

9.6.1.4 Loss of public access and reduced mobility through local paths

The Stakeholder Engagement Plan will provide detailed and regular information to local community members about Project activity to mitigate community concerns about mobilisation and inform updates on access routes around the Project site. Based on the site visits and consultations undertaken, no important local paths were identified across the site and no users were observed.

A Traffic Management Plan (TMP) will be developed considering the alternative access local paths mentioned above.

9.6.1.5 Reduced access to grazing and pastoral land

The Stakeholder Engagement Plan will be the means for providing detailed and regular information to local community members about Project activity to mitigate community concerns as a result of misinformation on Project size, timing and access permits. Alternative land has been provided for Farm B in August 2020. This land was considered unsatisfactory, and a new land allocation was requested for an area selected by Farmer B. Farmer B selected the new land area and has taken moved to the new land. It is important to note that Farm B now has

access to three parcels of land –1) the land plot allocated to him in August 2020, which he hold a long-term lease for 49 year; 2) the land plot allocated in October 2020, which he also hold a long-term lease for 49 years; as well as 3) the original land left over from the project. Farm A has sufficient land for grazing still available (calculated in terms of heads). Farmer A has indicted that access to land does not form a significant part of his livelihood. No specific mitigation is required.

9.6.1.6 Increased presence of workers and interaction with local communities

The Community Health and Safety Plan will be developed as a mitigation measure for unplanned worker migration and the presence of workers in the Project area. It will encompass:

- An induction for workers, that provides awareness training on communicable disease prevention (Covid-19), focusing on unplanned interaction with nearby community members.
- Ensure health screening is being conducted for employees and contractors before contracting workers and on a periodic basis throughout their employment/contract.
- Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases.
- Enforce and monitor a zero-alcohol tolerance policy, including current intoxication, for workers during working hours and perform random alcohol testing through periodical screen before and / or after leaving the site. Include this policy on contractors' agreements.
- Training on the Project's goals to establish good relationships with local stakeholders, avoid unnecessary conflict with any inhabitant by respecting human rights and being acknowledgeable of culture differences.

9.6.1.7 Increased presence of security personnel

The Security Management Plan will make sure that security personnel or contractor personnel are trained on the Project's goals to establish good relationships with local stakeholders, according to IFC PS4. These training will seek to avoid unnecessary conflict with any local person and establish the operational area of the security personnel solely within the Project site boundary.

The Plan will consider a procedure to log all security incidents, which will be investigated, and any security grievances will be identified and actioned.

9.6.1.8 Occupational health and safety impacts and impacts to Project workforce

The Project Developer and its contractors will comply with international Occupational Health & Safety regulations and standards (for example, Directive 89/391[96] and OSHA[97] standards) in addition to Uzbek safety standards regarding construction works, electrical works, structural climbing and other hazards. In general, construction operations will be planned and implemented in accordance with these standards and with IFC safety guidelines[98]. Furthermore, the EPC Contractor will be required to demonstrate and implement a suitable management system which confirms to the standards equivalent to ISO 9001, ISO 14001 and OSHAS 18001. This will be a key contractual requirement and will be monitored by the Developer.

Both the Developer and all its contractors will be required to produce an Operation Health and Safety Plan and a Community Health and Safety Plan for both construction and operational phases and will bring together the mitigation requirements discussed in preceding sections. The Community Health and Safety Plan will describe the potential hazards of the Project during construction, commissioning and operation to local communities and how these will be controlled. The document will set out community health and safety mitigation measures and the use of land surrounding the site for agricultural / grazing purposes. The document will also outline emergency preparedness and response along with a grievance mechanism to ensure that feedback is acknowledged and addressed appropriately.

[96] European Union Council Directive 89/391/EEC
[97] Code of Federal Regulations (1974) 39 FR 23502
[98] IFC (2007a)

- The OHS Plan will include specific measures to prevent and mitigate Covid-19, including: Induction for workers, that provide awareness training on communicable disease prevention, and OMS precaution recommendations on COVID -19.
- Training on an ongoing basis on communicable disease and hygiene equipment, the correct use of Personal Protective Equipment, and in policies and procedures on health, safety and environment (e.g. aerial work, electrical safety, excavation safety, social distancing measures).
- Health screening on a periodic basis for employees and / or it will describe the parameters that contractors will comply on health monitoring to avoid the spread of communicable diseases and / or COVID-19.

In addition, the Developer and all its contractors will be required to stablish Safety Policies and Procedures for construction phase. The following policies and procedures are listed as examples for the Project development:

- Develop an Emergency Response Plan (ERP) - this plan will be developed in conjunction with the Occupational Health and Safety Plan and Community Health and Safety Plan. This might state the procedures for engaging local emergency responders to at minimum: (i) communicate ERP; (ii) depending on level of risk from emergency events build local capacity to ensure appropriate local response in case of emergency.
- Safety Reporting including incident occurrences.
- Stop Work Policy
- Supplementary to both Plans, and the Safety Policies and Procedures, the Developer will identify opportunities to support local public health campaigns that focus on prevention of diseases.

9.6.2 Operation Phase

9.6.2.1 Community expectations of the Project

The need for local labour will vary throughout the Project duration, which could raise expectations of economic opportunities above actual Project workforce demand. As a result, the Stakeholder Engagement Plan will consider an inclusive communication program that will emphasizes accurate employment estimates, timeframes and skills requirements with a clear local content target. This Plan includes a description of the responsibilities of Project staff and an organization chart related to the engagement activities. It will outline the recruitment strategy and processes to promote transparency and participation of the local population, including women.

9.6.2.2 Increased local employment, capacity building and supply demand

There will be a maximum of 24 workers employed during operation and the impact is not of a level that requires any specific mitigation or enhancement measures.

9.6.2.3 Loss of public access and reduced mobility through local paths

See Section 7.6.1.3

9.6.2.4 Reduced access to grazing and pastoral land

See Section 7.6.1.5

9.6.2.5 Increased presence of security personnel

Results from the Security Management Plan will be evaluated by the Developer and, if applicable, by local people. The assessment results will consider recommendations to improve relationships with local stakeholders, and best practices on human rights and cultural sensitivity training.

9.6.2.6 Occupational health and safety impacts and impacts to Project workforce

See Section 7.6.1.7

Further to social mitigation and enhancement measures developed in both phases, a grievance mechanism will be developed and implemented under IFC PS 1. This will provide a communication platform to identify, address, and monitor communities' concerns on the social impacts considered in this ESIA.

9.7 Traffic and Transportation

It is recommended that the efficiency of deliveries of construction materials to the site is closely monitored and, if necessary, sufficient storage provision is made available on site to prevent any delays to the construction process.

A Traffic Management Plan (TMP) will be developed which will reduce risks to drivers and components being transported. This will include (amongst others):

- Detailed site access route.
- Speed controls (such as speed limits, signs, speed bumps etc.).
- Measures for ensuring use of well-maintained vehicles which are serviced regularly.
- Measures to maintain / make good the access roads.
- Details of the temporary site compound which will include parking for up to 40 light vehicles including a HGV manoeuvring, holding and unloading areas.
- Information regarding road safety briefings which will be given to all staff and contractors.
- Procedures for ensuring appropriate licenses / permits are in place for all drivers and provision of suitable training to reduce potential accidents on route to, and within, the site.
- Measures to control the delivery / departure of all HGVs to avoid conflict with other road users.
- Detail sensitive receptors en-route and ensure all drivers are aware of these.
- It is recommended that the route for use by HGVs is verified through further assessment (including a route inspection undertaken prior to construction). Consultation with the relevant Roads Authority is recommended to further identify the most appropriate route and any permits or additional mitigation measures required.

The transportation of equipment and materials to site from the border with China utilises paved highways and dual carriageways which are suitable for and regularly used by HGV vehicles. Upgrade works may be required for several roads in the vicinity of the Project site due to the presence of potholes and poorly maintained bridges. This would be verified through further route inspection prior to construction.

Mitigation has been proposed to alleviate potential impacts and these measures will be incorporated into a Construction Transportation Management Plan (TMP) for use prior to and during construction.

Overall, the assessment concludes that there will be no significant residual effects associated with transportation of materials and equipment during the construction and operation phases of the Project.

9.8 Archaeology and Cultural Heritage

9.8.1 Construction Phase

Although there are not likely to be direct impacts on any features during construction, mitigation will focus on the implementation an appropriate archaeological chance finds procedure during initial construction works to identify any uncovered archaeological features.

In accordance with the requirements of IFC PS8 (Cultural Heritage), a chance find procedure will be developed which will be applied in the event that cultural heritage is subsequently discovered. The Developer or its contractors will not disturb any chance find further until an assessment by a competent professional is made and actions consistent with the requirements of PS8 are identified. There is no requirement for a chance finds procedure under the OVOS.

An archaeological chance finds procedure is defined as a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons (i.e. construction of a solar PV project)

within a specified area or site where there is the possibility that archaeological deposits may be disturbed or destroyed (the working area). The procedure will result in the preparation of a report and ordered archive.

An archaeological chance finds procedure will in all cases be intended:

- To allow, within the resources available, the preservation by record of archaeological deposits. The presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works.
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the chance find procedure itself are not sufficient to support a treatment to a satisfactory and proper standard.

The archaeological chance finds procedure will be intended to establish and make available information about the archaeological resource existing on the site.

During construction, toolbox talks will be provided to ensure that workers will be alert to any signs of past cultural activity in the area. Should any artefacts or evidence of past activity be discovered, it is important that they are protected, the appropriate authorities notified immediately, and no action taken that would disturb the resources until feedback has been provided.

10. Next Steps

The general recommendation from the ESIA study is that the proposed 100 MW Nur Navoi Solar Plant Project should proceed but in order to ensure the environmental and social sustainability of the proposed Project, it is recommended that the developer implements the following:

- The Project should facilitate negotiations with relevant members of the Khokimyiat should new or unidentified outstanding issues be raised.
- Implement the Project CESMP to mitigate negative impacts and enhance the positive impacts. The CESMP requires that the proposed Project follows the recommended mitigation measures; and livelihood and community benefit enhancement strategies.
- Develop a Workers Accommodation Plan. Given current Covid-19 restrictions, the Project is planning to install workers camp.
- Project will carry out a skills audit and develop a Local Hiring Policy that would identify and prioritise local community employment opportunities to ensure gender equity in human resource recruitment.
- Implement the Stakeholder Engagement Plan and commit to a pro-active and continuous stakeholder engagement process to address emerging project issues and to continue the enlightenment of the community on Project benefits. Community engagement should be undertaken in close collaboration with the local administration (local representatives and the county leadership).

Appendix A Figures

Appendix B Species List

Common Name	Latin Name	IUCN Category	Uzbek Red Data Book
Birds			
Black-bellied sandgrouse	*Pterocles orientalis*	Least Concern	No
Feral pigeon	*Columbia livia*	N/A	No
Steppe eagle	*Aquila nipalensis*	Endangered	No
Western marsh harrier	*Circus aeruginosus*	Least Concern	No
Common buzzard	*Buteo buteo*	Least Concern	No
Long-legged buzzard	*Buteo rufinus*	Least Concern	No
Common kestrel	*Falco tinnunculus*	Least Concern	No
Great grey shrike	*Lanius excubitor*	Least Concern	No
Western jackdaw	*Corvus monedula*	Least Concern	No
Carrion crow	*Corvus corone*	Least Concern	No
Crested lark	*Galerida cristata iwanowi*	Least Concern	No
Asian Short-toed lark	*Alaudala (rufescens) cheleensis*	Least Concern	No
Skylark	*Alauda arvensis*	Least Concern	No
Common myna	*Acridotheres tristis*	Least Concern	No
Isabelline wheatear	*Oenanthe isabelline*	Least Concern	No
Desert wheatear	*Oenanthe deserti*	Least Concern	No
White wagtail	*Motacilla (alba) alba*	Least Concern	No
Hoopoe	*Upopa epops*	Least Concern`	No
Red-rumped swallow	*Hirundo daurica rufula*	Least Concern	No
European bee-eater	*Merops apiaster*	Least Concern	No
Barn swallow	*Hirundo rustica*	Least Concern	No
European roller	*Coracias garrulus*	Least Concern	No
Tree sparrow	*Passer montanus*	Least Concern	No
House sparrow	*Passer domesticus*	Least Concern	No
Common magpie	*Pica pica*	Least Concern	No
Common swift	*Apus apus*	Least Concern	No
Blue-cheeked bee-eater	*Merops persicus*	Least Concern	No
Mammals			
Yellow ground squirrel	Spermophilius fulvus	Least Concern	No
Northern mole vole	Ellobius talpinus	Least Concern	No
Large jerboa	Allactaga major	Least Concern	No
Libyan jird	(Meriones libycus)	Least Concern	No
Long-eared hedgehog	Hemiechinus auritus	Least Concern	No
Common pipistrelle	Pipistrellus pipistrellus	Least Concern	No
Red Fox	Vulpes vulpes	Least Concern	No
Jackal	Canis aureus	Least Concern	No
Steppe cat	Felis lybica ornata	Least Concern	No

Common Name	Latin Name	IUCN Category	Uzbek Red Data Book
Badger	*Meles meles*	Least Concern	No
Reptiles			
Rapid racerunner	Eremias velox	Least Concern	No
Steppe agama	Trapelus sanguinolentus	Least Concern	No
Sunwatcher toad-headed agama	Phrynocephalus helioscopus	Least Concern	No
Steppe tortoise	Testudo horsfieldii	Vulnerable	No
Sand racer	Psammopsis lineolatus	Not yet assessed	No
Saw-scaled viper	Echis carinatus	Not yet assessed	No
Gamma snake	Boiga trigonatum	Least Concern	Yes
Tatar sand boa	Eryx tataricus	Not yet assessed	No
Higher plants			
White-earth wormwood	Artemisia terra alba	Not yet assessed	No
Tulip	Tulipa buhseana	Not yet assessed	No
Iris dzhungarsky	Iris songarica	Not yet assessed	No
Isirik	Peganum harmala	Not yet assessed	No
Acanthophilium	Acantophilium pungens	Not yet assessed	No
Hamadweed	Convolvulus hamadae	Not yet assessed	No
Hare barley	Hordeum leporinum	Not yet assessed	No
Yantak	Alhagi pseudoalhagi	Not yet assessed	No
Malcolmia	Malcolmia turkestanica,	Not yet assessed	No
Viviparous bluegrass	Poa bulbosa	Not yet assessed	No
Desert daisy	Microcephala lamellata)	Not yet assessed	No
Karelinia	Carelinia caspica)	Not yet assessed	No
Convolvulus sp.	Convolvulus fruticosus	Not yet assessed	No
Zugofolium sp.	Zugofolium oxianus	Not yet assessed	No
Onopordum spp.	Onopordum acantium	Not yet assessed	No
Ceratocarpous spp.	Ceratocarpus utriculosus	Not yet assessed	No
Poppy spp.	Papaver pavoninum	Not yet assessed	No
Cousinia sp	Cousinia sp.	Not yet assessed	No
Goose onion	Gagea sp.	Not yet assessed	No
Eremopyrum sp.	Eremopyrum bonaopartis	Not yet assessed	No
Roemeria sp.	Roemeria refracta	Not yet assessed	No
Azhrik	Aeluropis littoralis	Not yet assessed	No
Cynodon	Cynodon dactylon	Not yet assessed	No
Tamarisk	Tamarix laxa	Not yet assessed	No
Common reed	Phragmites australis	Not yet assessed	No
Lower plants			
Desert Moss	Tortula desertorum	Not yet assessed	No

Appendix C Meeting attendance records

Список участников консультаций

Место проведения Ўзунзор қўрғони, Малик МФЙ

Дата 24.06.2020

№	И. Ф. О	Должность	Организация	Номер тел	Подпись
1	Зокир Хусанов	Фермер №1	ФХ Мехригиё	97-320-56-16	
2	Бозорова Санобат	Пенсионер	Житель Ўзунзор	91-331-54-57	
3	Бозоров Тура	пенсионер	Житель Ўзунзор	91-331-54-57	
4	Ражабов Чори	пенсионер	житель Ўзунзор	97 797 10 57	
5	Рафиков Шарифжон	пенсионер	житель Ўзунзор	91 252 18 55	
6	Тайиров Санжар	учитель	житель Ўзунзор	93 366 53 23	
7	Эргашев Шодир	электрик	житель Ўзунзор	93 313 89-51	
8	Исломов Бекзод	мастер	житель Ўзунзор	93 [illegible] 73-74	
9	Тайиров Элик	мастер	житель Ўзунзор	93 258-31 23	
10	Ўлмас Фўер	аппаратчик	житель Ўзунзор	94 259 39 35	
11	Хожиев Hamad	мастер	житель Ўзунзор	99 686 61 23	

Список участников консультаций

Место проведения Фархад Курганы

Дата 25.06.2020

№	И. Ф. О	Должность	Организация	Номер тел	Подпись
1.	Азим Суванов	Фермер	И. Жамурбек Ф/Х	93-460-49-92	
2	Бердиева З.	[illegible]	Фархад М.	93-[illegible]	
3.	Туйбаназаров	—		93-[illegible]	
4.	Рахимова Г.	—	—	94-[illegible]-91-81	
5.	Очилов У.	—		94-488-22-05	
6.	Исмирова	—		94-376-26-2[illegible]	
7	Худоева С.	—		94-224-05-82	
8	Жумаева Ж.	—		93-434-61-77	
9	Назарова О.	—		94-322-09-91	
10.	Шукуров Х.			93-435-85-[illegible]	
11.	Эшбоева М.	—		93-147-00-67	
12.	Умиров Ф.	—		97-228-24-22	
13.	Юлдашева	—		—	
14	Мустафоев О.	—		94-488-24-34	
15	Кубанов Ф.	—		93-437-52-22	
16	Жабборов С.	—		94-322-09-91	
17.	Муродова Г.	—		93-439-65 60	
18.	Хамова Г.	—		93-315-54-09	
19	Шукурова Т.			93-313-85 23	
20	Кубанов Ф.			94 258-54-04	
21	Кубанова М.				

Список участников консультаций

Место проведения [illegible]

Дата 25.06.2020

№	И. Ф. О	Должность	Организация	Номер тел	Подпись
1.	[illegible]	[illegible]	[illegible]	93-460-49-92	[illegible]
2	[illegible]	[illegible]	[illegible]	93-[illegible]	[illegible]
3.	[illegible]	—		93-[illegible]	[illegible]
4.	[illegible]	—	—	94-[illegible]-91-81	[illegible]
5.	[illegible]	—		94-488-22-05	[illegible]
6.	[illegible]	—		94-376-26-21	[illegible]
7	[illegible]	—		94-224-05-83	[illegible]
8	[illegible]	—		93-434-61-73	[illegible]
9.	[illegible]	—		94-322-09-91	[illegible]
10.	[illegible]			93-435-85-27	[illegible]
11.	[illegible]	—		93-142-00-63	[illegible]
12.	[illegible]	—		97-228-24-27	[illegible]
13.	[illegible]	—		—	[illegible]
14	[illegible]	—		94-488-24-34	
15.	[illegible]	—		93-[illegible]-52-22	[illegible]
16	[illegible]	—		94-322-09-91	[illegible]
17.	[illegible]	—		93-439-65-60	[illegible]
18.	[illegible]	—		93-315-54-09	
19	[illegible]			93-313-85-23	[illegible]
20	Кувановф			94 258-54-04	[illegible]
21	Кувановам				

Appendix D Environmental and Social Management and Monitoring Plan

The mitigation measures for the construction and operation phases are summarised in Table 10-1 and Table 10-2, respectively. Management measures for decommissioning will mirror that of construction and are contained in the DESMP.

Table 10-1: Summary of the mitigation measures for the Construction Phase

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Loss of vegetation cover and biodiversity	• Implement robust management measures[99] to ensure good construction practice within the proposed project site. • Employ an ecologist during construction to oversee implementation of the BMP. • Initial site preparation and clearance to be undertaken outside of the bird breeding season, where possible. • Storage of top 30cm of topsoil separately from subsoil. All of it should be stored on areas of modified habitat. • A pre-construction survey should be completed for works undertaken in the breeding season to check for animals (reptiles and active bird nests) and, if species of conservation importance are identified, construction activities are to be programmed to avoid such features until they have been moved or there is a natural cessation of breeding effort. • Construction vehicles must remain on the access roads and not drive in the un-cleared bush. All workers and contractors must use the designated parking areas on site and the designated tracks. • Pre-construction searches for tortoises during hibernation, mark potential burrows, destructive search and translocation to an appropriate facility for off-site storage. • Topsoil to be used for restoration purposes. Natural regeneration is proposed. There will be an active management approach to ensure revegetation is successful but will be detailed in the BMP. • Record sightings of Houbara bustard and Sociable lapwing within the vicinity of the	• Biodiversity Management Plan	• SEPCOIII EHS Manager • PMC ESHS Officer	• Site Inspection Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

[99] For example: NetRegs (2020). Guidance for Pollution Prevention (GPP). Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	site. Provide identification guide to ensure site workers can identify the species. • Areas to be cleared, precisely demarcated with vegetation clearing only in agreed areas. Clearing to commence on sign-off from ecologist and PMC ESHS Officer. • Any areas outside of the footprint of the Project, that are cleared as a result of construction activities (compound, storage areas etc.) should be restored following the completion of construction phase. • Fires will not be allowed under any circumstances. • Cleared areas no longer required for construction activities should be restored by natural revegetation/reseeding using the existing seed bank contained in the topsoil.				
Disturbance, alteration & destruction of faunal and avifaunal habitats	• Environmental toolbox talks prior to, and during, construction to raise awareness, limit conflict and reduce additional disturbance to fauna and avifauna. • Areas which have to be cleared must be temporarily demarcated and fenced off to prevent access to animals. • Daily inspections will be carried out on excavations to check for animals that might be trapped in the excavation. These individuals must be carefully moved to a safe area outside construction activities. • Procedure will be implemented for removal of animals found within the construction area. • Drivers operating in the area must be well briefed and must be aware of the dangers that vehicles pose to the local fauna, particularly slow moving species such as tortoise. • Vehicle speed limits must be imposed and adhered to. A limit of 20kph is proposed but will be agreed with the EPC.	• Biodiversity Management Plan	• SEPCOIII EHS Manager	• Site Inspection Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Record all instances of collisions with project vehicles. • Bird divertors installed on new overhead lines. • Tortoise holes cut in selected parts of the perimeter fence to enable free movement.				
Conflict between construction workers and fauna	• The collection, harvesting or hunting of plants or animals is strictly prohibited. A 'no tolerance' policy will be adopted with respect to construction workers. • Any person found guilty of poaching will be apprehended, immediately dismissed and referred to the appropriate authority.	• Biodiversity Management Plan	• SEPCOIII EHS Manager	• Site Inspection Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Risk of invasive flora species	• Identification of potential invasive species and action taken to clear these species if they occur in or around areas designated for vegetation clearance prior to construction. • Vehicles will be cleaned in a designated wash down area within the construction compound prior to entrance to site. Wash water will be directed to the surface water drainage system.	• Biodiversity Management Plan	• SEPCOIII EHS Manager	• Site Inspection Reports	• Mitigation work to be carried out as and when identified.
Surface water	• Buffer distance of 25m applied to the drainage canals. • Routes of roads to be selected to avoid existing drainage channels or depressions where possible. • Culverts or other drainage control features should be installed where crossings of drainage routes are unavoidable and to prevent ponding of surface water on the upstream side. • Vehicles shall not be washed in nearby drainage canals. Washing will take place in designated wash down area within the construction compound.	• Water and Wastewater Management Plan	• SEPCOIII EHS Manager	• Site Inspection Reports • Note: water quality samples are to e taken if there are signs of pollution.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Soil erosion	• Run-off and erosion control features included in all civil designs by contractor. • Demarcate storage and staging areas and store all materials, equipment and vehicles in these areas to reduce soil damage. • Vehicles confined to demarcated roadways. • Where possible, establish native vegetation by natural revegetation in excavated areas immediately after final disturbance. Stockpiles of stripped topsoil with be used for revegetation as it contains native seeds. • Salvage and store the top 30cm of topsoil and subsoil separately from areas excavated. • On completion of earthworks, backfill material in same stratigraphic sequence i.e. subsoil first then topsoil. • If narrowing access roads following construction, scarify compacted areas and establish native grasses. • Once construction and road-building are complete, scarify all areas compacted by off-road vehicle / equipment movements and establish native vegetation. • In the first instance monitor natural regeneration of vegetation. If unsuccessful an appropriate seed mix shall be used and will be applied at the start of the active growing season. • Store all materials within designated areas of temporary storage facilities and provide supplies to clean-up of minor spills. • Confine all vehicles and equipment to the roadway and, to extent possible, minimize activities during wet conditions. When activities must occur in wet conditions, control storm water by using fabric, straw bales or other measures to impede storm water flow and prevent erosion.	• Soil Erosion Management Plan • Water and Wastewater Management Plan • Biodiversity Management Plan	• SEPCOIII EHS Manager	• Site Inspection Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• When damage to wet soil occurs, repair once dry conditions return. Surface levelling should be carried out in the first instance.				
Wastewater	• Ensure temporary storage of wastewater at the site before disposal to a designated facility by a contracted waste handler. • Where third party wastewater disposal & transport companies are to be utilized, the Company / EPC will ensure all required licenses / permits are in place and that they facilities are audited to ensure that they are fit for purpose. • Prohibit illegal disposal of wastewater into the canals around the project site. • Ensure regular inspection of wastewater management practices within the solar plant to check for compliance. • Ensure there is proper and adequate sanitation facilities at the site during construction.	• Water and Wastewater Management Plan • Quantity of wastewater generated. • Quantity of wastewater disposed by a licensed waste carrier	• SEPCOIII EHS Manager • Licensed waste carrier	• Monthly ESHS reports prepared by SEPCOIII. • Monthly PMC audits of the MPs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Sewage Effluent	• The construction compound will have a local effluent collection and/ or treatment system. The contractor will design, build and operate these systems in accordance with Uzbek legislation and Good International Industry Practise. • Effluent from domestic sewerage treatment shall meet the relevant standards acceptable to the Uzbek environmental authorities. • Effluent will be stored in a septic tank or untreated storage tank and removed and disposed of periodically by a licenced contractor.	• Water and Wastewater Management Plan	• SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII. • Monthly PMC audits of the MPs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified
Non-hazardous solid wastes	• Train workers on solid waste management practices described in the Storage & Management of Waste MP and Lender Group requirements. • Segregate all solid wastes at source. • Re-use, re-cycle or reduce solid waste generation onsite to the extent possible.	• Storage & Management of Waste MP • Quantity of solid waste generated. • Quantity of solid waste correctly	• SEPCOIII EHS Manager • Licensed waste carrier.	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Dispose all construction wastes that cannot be recycled or reused to a licensed solid waste disposal site using a licensed refuse handler. • Provide facilities for proper handling, segregation and storage of wastes at designated points within the construction compound. • Do not leave wastes on site at the end of the work. • Provide adequate number of properly contained litter bins and containers properly marked with type of wastes. • Strictly prohibit burning or dumping of any wastes at the site. • Perform regular inspection of solid waste management practices onsite. • Implement Duty of Care with respect to waste consignments, tracking where waste is transported to and disposed of.	disposed to licensed disposal sites.			• Mitigation work to be carried out as and when identified.
Hazardous materials / wastes	• Provide facilities for proper handling, segregation and storage of wastes at designated points within the construction compound. • Hydrocarbons will not be stored on site. • Refuelling will take place at fuel station located at the junction with the highway. • For heavy equipment, a fuel tanker will be brought to site at a pre-defined time to refuel this equipment at site. Drip trays will be installed under refuelling points. • Bunds to be located on impermeable surfaces with controlled drainage away from natural water courses. Bunds should be sufficient to contain 110% of the volume of liquids to be stored within. They should also be roofed to stop contamination of rainwater run-off.	• Storage & Management of Wastes MP • Storage and Management of Hazardous Materials MP. • Pollution Incident Response Plan • Quantity of Hazardous Waste generated. • Quantity of Hazardous Waste disposed.	• SEPCOIII EHS Manager • Licensed waste carrier	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Train site workers on proper hazardous waste management. • Segregate site wastes by separating hazardous waste from non-hazardous waste. • Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow. • Ensure that hazardous materials are stored in proper areas, where they cannot reach land in case of any spillage. • Incorporate dripping pans at machinery, equipment and area prone to contamination by leakage of hazardous materials such as oil and fuel • Regular maintenance of all equipment and machines used onsite so as to minimise leakage of hazardous materials • Containers for storing hazardous waste, including used oil, should be stored securely, labelled and disposed in line with the governing regulations • Undertake regular inspection of hazardous waste management practices onsite. • Strictly prohibit illegal disposal of hazardous wastes onsite • Store hazardous materials in designated areas secured with a fence. • Implement Duty of Care with respect to waste consignments, tracking where waste is transported to and disposed of. • Follow Uzbek Government requirements set out in the international Convention "The Control of Transboundary Movements of Hazardous Wastes and Their Disposal (IEA ID# 3042)				
Noise and vibration	• Adopt and follow best practicable means to ensure that the quietest available plant and construction techniques are used.	• Noise and Vibration MP. • Noise monitoring devices procured	• SEPCOIII EHS Manager	• Monthly ESHS reports prepared by SEPCOIII	• Prior to start of Construction.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Where appropriate, micro-siting is to be undertaken to ensure construction noise impacts are minimised and equipment is located as far as possible from noise sensitive receptors (NSRs). NSRs include on-site accommodation. • Routing of project construction traffic shall be through the main highway and short section of unmarked road to site. • Restrict all construction activities to daytime during normal working hours • Conduct construction activities within the maximum permitted noise levels • Provide prior information to the community of any planned noisy activity that is likely to exceed the permitted noise levels (piling work) • Strictly ensure the use of protective personal equipment at all times while on site and noise reduction techniques such as silencers and ear mufflers to employees • Regularly monitor noise levels to comply with permitted maximum levels, including all vehicles and machineries on site.	and installed on site • Levels of noise and vibration produced at the site • Number of Noise complaints received.			• Monitoring carried out on a monthly basis or following a complaint. • Mitigation work to be carried out as and when identified.
Archaeology and cultural heritage	• Train workers on the importance of archaeological and cultural resources and how to deal with them through toolbox talks. • In case of chance find, the work should be halted and the area protected and the matter reported immediately to the Department of Culture for appropriate action.	• Chance Find Procedure. • Number of recorded chance finds.	• SEPCOIII EHS Manager • Department of Culture.	• Monthly ESHS reports prepared by SEPCOIII	• Throughout the construction works.
Visual and landscape	• Carry out ground levelling if required to ensure the site maintains an overall flat elevation post construction. • Remove in a timely manner all the construction machinery, equipment and vehicles that are not in use and keep them in specific locations within the Project site. • Conduct demobilization audit prior to EPC leaving site to ensure that site conditions are	• Biodiversity Management Plan •	• SEPCOIII EHS Manager	• Monthly ESHS reports prepared by SEPCOIII	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	acceptable for handover to the operations team.				
Occupational Health and Safety	• Comply with 'governing regulations' and international best practise. • Establish a permit to work system for all high-risk activities (i.e. hot works, confident space, working at high etc.) • Train employees on the importance of occupational health and safety requirements and develop work instruction. • Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls for use during construction. • Strictly enforce the use of the Personal Protective Equipment to minimise the accidents. • Provide regular medical checks for the workforce. • Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing, at all times. • Provision and placement of appropriate fire extinguishers and training personnel on their use • Put clear signage to restricted areas in Chinese, Uzbek, Russian and English languages. • Prohibit unauthorised persons from entering the site through installation of a perimeter fence. • Undertake regular inspection to ensure compliance with OHSP. • Report and investigate all incidences of accidents or near misses and keep proper records of the actions taken. • Promote Covid-19 Awareness • Provide appropriate traffic safety training to all drivers (employers and contractors) as	• Occupational Health and Safety Plan. • Covid 19 MP. • Workers Accommodation MP • IFC/ EBRD Guide for Workers Accommodation. • Emergency Preparedness and Response Plan. • Confirmation of the appointment of medical professional on site. • PPE procured and being used by the workers • Fire extinguishing facilities on site • First aid kit on site • Signage installed on site.	• SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs. • Record of accidents and near misses • Corrective Action Reports • Grievance mechanism forms.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	part of their induction and on an on-going basis.				
Socio-economic – employment	• Develop Local Recruitment and Employment Plan to encourage & maximize local workers, vulnerable persons and women in the workforce including retention and promotion. • Communicate employment estimates, timeframes and skills requirements clearly to the community. • Invest in skills training to enable greater employment of local population throughout Project life, for both construction and operations phases, to start as early as possible ensuring maximum employment during construction. • Implement a local employment plan in consultation with the community and in a way that meets long term operational needs of the Project as well as the short-term construction needs, taking into account the relatively low skill base of the local population when it comes to solar power related jobs (see separate line item below). • Investigate local sourcing and procurement opportunities to promote sustainable small business development. • Invest in capacity building for small businesses to enable them to meet standards for procurement required by the company and to service the needs of indirect employees (through service industries). • Work with local vocational training schools to develop curricula which will qualify local students to better meet the needs to the developing solar industry locally.	• Stakeholder Engagement Plan. • Community Grievance Mechanism • Local Recruitment & Employment Plan. • Stakeholder engagement activities. • Number of grievances recorded. • Number of local workers hired. • Minutes of stakeholder meetings. • Skills training agreement with local vocation training centre. • Agreement to provide support to local businesses	• NNS CLM / CLO	• CGM log. • Corrective Action Reports • Number of local people employed on the Project. • Training places provided and completed.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Local hiring and workforce management	• Develop a local employment plan including roles and responsibilities (there will be a need for HR, EPC hiring manager, NNS CLM/CLO, Sepco CLO and oversight by Nur Navoi)	• Local Recruitment & Employment Plan. • Monthly workforce statistics.	• NNS CLM • SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII • Inspection reports • CGM log.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Identification of job roles required and targets as appropriate. Use targets to measure the success of the local hiring plan. • Identify level of interest in the project. This should include a list of names, skills, availability to start work. Identify training needs and verify the skills/qualifications. • Community Liaison Officer to maintain a database of local workers expressing an interest in employment opportunities at the Project as per bullet point above, • Pass this information on to the EPC contractor or responsible person. • Periodically the EPC contractor will publish a list of required roles and will review the list of interested persons. The CLO should make sure this information is disclosed to the communities. The most suitable will be invited for interview and if suitable they will be offered jobs.	•		• Number of local people employed on the Project. • Training places provided and completed.	• Mitigation work to be carried out as and when identified.
Socio-economic – population and land use	• Implement measures to ensure access to local villages is not adversely affected by the fencing of the Project area. Such measures may include providing alternative routes to the village, which can be accessed by pedestrians as well as vehicles. Appropriate signage should be erected around the site. • Provide detailed and regular information to local community members about Project activity to mitigate community concerns as a result of misinformation. • Consider scheduling construction activities to minimise the effects on local communities and farmers. For example, higher impact activities such as piling could be carried out outside of prayer times to reduce impacts on the nearby mosque. • Prohibit non-local workers from entering the local communities.	• Community Health & Safety MP. • Water Resource and Management Plan • Confirmation of access arrangements. • Minutes of stakeholder meetings.	• CLO • SEPCOIII EHS Manager • PMC	• Inspection reports • CGM log • Corrective Action Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Operate a closed camp status for non-local residents.				
Social Infrastructure	• Provision of a dedicated medical professional to be employed by the Project. • Investing in local social infrastructure through a community benefit program.	• Occupational Health and Safety Plan. • Contract of employment for medical professional(s)	• SEPCOIII EHS Manager • PMC	• Confirmation of employment.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections
Air Quality	• Identify strategies to manage dust on the road during the execution of the Project. • Provision of designated wash down area to spray and wash wheel spokes. tires and around the wheel opening of all vehicles entering and exiting the construction compound. • Use of properly maintained vehicles and construction equipment with emission controls. • If necessary, use water to dampen down on-site roads and excavations to reduce dust. • Maximum speed limit of 20kph in place on site. • Trucks carrying aggregates have covered loads when entering or leaving the site. • Communicate project risk to local communities and address concerns accordingly. Monitor any complaints filed (via grievance mechanism) from local stakeholders as an additional tool to monitor dust management measures.	• Transport and Road Safety MP • Dust Suppression MP • Vehicle inspection checks carried out • Minutes of stakeholder meetings. • CGM and WGM Grievances received.	• SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII • Inspection reports • Record of traffic accidents and near misses • CGM and WGM logs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Spread of Food and Water-borne Disease	• Food stored and prepared in accordance with good hygiene standards and required by Uzbek and IFI standards. • Establish food hygiene procedures including bacterial testing regimes to be established for camp kitchens and water supply. • Where appropriate, support local public health campaigns against food and water borne diseases.	• Water and Wastewater Management Plan • Storage & Management of Waste MP • Adherence to International food standards (for example FAO/ WHO Codex Alimentarius) • Agreements with relevant government /NGOs to support health campaigns • Information disclosed as part of health campaigns	• SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII • Inspection reports • WGM grievances log • Corrective Action Reports	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Spread of Communicable Disease	• Workers accommodation designed in compliance with the IFC/ EBRD Guide for Workers Accommodation. • Health screening and quarantine if necessary, carried out in accordance with Covid-19 MP. • Establishment of designated areas to handle quarantine cases. • Establishment of a COVID19 management plan. • Ensure health screening is being conducted for employees and contractors before contracting workers and prior to entrance to site. • Temperature screening will be carried out on entrance to site each day. • Random Covid-19 testing will be carried out throughout their employment/ contract. • As part of health and safety induction for workers, provide awareness training on	• Covid 19 MP • Workers Accommodation Plan • OHS MP • Provision of employee health screening. • Provision of health-related awareness and training to workforce • Agreements with relevant government/ NGOs to support health campaigns	• SEPCOIII EHS Manager • PMC	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs. • Corrective Action Reports • Heath related advertising and communication. • Number of reported heath incidents.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	communicable disease prevention. Provide this training on an ongoing basis. • Work in collaboration with an onsite medical team to ensure that such awareness and education training is appropriately provided to workers and contractors. • Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases.				
Increased Pressure on Health Services	• Ensure that all Contractors are provided with adequate health care (for work related injuries and off the job-related health issues) that is independent of the local health care system. • Liaise with local health professionals to identify ways that the Project can provide sustainable investments in the health care facilities used by their workers. • Consider an agreement or contract with health care provider to provide investments in facilities used by workers	• OHS Plan • Provision of worker healthcare through dedicated Project professional.	• SEPCOIII EHS Manager • PMC	• Inspection reports • Number of reported heath incidents.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Pressure on Water Resources	• Ensure that workers and employees must not use water from the canals located east and west of the Project site. Ensure a system of penalties is put in place for non-compliance. • Vehicles will not be washed in canals.	• Water & Wastewater MP • Grievances received • Provision of water use and resource studies.	• SEPCOIII EHS Manager • PMC	• Inspection reports • Corrective Action Reports • Grievance mechanism forms.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Sale and Use of Drugs and Alcohol	• Enforce and monitor the zero-alcohol and drugs tolerance policy, including current intoxication, for workers during working hours. • Ensure random alcohol testing is conducted for workers entering and leaving the site. • Design a system of penalties for anyone found with drugs or alcohol on site.	• Workers Accommodation MP • HR MP	• SEPCOIII EHS Manager • PMC	• Inspection reports • Corrective Action Reports • Test results. • Disciplinary action taken.	• Communicated prior to start of Construction. • Monitoring carried out during weekly site inspections.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Safety of Local Community	• Ensure that Project security is aware of the Project's goals to establish good relationships with local stakeholders; the grievance mechanism for communities to voice concerns; and receives human rights and cultural sensitivity training to ensure the respect and protection of the local community.	• Community Health & Safety MP • Provision of information through the SEP and grievance mechanism	• CLO • SEPCOIII EHS Manager • PMC	• Monthly PMC audits of the MPs. • Inspection reports • Corrective Action Reports • Grievance mechanism forms.	• Communicated prior to start of Construction. • Monitoring carried out during weekly site inspections.
Site security	• Develop a Security MP / Code of Conduct for site security personnel which will be in line with the requirements of PS2, PS4 and the Voluntary Principles of Security & Human Rights. • Security provided by private security firm only, not the home guard. • Firearms are prohibited on site. • Fence the entire solar plant to restrict entrance to the site. • Inspect the fence around the facility regularly and seal all loopholes. • Ensure adequate lighting within and around the solar plant. • Regularly check and maintain security lights at the site. • Train the onsite guards to adequately handle trespass incidents • Ensure that the security staff act in compliance with relevant Uzbek laws; • Ensure that robust background checks are carried out staff to make sure they have not been implicated in past abuses; • Implement a Code of Conduct for security personnel; • Introduce head of security personnel to neighbouring communities and outline the necessary safety precautions that will need to be put in place to ensure both the safety of the Project and safety of local communities;	• Security and site access MP • Provision of code of conduct for security personnel. • Results of background checks for security staff. • Minutes of stakeholder meetings. • CGM and WGM Grievances received.	• SEPCOIII EHS Manager • Security Contractor • PMC	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs. • Inspection reports • CGM and WGM logs.	• Communicated prior to start of Construction. • Monitoring carried out during weekly site inspections

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Community safety meetings should be organised with all potentially affected groups and be conducted in advance of construction activities; and • Ensure that all potentially affected stakeholders know how to contact the company and to file grievances or concerns about security arrangements.				
Emergency response	• Work with local emergency responders to at minimum: (i) communicate ERP; (ii) depending on level of risk from emergency events build local capacity to ensure appropriate local response in case of emergency. • Communicate potential risks and ERP to those potentially most affected by emergency events. • Provide safety information to local community via the SEP. • Emergency drills must be completed.	• OHS Plan • Emergency Management and Response • Minutes of community meetings • Findings of Emergency Drills • CGM and WGM Grievances received.	• NNS • SEPCOIII EHS Manager • Security Contractor • PMC	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs. • Emergency Drills	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.
Traffic management	• The Transport and Road Safety Management Plan must aim to reduce risks to drivers, communities along the transport route, as well as components being transported. The TMP is to include (amongst others) a detailed site access route; stopovers, speed controls; measures for ensuring well-maintained vehicles and access roads; procedures for ensuring appropriate training programmes and licences are in place for all drivers; and detail on sensitive receptors along the transport route. • Provide appropriate traffic safety training to all drivers (employees and contractors) as part of their induction and on an ongoing basis. • As part of pre-construction engagement activities, ensure that traffic safety and “rules of the road” are discussed with local communities. Discuss and address	• Transport and Road Safety MP • Number of road safety briefings provided. • Number of road safety complaints received. • Number of driving incidents including speed violations.	• SEPCOIII EHS Manager • Security Contractor • PMC	• Monthly ESHS reports prepared by SEPCOIII • Monthly PMC audits of the MPs. • Inspection reports • Record of accidents and near misses • WGM and CGM Logs.	• Prior to start of Construction. • Monitoring carried out during weekly site inspections. • Mitigation work to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	community concerns. Special sessions may be required for particularly vulnerable groups such as children. At minimum communicate type, frequency and traffic risks before heavy traffic begins for the construction phase. All discussions and training sessions are to be made available in language that the workers can understand. • Construction traffic through community areas will not be permitted with the exception of public meetings and stakeholder engagement activities. •				

Table 10-2: Summary of the mitigation measures for the Operation Phase

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Biodiversity	• Confine all vehicles to roadways. • Road condition monitored regularly, and damaged and rutted roads repaired rather than bypassing damaged sections. • Monitoring of erosion controls and repair as needed. • Re-stabilise existing eroded tracks with restoration of vegetation cover as required. • Hunting prohibited on site, particularly in relation to Houbara bustard. • During routine maintenance any invasive flora species should be identified and removed. Cutting and poisoning of saplings is an effective control measure. • Record bird collisions with the panels and overhead lines. • Monitor and maintain bird flight diverters on OHL throughout operational phase. • Implementation of mitigation measures for Central Asian Tortoise (TBC) as set out in the BMP. • Record sightings of Sociable lapwing and Houbara bustard in the vicinity of the Solar Park, • Identify a recently excavated area on site and manage it to understand rate and success of natural revegetation. Active management approaches shall be implemented if necessary. • Routine inspections will record any bird collisions and fatalities on site in line with IFC guidance: Bird rescue protocol and monitoring at PV solar sites	• Biodiversity Management Plan • Annual audits • Number of bird collisions with OHL • Tortoise population • Success level of vegetation restoration. • Level of plant cover. • Presence of indicator species.	• Project Developer	• Audit Reports	• Plan developed prior to start of Operation. • Monitoring carried out during detailed monthly audits. • Mitigation to be carried out as and when identified.
Liquid wastes	• Develop a Water Management Plan for operations. • Train employees on the importance of proper liquid waste management and water resource management. • Reduce, reuse or re-cycle all liquid waste generated onsite to the extent possible. • Dispose all liquid wastes that cannot be recycled or reused to liquid waste disposal facilities a licensed transporter.	• Water Management Plan • Pollution Incident and Response Plan • Quantity of liquid waste generated • Quantity of liquid waste correctly	• Project Developer • Licensed hazardous waste transporter	• Water Management Plan and Inventory • Inspection reports • Audit Reports	• Plan developed prior to start of Operation. • Monitoring carried out during detailed

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Prohibit illegal disposal of wastewater into waste resources (canals or groundwater). • Conduct inspection of wastewater management practices to check for compliance • Emphasise on proper sanitation during operation phase of the project.	disposed to disposal sites • Number of Waste storage facilities the plant • Number of Sanitation facilities on at the plant • Number of Audits completed			monthly audits. • Mitigation to be carried out as and when identified.
Solid Wastes	• Develop a Waste Management Plan for operations. This will establish the Chain of Custody system to be implemented. • Train employees on the importance of proper solid waste management • Reduce, reuse or re-cycle all solid waste generated to the extent possible • Dispose all solid wastes that cannot be recycled or reused to solid waste disposal sites using a licensed refuse handler. Disposal sites shall be appropriately licensed and meet the general requirements of IFC PS. • Maintain proper records of solid wastes to know the quantity of wastes generated on site • Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes • Perform regular inspection of waste management practices onsite. • Wastes will be stored in a designated storage area within the substation area to facilitate collection of the wastes by third party waste collector.	• Implementation of Waste Management Plan. • Quantity of solid waste generated • Number of solid waste storage facilities at the plant • Quantity of solid waste correctly disposed to disposal sites • Number of completed inspection missions • Annual audits	• Project Developer • Licensed hazardous waste transporter	• Solid waste management Plan and inventory • Inspection Reports • Audit Reports	• Plan developed prior to start of Operation. • Monitoring carried out during detailed monthly audits. • Mitigation to be carried out as and when identified.
Water availability	• A full Water Management Plan will be developed prior to the commencement of operations.	• Water Management Plan • Operational water availability / resource use assessment.	• Project Developer	• Inspection reports.	• Plan developed prior to start of Operation. • Monitoring carried out during detailed

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
					monthly audits. • Mitigation to be carried out as and when identified.
Soil erosion/compaction	• Confine all vehicles to roadways. • Monitor road condition regularly; then repair damaged and rutted roads rather than bypassing damaged sections. • Monitor erosion controls and repair as needed. • Where possible, maintain any existing grass cover on berms and ditches. • Prohibit use of vehicles and equipment off prepared roads. • Re-stabilize existing eroded tracks and restore grass cover as needed.	• Biodiversity Management Plan • Number of completed inspections, • Annual audits.	• Project Developer	• Inspection reports.	• Plan developed prior to start of Operation. • Monitoring carried out during detailed monthly audits. • Mitigation to be carried out as and when identified.
Visual Impacts	• Implement site rehabilitation and landscaping measures to restore the site. This should be implemented in the first available active growing season following the completion of construction. • Ensure proper storage, regular collection and disposal of waste streams generated. • Carry out the facility inspection work on regular basis.	• Biodiversity Management Plan • Waste management plan developed and implemented • Site inspection missions completed • Annual audits	• Project Developer.	• Inspection Reports • Grievance Reports • Audit Reports	• Plan developed prior to start of Operation. • Monitoring carried out during detailed monthly audits. • Mitigation to be carried out as and when identified.

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
Hazardous Materials / Wastes	• Develop and implement a Waste Management Plan. • Train employees on Hazardous waste management • Segregate waste by separating hazardous waste from non-hazardous waste. • Establish a designated storage area for fuels / chemicals with an impervious base and impermeable bund walls and protected from precipitation. Capacity must be 100% of the full volume to be stored within a bund and secured area. • Containers for storing hazardous materials / waste (including used oil) should be stored in the designated, secured with a fence. All containers are to be labelled correctly. • Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow. • Prohibit illegal disposal of hazardous wastes on the solar plant during solar plant maintenance exercise. • Undertake regular inspection of hazardous waste management practices onsite. • Vehicles will not be refuelled on site but at the nearby filling station. • Provision for chemical, oil and hazardous spills kits to be located in strategic locations to immediate access and to control the spill and contain any hazards.	• Waste Management Plan developed and implemented • Number of trained Workers on Hazardous Waste Management • Amount of Hazardous Waste Segregated • Quantity of accidental hazard spillage • Quantity of hazardous waste correctly disposed • Number of completed inspection missions • Annual Audits	• Project Developer • Licensed hazardous waste transporter	• Inspection Reports • Hazardous Waste Management Plan and Inventory • Audit Reports	• Plan developed prior to start of Operation. • Monitoring carried out during detailed monthly audits. • Mitigation to be carried out as and when identified.
Occupational Health and Safety	• Develop and implement an O&M ESHS MP for operations. • Train new employees on the importance of occupational health and safety • Ensure compliance with the governing regulations • Maintain the fence around the entire solar park to prohibit unauthorized persons from accessing the site • Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks (if required) and overalls. • Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning	• O&M ESHS MP developed and implemented • Number of employees trained on occupational health and safety • PPE procured and being used by the employees • Fire extinguishing facilities at the plant • First aid kit on site	• Project Developer	• Inspection reports • Record of accidents and near misses • Corrective Action Reports	• Plan developed prior to start of Operation. • Monitoring carried out during weekly and monthly audits. • Mitigation to be carried out as and

Impact	Mitigation Measures	MP Reference and KPI (if appropriate)	Responsibility	Monitoring Means	Frequency
	• Regular medical checks including screening for Covid-19 • Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing • Put clear signage to restricted areas in Uzbek, Chinese and English language to reduce risk of accidents • Undertake regular inspection of the plant • Promote Covid-19 Awareness in languages that the workers understanf.	• Signage installed at the plant • Number of inspection missions competed • Annual Audits			when identified.
Noise and Vibration	• Carry out an operational noise survey in the event of complaints being received.	• Levels of noise and vibration produced at the site • Number of Noise complaints received • Number of inspection missions completed	• Project Developer	• Inspections • Project Grievance Mechanism	• In the event of a complaint being received.
Socio-economic	• Continuing stakeholder engagement in accordance with the SEP and manage expectations in terms of the number of employment opportunities generated during operations. • Continued implementation of the Local Recruitment & Employment Plan in consultation with the local community. • Continued implementation of community grievance mechanism. • Continued implementation and compliance with O&M ESHS MP. • Development of Security Management Plan and use of private security personnel. • National Guard will not be used to provide security.	• Stakeholder Engagement Plan • Stakeholder engagement activities. • Number of grievances recorded. • Number of local workers hired. • Security Management Plan	• Contractor • Project Developer	• Inspection reports • Community consultation. • Project Grievance Mechanism	• Monitoring carried out during detailed monthly audits.

Appendix E Example Key Performance Indicators

NNS sets ambitious environmental targets in order to minimise the Navoi Solar Park's environmental and social footprint. The targets will be assessed by the following key performance indicators which were set according to the national standards and international best practice (adhere to more stringent standards) for the project during construction and operational phases. The following table shows the elements that are proposed to be monitored during the life of the Project.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Air Quality					
Ambient air quality	Fugitive dust and particles (SPM, PM10)	Construction Decommissioning	PM10: 50 µg/m3 (24-hours);	In the event of a valid complaint being received.	Independent 3rd party consultant
Ambient air quality	No visible dust outside the site boundary	Construction Decommissioning	Visual observation	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of dust suppression	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Ambient air quality	Pollution Prevention and Control Plan	Construction Decommissioning	Confirmation of compliance with measures specified in the Pollution Prevention and Control Plan as it relates to air quality. Refer to the Pollution Prevention and Control Plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of prevention measures to reduce air quality impacts.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Vehicle emissions	Traffic management plan	Construction Decommissioning	Confirmation of compliance with measures specified in the Traffic management plan as it relates to air quality. Refer to the Traffic management plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of prevention measures to reduce air quality impacts.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Vehicle emissions	Vehicle inspection checks	Construction Decommissioning	Confirmation that checks have been carried out and that vehicles have passed.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of prevention measures to reduce air quality impacts.	Monthly checks: SEPCOIII and ROLE TBC.
Ambient air quality	Complaints relating to dust and air quality	Construction Decommissioning	Minutes of community meetings Grievances received	During weekly checks and monthly detailed audit	Weekly checklist: CLO, SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Noise and vibration					
Ambient noise and vibration level	Observed sound levels in L_{Aeq} dBA for day and night time against nature and recipient. Limits apply at the boundary of closest residential properties.	Construction Operation Decommission	Construction limits: 70 dBA Operation limits: Daytime: 55 dBA Night-time: 45 dBA	Noise measurements to be taken in the event of a valid complaint being received.	Independent 3rd party consultant
Noise and vibration	Noise monitoring devices procured and installed on site	Construction Operation Decommissioning	Number and type of noise monitoring devices	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Noise and vibration	Number of PPE procured and being used by workers	Construction Operation Decommissioning	Visual inspection of PPE use on site	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Noise and vibration	Number of Noise complaints received	Construction Operation Decommissioning	Review of grievance log	During weekly checks and monthly detailed audit	Weekly checklist: CLO, SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Hydrology and Water Quality					

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Surface and groundwater quality	Level of pollutants in surface and groundwater	Prior to start of Construction Prior to Operation Decommissioning	pH (SI) Conductivity (µS/cm) TDS (mg/L) TSS (mg/L) DO (mg/L) ORP Metals (mg/L) E-coli (cfu) Hydrocarbons (mg/L)	Sampling prior to start of construction and following completion of construction. Further sampling to be taken pre and post decommissioning. Additional sampling should be carried out in the event of a valid complaint being received.	SEPCOIII and ROLE TBC. Lab analysis carried out by suitable qualified laboratory.
Loss of habitat and disturbance to waterbodies.	Water Resource and Management Plan	Construction Decommissioning	Confirmation of compliance with measures specified in the Water Resource and Management Plan. Refer to the Water Resource and Management Plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Loss of habitat and disturbance to waterbodies.	Biodiversity Management Plan	Construction Decommissioning	Confirmation of compliance with measures specified in the Biodiversity management plan as it relates to waterbodies. Refer to the Biodiversity management plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of waterbodies.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Alteration of surface water flow	Culverts or other drainage control measures constructed.	Construction Operation Decommissioning	Confirmation of number of culverts or other drainage control measures constructed and condition of such culverts.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of waterbodies.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Alteration of surface water flow	Water Resource and Management Plan	Construction Operation Decommissioning	Confirmation of compliance with measures specified in the Water Resource and Management Plan as it relates to waterbodies. Refer to the Water Resource and Management Plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of waterbodies.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.
Alteration of surface water flow	Drainage system design	Pre-Construction. Construction Operation Decommissioning	Confirmation of suitability of drainage system design.	Prior to sign off on detailed design. Performance of drainage system verified during weekly and monthly audits.	Pre-construction: Masdar Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Alteration of surface water flow	Flood risk assessment.	Construction Operation Decommissioning	Confirmation that measures specified in the FRA have been implemented on site.	During monthly detailed audit.	Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.
Untreated Sewage Effluent	Water Resource and Management Plan	Construction Operation Decommissioning	Confirmation of compliance with measures specified in the Water Resource and Management Plan as it relates to sewage effluent. Refer to the Water Resource and Management Plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of waterbodies.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Untreated Sewage Effluent	Provision of waste management plan	Construction Operation Decommissioning	Confirmation of compliance with measures specified in the waste management plan as it relates to sewage effluent. Refer to the waste management plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of waterbodies.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Untreated Sewage Effluent	Information disclosed as part of health campaigns	Construction Operation Decommissioning	Review of health related information disclosure and awareness programs being undertaken.	During monthly detailed audit	Monthly detailed audit: Masdar
Geology and Soils					
Alteration of surface water flow	Civil engineering design	Pre-Construction. Construction Operation Decommissioning	Confirmation of suitability of civil engineering design.	Prior to sign off on civil engineering design. Performance of civils design verified during weekly and monthly audits.	Pre-construction: Masdar Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Soil quality and erosion	Erosion rate observation	Construction Operation Decommissioning	Visual observation	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of managing erosion	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager
Biodiversity					
Flora protection	Destruction rate observation and revegetation success.	Construction Operation Decommissioning	Visual observation	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Flora protection	Destruction rate observation and signs of erosion.	Construction Operation Decommissioning	Confirmation of the use of designated roads and parking areas	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Flora protection	Preparation and implementation of Biodiversity management plan.	Construction Operation Decommissioning	Confirmation of compliance with measures specified in the Biodiversity management plan. Refer to the Biodiversity management plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance in terms of the protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.
Conflict between construction workers and fauna	No evidence of workforce damaging or hunting/collecting flora and fauna	Construction Operation Decommissioning	Visual observation and monitoring of grievance mechanism	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of protection of flora and fauna and prohibition of hunting and collecting species.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Risk of invasive flora species	No sign of spread of invasive species.	Construction Operation Decommissioning	Visual observation	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.
Risk of invasive flora species	Preparation and implementation of Biodiversity management plan.	Construction Operation Decommissioning	Confirmation of compliance with measures specified in the Biodiversity management plan. Refer to the Biodiversity management plan for further details.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of protection of flora to maintain both biodiversity and to protect against erosion.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager with support from 3rd party ecology as required.
Occupational Health and Safety					
Occupational Health and Safety	Occupational Health and Safety Plan developed and implemented	Construction Operation Decommissioning	Compliance with the measures specified in the OHS plan	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager and SEPCOIII HSE Manager.
Occupational Health and Safety	Develop and implement Emergency Preparedness and Response Plan.	Construction Operation Decommissioning	Compliance with the measures specified in the Emergency Preparedness and Response Plan	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager and SEPCOIII HSE Manager.
Occupational Health and Safety	Workers trained on occupational health and safety	Construction Operation Decommissioning	Workers trained on occupational health and safety and confirmation that number meets the requirement for the total workforce on site	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager and SEPCOIII HSE Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Available of suitable PPE	PPE procured and being used by the workers	Construction Operation Decommissioning	Visual inspection and review of the number of H&S incidents, near-misses or accidents recorded.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager and SEPCOIII HSE Manager.
Availability of fire fighting facilities	Fire extinguishing facilities on site	Construction Operation Decommissioning	Visual inspection and review of the number, availability and condition of facilities.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager and SEPCOIII HSE Manager.
Availability of first aid kit and qualified first aiders	Qualified first aid professionals on site and first aid kit on site	Construction Operation Decommissioning	Visual inspection and review of the number, availability and condition of first aid kits. Confirmation of a medical professional on site.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Occupational Health and Safety	Signage installed on site	Construction Operation Decommissioning	Confirmation of appropriate signage on site particularly at meeting areas or where work will be undertaken. Number of H&S incidents, near-misses or accidents recorded.	During weekly checks and monthly detailed audit Daily toolbox talks should emphasise the importance of OHS.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Waste					
Solid and Liquid wastes	Pollution Prevention and Control Plan	Construction Operation Decommissioning	Confirmation of implementation of the Pollution Prevention and Control Plan	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Solid and Liquid wastes	Water Resource and Management Plan	Construction Operation Decommissioning	Confirmation of implementation of the Water Resource and Management Plan	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Liquid wastes	Quantity and quality of liquid waste generated Number of Sanitation facilities on site	Construction Operation Decommissioning	Confirmation of Quantity and quality of liquid waste generated. Confirmation that waste water has been collected and disposed of at a licensed facility or appropriately treated on site in the case of sewage.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Eppert.
Liquid wastes	Number of Sanitation facilities on site	Construction Operation Decommissioning	Confirmation of number of sanitation facilities on site and confirmation that it meets the needs of the workforce.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Solid wastes	Quantity of solid waste generated and correctly disposed to licensed disposal sites.	Construction Operation Decommissioning.	Confirmation of Quantity and quality of liquid waste generated. Confirmation of disposal by licensed solid waste transporter.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Solid wastes	Solid waste storage facilities on site.	Construction Operation Decommissioning.	Confirmation of number of waste facilities on site and confirmation that there has been appropriate segregation and storage.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Hazardous materials / wastes	Hazardous Waste Management training	Construction Operation Decommissioning.	Number of Trained Workers on Hazardous Waste Management	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Hazardous materials / wastes	Amount of Hazardous Waste Segregated	Construction Operation Decommissioning.	Confirmation of amount of hazardous waste generated.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Hazardous materials / wastes	Quantity of accidental hazard spillage	Construction Operation Decommissioning.	Confirmation of number of spillages of hazardous wastes.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Security					

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Project site safety and security	Security Management Plan developed and implemented	Construction Operation Decommissioning.	Confirmation of implementation of the Security Management Plan	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Number of Security personnel employed	Construction Operation Decommissioning.	• Confirmation of implementation of the Water Resource and Management Plan	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Site Fence Trained workers on site security	Construction Operation Decommissioning.	Visual inspection of the condition of the site perimeter fence and evidence of damage.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Trained workers on site security	Construction Operation Decommissioning.	Review of number of trained workers on site security	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Provision of code of conduct for security personnel.	Construction Operation Decommissioning.	Confirmation that a code of conduct is in place and that all security personnel have sign up to it.	Prior to the appointment of security personnel	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Results of background checks for security staff.	Construction Operation Decommissioning.	Review of Results of background checks for security staff.	Prior to the appointment of security personnel	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Project site safety and security	Positive view of the security personnel by local community meetings	Construction Operation Decommissioning.	Minutes of community meetings Confirmation of provision of information through the SEP and grievance mechanism	During weekly checks and monthly detailed audit	Weekly checklist: CLO, SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Community Health and Safety					

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Safety of Local Community	Community H&S Plan	Construction Operation Decommissioning.	Confirmation of implementation of the Community H&S Plan See separate CHS Plan for further details.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Safety of Local Community	Provision of information through the SEP and grievance mechanism	Construction Operation Decommissioning.	Review of information provided to communities and review of grievance log.	During weekly checks and monthly detailed audit	Weekly checklist: CLO, SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Archaeology and Cultural Heritage					
Archaeology and cultural heritage	Chance Find Procedure	Construction	Confirmation of implementation of the Chance find procedure and review of reports produced	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Archaeology and cultural heritage	Number of recorded chance finds	Construction	Number and type of chance finds	During weekly checks and monthly detailed audit for the initial site preparation and topsoil stripping work.	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Visual and Landscape					
Visual and landscape	Site rehabilitation and landscaping	Operation Decommissioning.	Visual inspection of success of site rehabilitation and landscaping	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Visual and landscape	General site condition	Construction Operation Decommissioning.	Visual inspection of site condition and presence of litter particularly on the perimeter fence.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Socio-economic					
Socio-economic – population and economy	Stakeholder Engagement Plan and grievance mechanism	Construction Operation Decommissioning.	Confirmation of implementation of the Stakeholder Engagement Plan and grievance mechanism Review of Stakeholder engagement activities. Number of grievances recorded.	During weekly checks and monthly detailed audit	Weekly checklist: CLO Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Socio-economic – population and economy	Skills training agreement with local vocation training centre.	Construction Operation Decommissioning.	Confirmation of training places provided and completed.	During weekly checks and monthly detailed audit	Weekly checklist: CLO Monthly detailed audit: Masdar E&S Manager.
Local hiring and workforce management	Local employment plan	Construction Operation Decommissioning.	Confirmation of the implementation of a Local employment plan Monthly audit results showing workforce statistics	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Socio-economic – population and economy	Adherence to GIIP with respect to construction works.	Construction	Visual inspection of construction works	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Socio-economic – population and economy	Access arrangements for local residents.	Construction Operation Decommissioning.	Review of grievance log	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Spread of Food and Water-borne Disease	Agreements with relevant government/NGOs to support health campaigns	Construction Operation Decommissioning.	Agreements with relevant government/NGOs to support health campaigns	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Spread of Food and Water-borne Disease	Information disclosed as part of health campaigns	Construction Operation Decommissioning.	Heath related advertising and communication.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Spread of Communicable Disease	Provision of employee health screening.	Construction Operation Decommissioning.	Confirmation of health screening. Number of reported heath incidents.	During monthly detailed audit	Monthly detailed audit: Masdar E&S Manager.
Spread of Communicable Disease	Provision of H&S induction focus on heath matters.	Construction Operation Decommissioning.	Confirmation that all workers have completed the health related induction.	During monthly detailed audit	Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Spread of Communicable Disease	Provision of health related awareness and training to workforce	Construction Operation Decommissioning.	Review of heath related advertising and communication. Number of reported heath incidents.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Increased Pressure on Health Services	Provision of worker health care through dedicated Project professional	Construction Operation Decommissioning.	Agreement or contract with health care provider. Confirmation of presence of health care professional on site.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Increased Pressure on Health Services	Investments in facilities used by workers	Construction Operation Decommissioning.	Agreement or contract with health care provider to provide investment in facilities.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Pressure on Water Resources	Provision of worker code of conduct	Construction Operation Decommissioning.	Review of signed worker code of conduct. Review of grievance log. Visual inspection confirming availability of bottled water for workforce.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Sale and Use of Alcohol	Development of zero-alcohol policy	Construction Operation Decommissioning.	Review of reported incidents and results of failed alcohol tests	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Traffic and Transportation					
Traffic Management	Traffic Management Plan	Construction Operation Decommissioning.	Confirmation of implementation of the Traffic Management Plan. Review of grievance log.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Traffic incidents	Advanced driver training.	Construction Operation Decommissioning.	Number of drivers that received advanced driver training.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.

Environmental component	Key performance indicators	Project phase	Parameter to be measured	Sampling frequency	Responsibility
Traffic incidents	Road safety briefings provided.	Construction Operation Decommissioning.	Number of road safety briefings provided.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.
Traffic incidents	Reported driving incidents including speed violations.	Construction Operation Decommissioning.	Number of driving incidents including speed violations.	During weekly checks and monthly detailed audit	Weekly checklist: SEPCOIII and ROLE TBC Monthly detailed audit: Masdar E&S Manager.

Appendix F Response from Cultural Heritage Department under the Ministry of Culture of the Republic of Uzbekistan

ЎЗБЕКИСТОН РЕСПУБЛИКАСИ
МАДАНИЯТ ВАЗИРЛИГИ ҲУЗУРИДАГИ
МАДАНИЙ МЕРОС ДЕПАРТАМЕНТИ

НАВОИЙ ВИЛОЯТИ
МАДАНИЙ МЕРОС БОШҚАРМАСИ

ДЕПАРТАМЕНТ КУЛЬТУРНОГО
НАСЛЕДИЯ ПРИ
МИНИСТЕРСТВЕ КУЛЬТУРЫ
РЕСПУБЛИКА УЗБЕКИСТАН

УПРАВЛЕНИЕ КУЛЬТУРНОГО
НАСЛЕДИЯ
НАВОИЙСКОЙ ОБЛАСТИ

210100, Кармана тумани, Мир Саид Баҳром кўч. (Мир Саид Баҳром мақбараси) тел/факс: 79 532 41 01

№ 99\99-11 **2020 йил 30 сентябр**

Ўзбекистон Республикаси Маданият вазирлиги маданий мерос департаменти Навоий вилояти маданий мерос бошқармаси томонидан

ХУЛОСА

Навоий вилояти Кармана тумани “Малик” МФЙ, “Алишер Навоий” массиви ҳудудидаги 523а,526,527,528,530,531,535-контурлар ва 523,524,525, 534,536,407,408,410,513-контурларнинг бир қисмидаги жами ер майдони 268,0 гектар бўлган, ҳамда 412-контур ва 513-контурларнинг бир қисмидаги жами ер майдони 15,0 гектар бўлган ҳудудларда маданий мерос объектлари мавжудлиги, туманда мавжуд археология ва архитектура маданий мерос объектларининг қонунда белгиланган муҳофаза зонаси чегара ҳудудлари ўрганилиб чиқилди.

Шунингдек, “NUR NAVOI SOLAR” МЧЖнинг курилиш лойҳаси ҳамда юқоридаги ўрганилган ҳолатлар юзасидан қуйидагича якуний хулосага келинди.

Хулоса: “NUR NAVOI SOLAR” МЧЖ томонидан қуввати 100 МВтли фотоэлектр қуёш энергияси ишлаб чиқариш объекти ва уларга ёрдамчи бинолар курилиш лойҳасига, қурилаётган ҳудудда маданий мерос объектлари мавжуд эмаслигини маълум қилиб, қурилиш учун бошқарма ўз ижобий хулосасини беради.

Бошқарма бошлиғи **Б.Ҳаққулов**

Ижрочи:Ш.Садинов
Тел 79 753 41 01

Unofficial translation

Cultural Heritage Department under the Ministry of Culture of the Republic of Uzbekistan
Navoi Region Cultural Heritage Department

No 99\99-11 **30 September 2020**

CONCLUSION

The inspection has been carried out to examine and identify any available cultural heritage objects, protected areas established around archaeological and architectural cultural heritage objects within the territory of the land plots, totaling in 268 ha and 15 ha correspondly, located at "Malik" village, Karmana district, Navoi region, on parts of the following lineaments: 523a, 526, 527, 528, 530, 531, 535 and 523, 524, 525, 534, 536, 407, 408, 410, 513 as well as 412 and 51.

Having mentioned the above, the following conclusion pertaining to the construction project of "Nur Navoi Solar" LLC has been made.

Conclusion: The Department provides its positive conclusion with regard to the construction works to be initiated under the framework of the "Nur Navoi Solar" LLC's project for the construction of 100MV PV station/its ancillary facilities, and informs that there are no cultural heritage objects available within the project site.

Head of the Department **B.Hakkulov**
[signed]

Executive person: Sh.Sadinov
Tel: (79) 753 41 01

[QR code]

Appendix G Response from Water Utility “NAVOI SUV TA’MINOTI” LLC

“NAVOIY SUV TA`MINOTI” MCHJ QIZILTEPA TUMAN BO’LIMI
Qiziltepa shahar, Ozodlik ko`chasi 25-uy.
tel.(79) 555-25-46
www.uznst.uz

“NAVOIY SUV TA`MINOTI” LLC QIZILTEPA DISTRICT BRANCH
Qiziltepa district Ozodlik street 25 apt.
tel.(79) 555-25-46
www.uznst.uz

№ 84 “ 09 ” “ 10 ” 2020 йил.

ИП ООО «NUR NAVOI SOLAR»ga

“NAVOI SUV TA'MINOTI” MChJ Qiziltepa tuman bo’limi ushbu orqali Navoiy viloyatida sizning kelajakdagi Loyihangiz joylashgan joyning yonidan o'tadigan D-250 mm "Toshrabot-Xozara" ichimlik suvi tarmog'i uning aktivlari balansiga kiritilganligini tasdiqlaydi. Ushbu quvur 9 ta mahallaga toza ichimlik suvi etkazib beradi va to'g'ridan- to'g'ri foydalanuvchilari suv yig'ishi uchun mo'ljallangan idishlarga boradi. Ushbu quvur liniyasining oqim xususiyatlari quyidagicha:

	Yozgi mavsum	Qish mavsumi
Oylik o'rtacha suv sarfi	40,000 m3	28,000 m3
Kundalik o'rtacha suv sarfi	1,490 m3	930 m3
Kunlik ta'minlash soatlari	10 soat	6 soat

Biz shuni tasdiqlaymizki, “Toshrabot-Xozara” ichimlik suvi tarmog’i hozirgi kunda va kelajakda NUR NAVOI SOLAR quyosh stansiyasi uchun hozirgi vaqtda va kelajakda eksupluatatsion talablarni qondirish uchun soatiga 12 m3 va loyiha qurilishi davomida (12 oy ichida) kunlik 120 m3 toza ichimlik suvi ta’minotini yetkazishi mumkin, va bu hech qanday salbiy oqibatlarga olib kelmaydi.

Shuningdek, biz loyiha qurilishi va ekspluatatsiyasi davomida yuqorida aytib o’tilgan toza ichimlik suvi ta’minotini yetkazib beradigan quvvat va infratuzilma mavjudligini tasdiqlaymiz.

“NAVOI SUV TA'MINOTI” MChJ
Qiziltepa tuman bo’limi IChTB boshlig’i: F.X.Qayumov

Unofficial translation

"NAVOI SUV TA'MINOTI"
LLC

KIZILTEPA DISTRICT BRANCH

No.84 **9 October 2020**

To: "NUR NAVOI SOLAR" FE LLC

We verify that D-250 mm "Tashrabot-Xozara" water supply pipeline that runs near your future Project construction site is on the balance of Kiziltepa district branch of "NAVOI SUV TA'MINOTI" LLC. This water supply pipeline supplies potable water to 9 villages and delivers water straightway to consumer's special water reservoirs. The capabilities of this water supply pipeline's waterflow are as follows:

	Summer time	Winter time
Average monthly supply	40,000 m^3	28,000 m^3
Average daily supply	1,490 m^3	930 m^3
Daily supply hours	10 hours	6 hours

"Tashrabot-Xozara" water supply pipeline is capable to continuously supply up to 3,500 m^3 of water per day.

We confirm that, currently as well as in future, for purposes of Nur Navoi Solar's PV plant, "Toshrabot-Xozara" water supply pipeline is capable to supply (a) 12 m3 of water per hour to satisfy the operational needs and (b) 120 m3 of water per day for construction period (during 12 months), and this water consumption will not result in negative or any other consequences.

Thus, we confirm that the water supply organization has available capacity and infrastructure to supply water during both operation and construction periods in the amount mentioned above

Chief of Kiziltepa district Branch
of "NAVOI SUV TA'MINOTI" LLC **F.X. Kayumov**
[signed, stamped]

Appendix H Land Leases (Farmer B)

[*unofficial translation of the original in Uzbek*]

DECISION OF THE KARMANA DISTRICT KHOKIMIYAT IN NAVOI REGION OF THE REPUBLIC OF UZBEKISTAN

7 August 2020 No. K-418

Allocation of a land plot located within the territory of "Malik" MFY from the district reserves to Mr. Hayitov Zokir Husenovich for the purposes of grazing livestock

In accordance with the Land Code, Law on Farmer Enterprises, Regulation on the Procedure for Allocation of Land Plots to Farmer Enterprises for Long-Term Lease approved by the Resolution of the Cabinet of Ministers No. 476 of 30 October 2003, and Decision of the district-level Councils of People's Deputies (*Kengashes*) No. 56 of 3 August 2020,

THIS DECISION IS ADOPTED TO:

1. Allot a land plot from district reserves (i) located within the part of the "Malik" makhalla's territory (Xazora massif) having lineaments 383,384, 385, 386, 387, 388, 389, 390, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 536, 537, 539, 540, 541, 542 and 534,535, (ii) totaling 106.94 hectares and including 4.58 hectares of lands containing deposits, 95.46 hectares of pastureland, 0.04 hectares of irrigation canals and waterways, 6.47 hectares of roads, 0.39 hectares of non-agricultural land, to Mr. Khayitov Zokir Husenovich for 49 years-lease to graze livestock.

2. Ensure due registration of a land lease agreement with the district-level Department of Land Resources and State Cadaster (Mr. Gafforov) in the manner prescribed by law.

3. Mandate Mr. Hayitov Zokir Husenovich to timely submit reports to the district-level State Tax Inspectorate and Department of Statistics.

4. Assign responsibility of monitoring the implementation of this Decision to the Deputy Khokim for Agriculture and Water Resources - S. Sattarova.

District Khokim **F. Umarov**

O'ZBEKISTON RESPUBLIKASI
NAVOIY VILOYATI
KARMANA TUMANI
HOKIMINING
QARORI

РЕШЕНИЕ
ХОКИМА
КАРМАНИНСКОГО РАЙОНА
НАВОИЙСКОЙ ОБЛАСТИ
РЕСПУБЛИКИ УЗБЕКИСТАН

Karmana t. "Talqoq" MFY
"07" Август 2020 y (г). № 26-418

Карманинский р. МСГ "Талкок"

"Малик" маҳалла фуқаролар йиғини ҳудудидаги туман заҳира ерларидан фуқаро Хайитов Зокир Хусеновичга чорвачилик йўналишидаги фермер хўжалиги ташкил этиш учун ер майдони ажратиш тўғрисида

Ўзбекистон Республикасининг Ер кодекси, "Фермер хўжалиги тўғрисида"ги қонуни, Вазирлар Маҳкамасининг 2003 йил 30 октябрдаги 476-сонли қарори билан тасдиқланган "Ер участкаларини фермер хўжаликларига узоқ муддатли ижарага бериш тартиби тўғрисида"ги Низом ҳамда халқ депутатлари туман Кенгашининг 2020 йил 3 августдаги 56-сонли қарорига асосланиб,

ҚАРОР ҚИЛАМАН:

1. Фуқаро Хайитов Зокир Хусеновичга "Малик" маҳалла фуқаролар йиғини (Ҳазора массиви) ҳудудидаги туман заҳира ерларидан 383, 384, 385, 386, 387, 388, 389, 390, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 536, 537, 539, 540, 541, 542-контурлар ва 534, 535-контурларнинг бир қисмида жойлашган жами 106,94 гектар, шундан 4,58 гектар бўз ерлар, 95,46 гектар яйлов, 0,04 гектар ариқ ва зовурлар, 6,47 гектар йўллар, 0,39 гектар қишлоқ хўжалигида фойдаланилмайдиган ерлар чорвачиликка ихтисослаштирилган фермер хўжалиги ташкил этиш учун 49 йил муддатга ижарага ажратилсин.

2. Туман Ер ресурслари ва давлат кадастри бўлими (Ғаффоров)га ер участкасини узоқ муддатли ижарага бериш шартномасини қонунчиликда белгиланган тартибда расмийлаштириш топширилсин.

3. Фуқаро Хайитов Зокир Хусеновичга туман давлат Солиқ инспекцияси ва Статистика бўлимларига ҳисоботларни ўз вақтида топшириш юклатилсин.

4. Ушбу қарорнинг бажарилишини назорат қилиш туман ҳокимининг Қишлоқ ва сув хўжалиги масалалари бўйича ўринбосари С.Сатторов зиммасига юклатилсин.

QARORLAR UCHUN

Туман ҳокими **Ф.Умаров**

[unofficial translation]

DECISION OF THE KARMANA DISTRICT KHOKIM IN NAVOI REGION OF THE REPUBLIC OF UZBEKISTAN

26 October 2020 No. K-629

Allocation of a land plot located within the territory of "Malik" MFY from the district reserves to expand the lands of the Farmer's Enterprise "BIBISORA 2020" specialized in grazing livestock

In accordance with the Land Code, Law "On Farmer Enterprises", Regulation on the Procedure for Allocation of Land Plots to Farmer Enterprises for Long-Term Lease approved by the Resolution of the Cabinet of Ministers No. 476 of 30 October 2003, and Decision of the district-level Council of People's Deputies (Kengash) No. 16/105 of 26 October 2020,

THIS DECISION IS ADOPTED TO:

1. Allocate a land plot from district reserves (i) located within the part of the "Yangiariq" village's territory (Karmana massif) and having the lineaments 311 and 312, (ii) **totaling 205.5 hectares** and including 200 hectares of pastureland, 5.05 hectares of rivers and water ways, to Farmer's Enterprise "BIBISORA 2020" for a 49-year long-term lease to expand its lands. To declare Farmer's Enterprise "BIBISORA 2020" as the leaseholder over the land plots (i) located within the part of the "Yangiariq" village's territory (Karmana massif) and "Malik" village's territory (Xazora massif) and having the lineaments 383,384, 385, 386, 387, 388, 389, 390, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 536, 537, 539, 540, 541, 542, 311 and 534,535,312, (ii) **totaling 311.99 hectares** and including 4.58 hectares of fallow lands, 295.46 hectares of pastureland, 0.04 hectares of irrigation canals and waterways, 6.47 hectares of roads, 5.05 hectares of rivers and water ways and 0.39 hectares of non-agricultural land.

2. Ensure that consequent changes to the land lease agreement between Farmer's Enterprise "BIBISORA 2020" and the district-level Khokimiyat are made and registered with the district-level Department of Land Resources and State Cadaster (Mr. Gafforov) in the manner prescribed by law.

3. Mandate Farmer's Enterprise "BIBISORA 2020" (Mr. Khayitov) to timely submit reports to the district-level State Tax Inspectorate and Department of Statistics.

4. Assign responsibility of monitoring the implementation of this Decision to the Deputy Khokim for Agriculture and Water Resources – Mr. S. Sattorov.

District level Khokim *[stamped]* **F. Umarov**

O'ZBEKISTON RESPUBLIKASI
NAVOIY VILOYATI
KARMANA TUMANI
HOKIMINING
QARORI

РЕШЕНИЕ
ХОКИМА
КАРМАНИНСКОГО РАЙОНА
НАВОИЙСКОЙ ОБЛАСТИ
РЕСПУБЛИКИ УЗБЕКИСТАН

Karmana t. "Talqoq" MFY
"26" Oktyabr 2020 y (g). № 7ч-629

Карманинский р. МСГ "Талқоқ"

"Малик" маҳалла фуқаролар йиғини ҳудудидаги туман заҳира ерларидан чорвачилик йўналишидаги "BIBISORA 2020" фермер хўжалигига кенгайтирган ҳолда мақбуллаштириш тўғрисида

Ўзбекистон Республикасининг Ер кодекси, "Фермер хўжалиги тўғрисида"ги қонуни, Вазирлар Маҳкамасининг 2003 йил 30 октябрдаги 476-сонли қарори билан тасдиқланган "Ер участкаларини фермер хўжаликларига узоқ муддатли ижарага бериш тартиби тўғрисида"ги Низом ҳамда халқ депутатлари туман Кенгашининг 2020 йил 26 октябрдаги 16/105-сонли қарорига асосланиб,

ҚАРОР ҚИЛАМАН:

1. "BIBISORA 2020" фермер хўжалигига "Янгиариқ" маҳалла фуқаролар йиғини (Кармана массиви) ҳудудидаги туман заҳира ерлари 311-контур ва 312-контурнинг бир қисмида жойлашган жами 205,05 гектар, шундан 200,0 гектар яйлов, 5,05 гектар дарё ва сойликлар билан банд бўлган ерлар чорвачилик йўналишида кенгайтирган ҳолда мақбуллаштириб 49 йил узоқ муддатли ижарага ажратиб берилсин ва "BIBISORA 2020" фермер хўжалиги ихтиёрида "Янгиариқ" маҳалла фуқаролар йиғини, "Кармана" массиви ва "Малик" маҳалла фуқаролар йиғини, "Ҳазора" массиви ҳудудидаги 383, 384, 385, 386, 387, 388, 389, 390, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 536, 537, 539, 540, 541, 542, 311-контурлар ва 534, 535, 312-контурларнинг бир қисмида жойлашган жами 311,99 гектар, шундан 4,58 гектар бўз ер, 295,46 гектар яйлов, 0,04 гектар ариқ ва зовурлар, 6,47 гектар йўллар, 5,05 гектар дарё ва сойликлар ва 0,39 гектар қишлоқ хўжалигида фойдаланилмайдиган ер майдонлари этиб белгилансин.

2. Туман Ер ресурслари ва давлат кадастри бўлими (Ғаффоров)га чорвачилик йўналишидаги "BIBISORA 2020" фермер хўжалиги билан туман ҳокимлиги ўртасида тузилган ер участкасини узоқ муддатли ижарага бериш шартномасини қонунчиликда белгиланган тартибда ўзгартириш киритиш топширилсин.

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