Environmental and Social Impact Assessment

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Uzbekistan: Samarkand I Solar PV and BESS Project

PART 5

Prepared by ACWA Power for the Asian Development Bank (ADB).

11 LANDSCAPE AND VISUAL AMENITY

11.1 Legal Requirements and Standards

11.1.1 National laws and regulations

The legal framework of Uzbekistan does not include specific legislation and standards to provide for the preservation of aesthetically valuable landscapes and visual amenity of private and public property. Nevertheless, indirectly relevant regulations for the protection of the natural environment, including vegetation and water resources, as well as those related to the preservation of cultural heritage sites will be applied where appropriate.

11.2 Baseline Conditions

For the purposes of the ESIA, the visual impact assessment was focused on project sites designated for the establishment of extensive project facilities comprising buildings and fencing. The OTL corridors were excluded from the survey, on this basis.

Landscape surveys involved the characterization of the visual context in and around the PV power plant and BESS sites. The baseline study consisted of a Landscape Character Assessment (LCA) and viewpoint analysis to inform subsequent visual impact assessment:

11.2.1 Landscape Character Assessment

The LCA commenced with a desktop review of the salient landscape elements and visual receptors present within the 1 km radii of the PV power plant and BESS sites. The search radius was based on a provisional, rule-of-thumb Area of Influence (AoI), taking into account the local topography and relevant aspects of the PV plant and BESS design.

11.2.1.1 100 MW PV plant site

The 100 MW PV plant site landscape and its 1-kilometre sweep is characterized by fallow land, pockets of cultivated land and patches of dry grassland. No significant, natural landscape elements, such as natural vegetation reserves, pristine grassland or wetlands are present within the site, and the topography is mostly even across the site and surrounding landscape. Nevertheless, the distant, towering mountains located south of the PV plant site offer appealing views within certain viewsheds and this landscape element can therefore be considered a visual amenity,

Minor on-site structures include a small farm building, shading structures, and fencing.

Figure 11-1 View of the 100 MW PV power PV plant site

Establishments surrounding the site include crop farms, temporary herding shelters, an existing OTL extending along the northern boundary, and one residential plot some 130 metres North of the site.

11.2.1.2 400 MW PV plant site and pooling station

The 400 MW PV plant and polling station sites are characterized by barren plains integrating into an expanse of sparse, dry grassland. No significant natural landscape elements such as groves, extensive surface water features, or marked landforms fall within the site boundaries.

Figure 11-2 View of the 400 MW PV power plant site

The 1-km sweep outside of the site boundaries includes the outskirts of the neighbouring Olga and Chorvador communities located East and South of the sites. The poorly vegetated surrounds include a sparse distribution of residential establishments and a municipal track connecting to the road network within these settlements.

11.2.1.3 Nurobod BESS

The landscape in and around the Nurobod BESS is characterized by generally flat terrain with little to no vegetative cover. The site interior includes a homogenous stretch of fallow land, with virtually no built-up structures or wooded areas.

The 1-kilometre buffer around the site comprises fallow land interspersed with a patch work of crop farms. Salient establishments outside the site perimeter include farm buildings and farmsteads located immediately East and West of the site.

Figure 11-3 Views with Nurobod BESS site

11.2.2 Viewpoint analysis

Following the identification of notable landscape characters within the AoI around the project sites, a viewpoint analysis was carried out to identify visual receptors that are subject to significant visual impacts from the PV power plants. The analysis involved the delineation of a Zone of Theoretical Visibility (ZTV). The ZTV was modelled using a global 30×30 metres Digital Elevation Model (DEM) sourced from the SRTM digital database.

The simulation visualizes the theoretical AoI based on the relative elevation of infinite viewpoints (to that of the PV power plant arrays) and zone the AoI into sections with different visual impact ratings. The impact magnitude can be evaluated in terms of the number of PV power plant sections visible from any given viewpoint. While the ZTV is an informative assessment tool, the following limitations should be taken into consideration:

- The visibility model is two dimensional and does not evaluate visual impact based on the height of the Project's intrusive structures in the viewsheds at any given viewpoint/ receptor. The lateral extent of intrusions within the receptors' field of view is the sole variable factored into the evaluation, whereas the vertical extent of intrusions is treated as a constant.
- The visibility model is based on a medium-resolution DEM and does not account for the screening effect of intervening features such as vegetation, natural landforms, and buildings, which can reduce of preclude the visual impact of the solar arrays.

The relatively high impact zones identified through the ZTV were examined via satellite imagery, and a number of representative viewpoints were selected for ground-truthing. The existing viewsheds within these locations were surveyed and photographed during subsequent walkovers in and around the sites.

11.2.2.1 100 MW PV plant site

The ZTV simulation indicates that maximum visual impact will occur within areas immediately North-East of the 100 MW PV plant site, and along the uplands and mountain range located more than 6 kilometres South of the site.

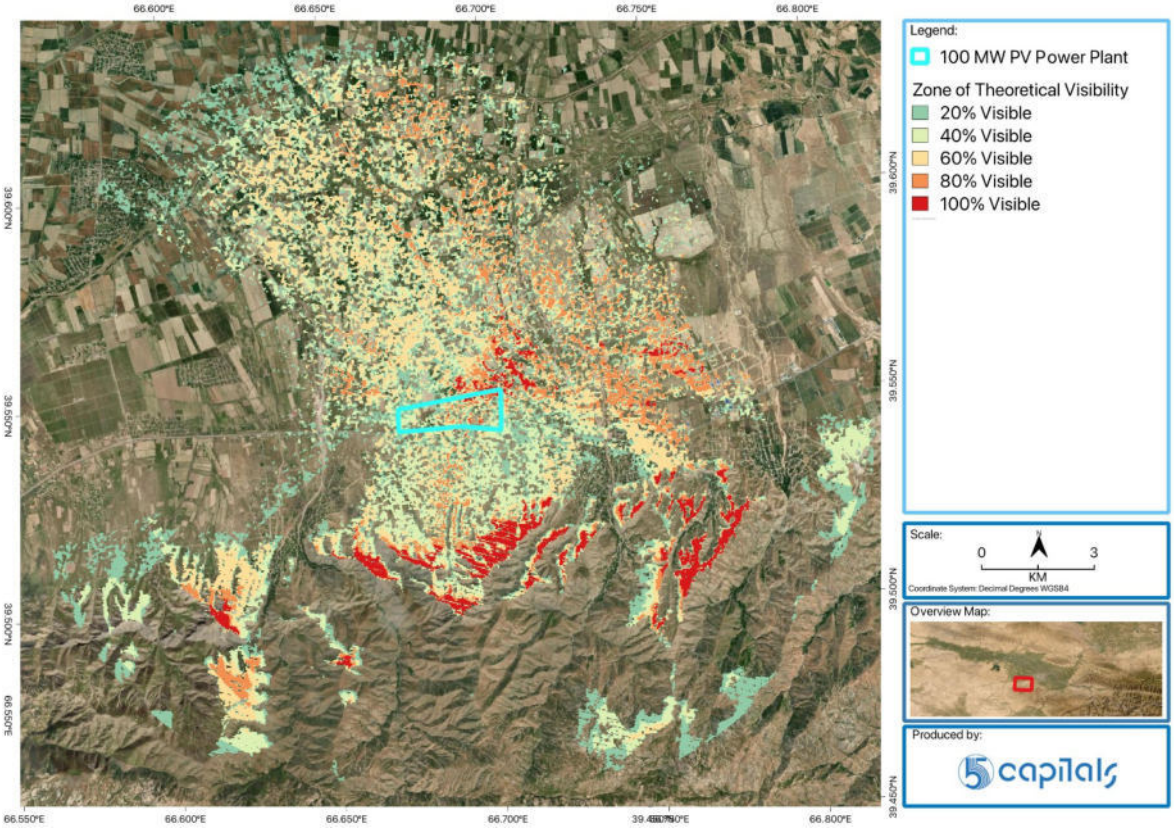


Figure 11-4 ZTV model constructed for the 100 MW PV plant

The impact zone nearby the site consists of fallow land and little to no agricultural land-use around several farm structures and herding shelters.

11.2.2.2 400 MW PV plant site and pooling station

Based on the ZTV simulation, no high impact zones were delineated within 5 kilometres of the site, owing to the flat topography of the broader landscape. The power plant will create a moderately noticeable visual impact in the mountain located over 10 kilometres North of the

site. However, no land-use or human settlements exist within this remote area along Zarafshan River.

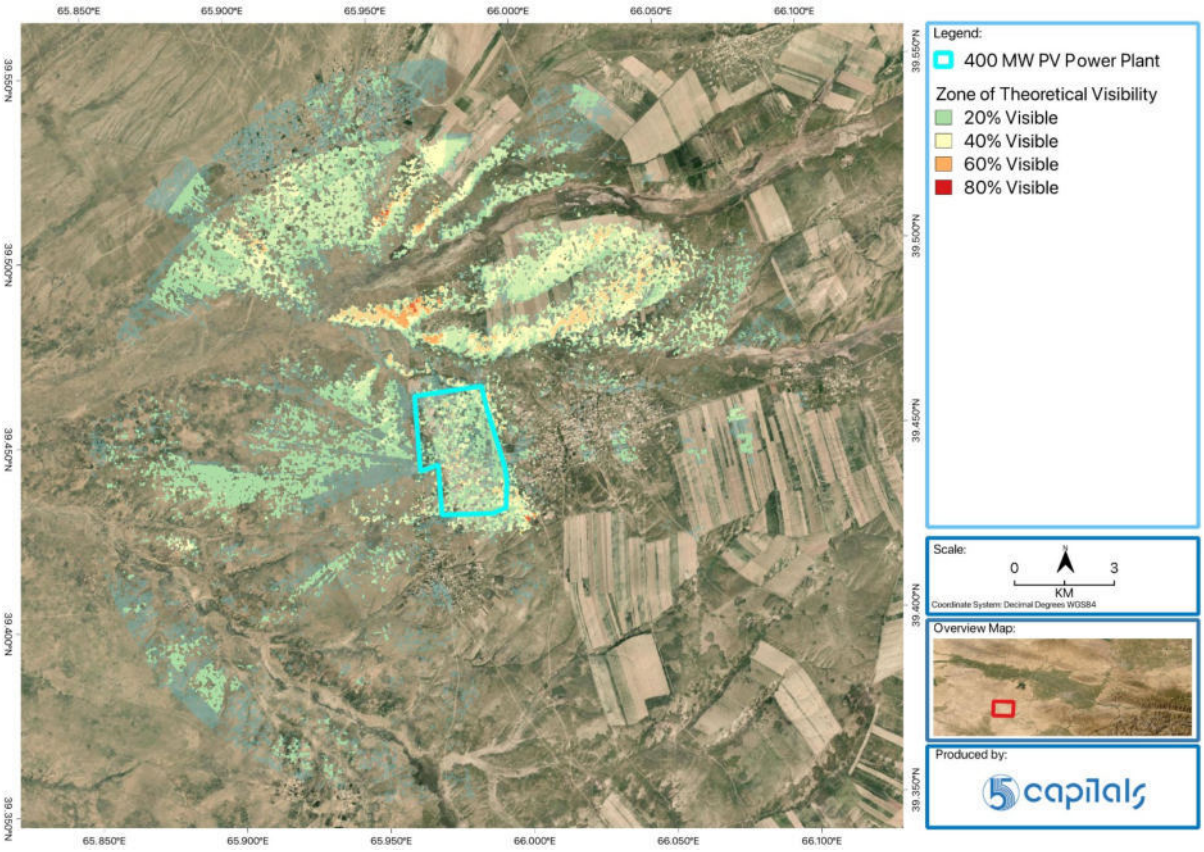


Figure 11-5 ZTV model constructed for the 400 MW PV plant

11.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential visual impacts within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is provided for each relevant receptor.

Table 11-1 E&S impact receptors – Landscape and visual amenity

RECEPTOR	SENSITIVITY	JUSTIFICATION
Residences and other establishments located nearby the PV plant and BESS sites	Low	Residences and other establishments within the ZTV have a potentially low sensitivity to visual impacts as no landscape elements high visual amenity/ aesthetic value have been identified within the intervening landscape. The visual receptors are nonetheless subject to declines in visual amenity from construction blight and lighting, and permanent land transformation with the establishment of extensive, high-rise superstructures within the PV plant and BESS sites in particular.

11.4 Potential Impacts and Management Measures

11.4.1 Construction phase

11.4.1.1 Loss of visual amenity due to alteration of landscape character

The Project's construction phase will entail vegetation clearance earthworks, civil works, and temporary establishments that will degrade the visual amenity of the existing landscape elements, unobstructed viewpoints located within the vicinity of the project sites. Excavations, stockpiles, laydown areas, on-site labour facilities, as well as heavy construction machinery may present an eyesore to nearby residents, particularly where construction zones are not fenced.

Areas of intensive earthworks within dust-prone sites may also temporarily undermine the aesthetic value of existing viewsheds, particularly those encompassing the PV plant and BESS sites. The main facility sites are relatively undeveloped plains with intrinsic visual appeal, which in the case of the 400 MW PV plant and Nurobod BESS viewsheds, enhances the views of the distant mountainous landscape located North and South of the sites respectively.

11.4.1.2 Visual nuisance due to light spills

Construction activities and related establishments will require outdoor lighting for security purposes and any night-time construction work. The introduction of intense lighting for onsite illumination may create light spills which may present a visual nuisance to nearby establishments and residences in particular. The intrusive effect of light trespass is likely to be more pronounced within residential establishments situated close to the PV plant and BESS sites in Nurobod district, due to the proximity of residential establishments within the surrounding landscape.

Table 11-2 Overview of potential impacts relating to landscape and visual amenity during construction

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
Loss of visual amenity due to alteration of landscape character	Zone of visibility of pre-existing vegetation, construction establishments and construction scars	Major	Residences and other establishments located nearby the project sites	Low	**Minor/ moderate**	**Minor**
Visual nuisance due to light spills	Project sites and the immediate vicinity	Major	Residences and other establishments located nearby the project sites	Low	**Minor/ moderate**	**Minor**

Impact Avoidance and Mitigation Measures

Loss of visual amenity due to alteration of landscape character

- Wherever possible, visual screens will be established or maintained around laydown areas, stockpiling sites, parking areas, and other visually intrusive construction zones within the project sites, to minimize the impact of construction blight on off-site receptors (i.e., through site fence, vegetation buffers/ hedgerows etc.).
- Vegetation removal will be restricted to demarcated construction zones within the project sites and designated transit corridors.
- Idle machinery and equipment will be restricted to designated parking areas within the project site or relevant machinery bases, and haphazard. parking along access roads and the vicinity of the project sites will be prohibited.
- Existing quarry sites will be used for acquisition of construction sand and other aggregates.
- Upon completion of construction works, all temporary structures and plants will be dismantled and demobilized, and any associated waste will be transferred to designated facilities for waste management.
- Site rehabilitation will be implemented following the completion of construction activities, with complete backfilling of on-site excavations, removal of stockpiles, temporary structures, and equipment, as well as the re-establishment of vegetative cover in residual areas within the project sites (i.e., those located outside of permanent clearance zones for the operation and maintenance of project facilities).
- A Soil Management and Erosion Control Plan, Waste Management Plan and Traffic Management Plan will be developed and implemented.

Visual nuisance due to light spills

- Night-time construction work will be minimized to the extent feasible and conducted with prior approval from relevant authorities and advance notices to residential communities located within 500 metres of the project sites.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Any floodlights required for night-time illumination will be oriented towards the interior of the project sites. • Construction lights will be fixed at a maximum position angle of 30° from vertical mounts and the height of lighting poles or towers will be minimized. • Floodlight shields and Light-Emitting Diode (LED) lamps will be adopted where intensive lighting is required.						

11.4.2 Operational phase

11.4.2.1 Loss of visual amenity due to alteration of landscape character

The development of the PV plant, collector sub-station and BESS site will result in a permanent alteration of the landscape features constituting viewsheds within neighbouring settlements. Land conversion will be particularly noticeable at sensitive viewpoints within the vicinity of the PV plant and BESS sites. The establishment of built-up structures such as new fencing, sub-station towers and OTLs will create visual intrusions and nuisances, and a resultant decline in the visual appeal of existing landscape elements, which include the scenic mountain views complementing the open range lands nearby the 100 MW PV plant and BESS sites in Nurobod.

Potential impacts on landscape character will nonetheless be cumulative, as some of the landscape elements are already degraded by intrusive structures (e.g., existing OTLs) and urban blight.

11.4.2.2 Nuisance and safety hazards due to glint and glare from PV panels

The establishment of the PV plant site will result in glint and glare impacts due to the reflection of light from the PV modules. Glint refers to the momentary flash of bright light typically received by moving receptors, whereas glare is defined as a continuous source of bright light typically received by static receptors. Depending on the visibility of the solar panels to nearby receptors, high exposure to glint and glare can result in distraction, flash-blindness, and in extreme cases, retinal burn.

Receptors of potential glint and glare impacts potentially include various establishments at elevated locations within the visibility zones of the PV plant infrastructure. Glare and glint are not expected to impact on motorists along the nearby track, considering the height of the mounted panels and local topography. Road users within impact zones may be subject to H&S incidents which can result from the distraction and loss of visibility associated with glint and glare, particularly within affected roads (e.g., service roads within the PV plant site).

Table 11-3 Overview of potential impacts relating to community landscape and visual amenity during operation

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Loss of visual amenity due to alteration of landscape character	Zone of visibility of permanent intrusive superstructures.	Major	Residences and other establishments located nearby the project sites	Low	**Minor/ moderate**	**Minor**
Nuisance and safety hazards due to glint and glare from PV panels	Zone of visibility of PV panel arrays.	Major	Residences and other establishments located nearby the project sites	Low	**Minor/ moderate**	**Minor**

IMPACT AVOIDANCE AND MITIGATION MEASURES

Loss of visual amenity due to alteration of landscape character

- Wherever possible, prominent built-up structures and visible establishments (i.e., fence lines and battery containers), will not be painted in conspicuous colours causing unappealing contrast with the surrounding landscape.
- A post-construction site rehabilitation plan will include efforts to establish vegetative screens/ hedge rows, around the PV power plant and BESS sites.

Nuisance and safety hazards due to glint and glare from PV panels

- PV modules with in-built technology to minimize reflection of incident light will be used for the full operational lifetime of the PV plant.
- Vegetation screens/ hedgerows will be enhanced to the extent possible to further screen the PV arrays within the PV plant site (subject to shading, fire safety restrictions etc.).

11.4.3 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, potential impacts relating to landscape and visual amenity will be similar to the above-described construction-phase impacts. Specifically, this set of impacts potentially includes the loss of visual amenity due to alteration of landscape character.

For the avoidance and mitigation of this impact, relevant impact management measures specified in Section 11.4.1.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

11.5 Monitoring Requirements

Table 11-4 below provides an overview of the key monitoring arrangements for evaluating performance relating to landscape and visual amenity, in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 11-4 Monitoring arrangements for impacts and preventative and mitigation measures relating to landscape and visual amenity

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Visual nuisance due to light spills	Grievances concerning light spills	- All related grievances are closed out within the shortest practicable duration	- Community Grievance Log	Ongoing	- EPC Contractor CLOs
Loss of visual amenity due to alteration of landscape character	Percentage of site-specific rehabilitation activities completed in line with the Site Rehabilitation Plan	- 100% of site-specific rehabilitation activities have been completed in line with the Site Rehabilitation Plan	- Disturbed zones within the project sites	Daily during demobilization	- Project Company Environmental Officer - EPC Contractor Environmental Officer

12 CULTURAL HERITAGE

12.1 Legal Requirements and Standards

12.1.1 National laws and regulations

Relevant legislation in Uzbekistan relating to archaeology and cultural heritage includes the following:

- Law No. ZRU-229 "On protection and use of the objects of archaeological heritage" (13 October 2009).
- Law No. 269-II "On the Protection and Use of Cultural Heritage Sites (30 August 2001, as amended).
- Presidential Decree No. R-5181 "On improving the protection and use of objects of tangible cultural and archaeological heritage" (16 January 2018).
- Resolution of the President of the Republic of Uzbekistan № RP-4068 dated December 19, 2018 "On measures for improving actions for protection of material cultural heritage objects".
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan № 846 dated October 4 2019 "On approval of the national list of real state sites and objects of material cultural heritage".

The above laws seek to protect and sites and objects of cultural heritage which are considered as part of the national heritage for all the people in Uzbekistan.

In addition, the Criminal Code of the Republic of Uzbekistan includes provisions that prohibit the intentional destruction or damage of objects of tangible cultural heritage under state protection, with further protections in place to protect cultural property in PAs, in particular protected historical and cultural territories, without first obtaining permission.

12.1.2 Lender requirements

12.1.2.1 ADB

ADB's Safeguard Policy Statement and related Safeguards, include various requirements for cultural resources of importance locally, provincially, nationally, and internationally. Where such resources are identified the ADB safeguards highlight the importance of consulting with the communities who use such facilities, as well as the regulatory agencies entrusted with protecting such resources.

When a project is located in areas where physical cultural resources are expected, the ADB Safeguard Policy Statement requires the use of "chance find" procedures that include a pre-

approved management and conservation approach for materials that may be discovered during project implementation.

12.1.2.2 IFC and EPFIs

In accordance with the Equator Principles, the assessment will refer to applicable IFC Performance Standards on Social and Environmental Sustainability, specifically with due consideration of Performance Standard 8 – Cultural Heritage. PS8 aims to protect the adverse impacts of project activities and support its preservation and to promote equitable sharing of benefits from the use of cultural heritage. Cultural heritage in this standard refers to:

- Tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values.
- Unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls.
- Certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

12.2 Baseline Conditions

Uzbekistan is endowed with some of the richest cultural heritage attractions in Central Asia. The country's cultural legacy includes uniquely magnificent and historic monuments, architectural complexes, and artefacts. At present, a total of five prominent cultural heritage sites are legally protected under the World Heritage Convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). These sites feature ancient cities marked by assemblages of palaces, fortresses, mosques, and grand city walls. Furthermore, an additional 33 sites in the country have been nominated for World Heritage designation. These sites include caravanserais, mausoleums, desert castles, rock paintings and silk road sites across the country. According to recent UNESCO publications[9], intangible cultural heritage in Uzbekistan includes oral traditions and expressions (folklore), musical and dance rites and festivals, as well as traditional knowledge, notably native sericulture techniques, and traditional handcraftsmanship.

The IFC PS 8 recognize that cultural heritage comprises both tangible and non-tangible heritage. Tangible cultural heritage is defined as heritage that is considered a unique and

[9] UNESCO Intangible Cultural Heritage. 2014. Periodic report No. 01048/Uzbekistan. Report on the implementation of the Convention and on the status of elements inscribed on the Representative List of the Intangible Cultural Heritage of Humanity.

often non-renewable resource that possesses cultural, scientific, spiritual, or religious value and includes moveable or immovable objects, sites, structures, groups of structures, natural features, or landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural value. Intangible cultural heritage refers to cultural resources, knowledge, innovations and/or practices of local communities embodying traditional lifestyles. Further, cultural heritage, is categorized as follows:

- **Replicable cultural heritage** – Relatively well-represented forms of tangible heritage that can themselves be moved to another location or that can be replaced by similar structures or natural features to which the cultural values can be transferred by appropriate measures.
- **Non-replicable cultural heritage** – Heritage that is regarded as more unique in terms of social, economic, cultural, environmental, and climatic representation of past peoples, their evolving ecologies, adaptive strategies, and early forms of environmental management (for specific eras or the site-specific linkage of multiple eras).
- **Critical cultural heritage** – Cultural heritage that is (i) internationally recognized heritage of communities who use or have used within living memory the cultural heritage for long standing cultural purposes, and/or (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation.

12.2.1 Samarkand Region

TANGIBLE CULTURAL HERITAGE

Several UNESCO World Heritage Sites are located in Samarkand Region. The most prominent of these is the ancient living city of Samarkand, which is commonly referred to as Central Asia's 'crossroads of cultures'. The city was founded eight to seven centuries BCE, attaining its prime under the Timurid dynasty in from the 11tth century to the 15th century CE. The city was historically occupied and ruled by Persian, Turkic, Mongol, and Uzbek civilizations, becoming a trade and Islamic centre over the medieval period. The archaeological sites and historic monuments protected within this city include the following:

- Ruins of the ancient Afrisiyab Town.
- Registan Ensemble including three monumental madrassahs.
- Shah-i-Zinda Ensemble with a collection of mausoleums.
- Bibi-Khanyim Mosque.
- Gur-e-Amir Maosuleum.
- Ulugh Bey Observatory.

Samarkand Region also covers a portion of the Zarafshan-Karakum silk road corridor, which has been inscribed as a UNESCO World Heritage Sites in 2023. The corridor constitutes part of

the wider renowned silk road, which enabled the transit of high-value commodities and transcontinental trade between China (far East) and Europe (far West). The 866-km long Zarafshan-Karakul portion spans mountainous, piedmont, steppe and desert landscapes within Tajikistan, Uzbekistan and Turkmenistan. In Uzbekistan, the silk road traverses the regions of Samarkand, Navoi and Bukara. In Samarkand Region, archaeological sites along the silk road corridor include the following:

- Jartepa II Temple
- Suleimantepa
- Kfirkala Settlement


Figure 12-1 Registan ensemble and Afrisiyab ruins

The distribution of UNESCO world heritage sites in Samarkand Region, relative to the project sites is shown in the figure below.

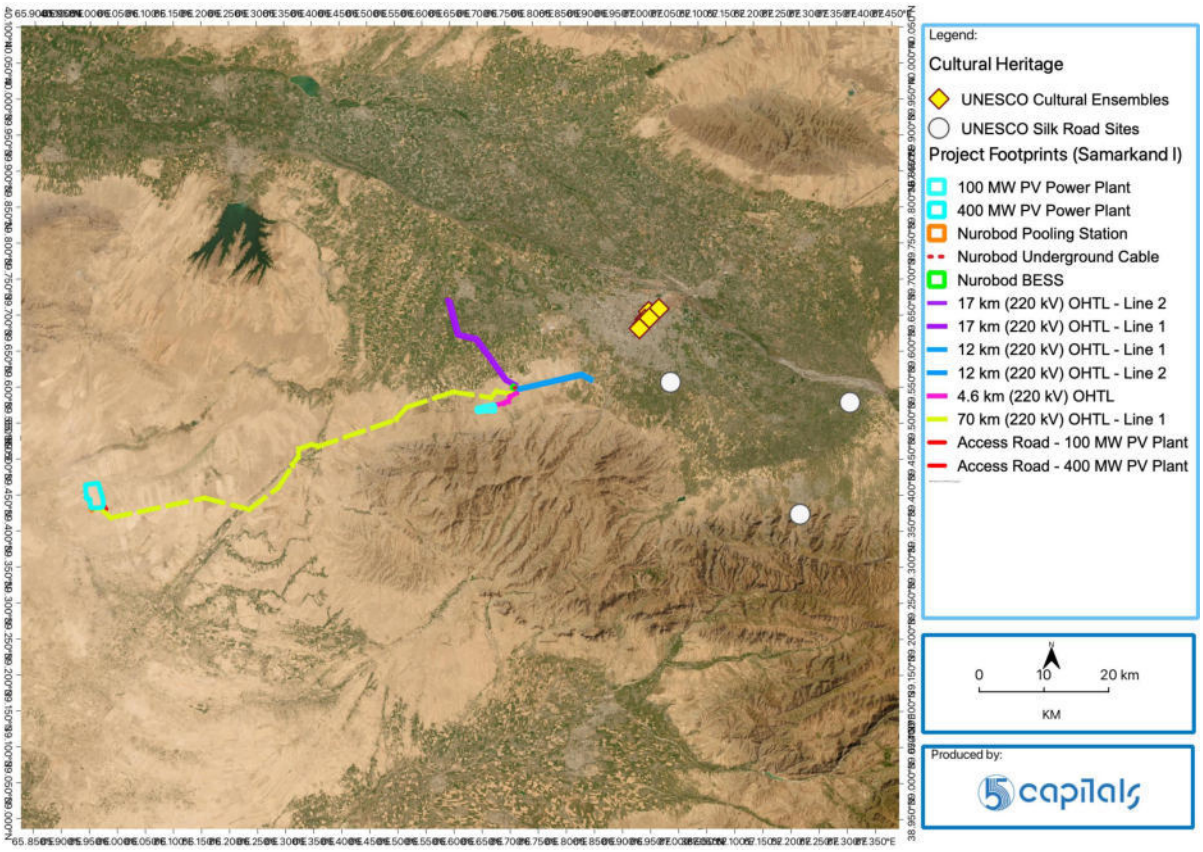


Figure 12-2 UNESCO world heritage sites in Samarkand Region, including cultural ensembles and silk road settlements

INTANGIBLE CULTURAL HERITAGE

Beyond its internationally protected tangible cultural heritage reserve, Samarkand Region offers the following endemic forms of intangible cultural heritage:

- Askiya, a form of native folk art involving entertaining discourse and satire.
- Bukhshi, a poetic, musical story-telling tradition unique to Uzbekistan.
- Ceramic arts of Uzbekistan, centred on the production of artistic and utility clay pottery.
- Palov, a traditional household dish that is prepared for festive events and ceremonies.

12.2.2 Administration of cultural heritage

The Ministry of Culture is the national authority with overarching responsibility for the designation and preservation of tangible and intangible cultural heritage in Uzbekistan. It is also overall accountable for relevant performance on obligations stipulated in international conventions on the protection of cultural heritage to which Uzbekistan is party, and for the coordination of scientific research around existing and prospective tangible cultural heritage

sites. Subordinate to the Ministry of Culture is the Cultural Heritage Agency, which is entrusted with management of tangible and intangible cultural heritage in line with relevant legal requirements, including the designation and registration of tangible and intangible cultural, as well as undertaking compliance monitoring. The authority charged with undertaking specialized surveys for the identification of new cultural heritage sites is the national Institute of Archaeology.

The protection of tangible cultural heritage is implemented by means proportional to the value or uniqueness of specific heritage resources. In-situ preservation with mandatory setbacks is the common management approach applied for historical sites characterized by grand structures and/or remnant architecture.

12.2.3 Regulatory directives and feedback

Resident offices of the Cultural Heritage Agency and the Institute of Archaeology in Samarkand Region were engaged to gather pre-existing information on tangible cultural heritage and recommendations with regard to potentially applicable requirements for the preservation of established or undiscovered cultural heritage resources. Several inventoried archaeological and historical sites within the project-affected districts were referenced over the course of consultations, however, it was further noted none of these sites (and their respective buffers) fall within the footprint of the planned project facilities.

The following table provides an overview of the key information and recommendations provided by resident experts from the Cultural Heritage Agency and Institute of Archaeology, in relation to cultural heritage within the project-affected districts and wider region.

Table 12-1 Information and technical feedback from cultural heritage management authorities consulted during the ESIA

REGIONAL AUTHORITY	INFORMATION ON CULTURAL HERITAGE	RECOMMENDATIONS
Cultural Heritage Agency – Samarkand Regional Office	• Numerous archaeological sites have been established within Samarkand Region as a whole. • About 21 cultural monuments are located in and around Nurobod District. Most of these are monuments, which include Kultepa, Sazagon, Boisaritepa, Tepakultepa, Ibrohimota, and Imomtepa. None of these monuments (and their protective setbacks) are located within the project sites, and no specific safeguards are required with respect to these resources.	• A precautionary archaeological survey should be carried out within the project sites, by the Institute of Archaeology, ahead of construction works. • In line with legal requirements, the Project Developer and EPC Contractor should obtain a permit from the resident Cultural Heritage Office, prior to the start of any construction works within land earmarked for the Project. • As numerous tangible cultural heritage assets are located within Samarkand Region and Samarkand District in particular,

Regional Authority	Information on cultural heritage	Recommendations
	• The 21 above-mentioned monuments are classed as archaeological objects of national importance. No objects of international importance (e.g. UNESCO sites) have been designated within this range. • Some of the protected monuments and burial sites are of spiritual importance to their host communities. • No additional forms of intangible cultural heritage exist within the project-affected districts in Samarkand (further to those referenced in the sections above).	construction works should be undertaken with the supervision of a Government Archaeologist. Protocols must be established for the management of incidental archaeological finds, and construction workers should receive relevant inductions.

12.2.4 Pre-construction survey

At the time of ESIA scoping, no established cultural heritage sites were identified within the project sites. Nevertheless, due to the prevalence of ancient and medieval sites in Uzbekistan, archaeological due diligence is a mandatory requirement for major development projects, prior to construction. While some tracts of land within urbanized areas have been surveyed as part of earlier development projects and exploration campaigns, the vast remainder of lands within developing parts of the country have not been explored.

At the start of ESIA-stage consultations, the Cultural Heritage Agency and Institute of Archaeology commissioned an independent pre-construction archaeological survey to ensure the absence of significant, undiscovered archaeological resources within the project sites. These surveys entailed specialized scans and intrusive investigations within the 100 MW PV power plant, 400 MW PV power plant, Nurobod BESS, and the OTL (4.9-km, 11-km, 19-km and 70-km corridor) sites.

The expert surveys concluded that no critical or non-replicable cultural heritage resources were encountered within the footprint of the PV power plant and BESS sites. The sites are therefore suitable for further development.

12.3 Receptors

The following table provides an overview of E&S impact receptors in the context of cultural heritage impacts within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is provided for each relevant receptor.

Table 12-2 E&S impact receptors – Cultural heritage

RECEPTOR	SENSITIVITY/ VALUE	JUSTIFICATION
Tangible cultural heritage resources	High	At the time of this assessment, no tangible cultural heritage resources were identified within the project sites. Nevertheless, numerous historical and archaeological sites of national and international importance are located within Samarkand Region, some dating as far back as 800 BCE to 1400 CE. Undiscovered (potentially resident) cultural heritage resources are potentially important considering the multitude of non-replicable and critical historical structures and artifacts in the affected regions, and are potentially vulnerable to structural damage, given their age.
Local customs	High	Local customs and cultural milieu are regarded as having a potentially high value to local communities within the project districts.

12.4 Potential Impacts and Management Measures

12.4.1 Construction phase

12.4.1.1 Degradation and/ or loss of undiscovered tangible cultural heritage resources

The project sites are located in Samarkand Region, where an array of archaeological and historical sites have been established for protection tangible cultural heritage, including prominent World Heritage Sites. Some of the physical heritage includes non-replicable and critical archaeological sites and monumental historical structures (i.e., ancient city ruins and monuments), for which the sole means of preservation are avoidance or in-situ restoration. Existing cultural heritage sites and their buffers in the region are legally protected.

While identified several sites of archaeological importance are located a sufficient distance away from the project sites and access routes, contingencies such as the off-roading of construction vehicles and trespassing can result in the destruction of legally protected cultural property. Additionally, there is potential for damage to undiscovered (buried) tangible heritage resources within the Project's construction footprint. Ground-disturbing construction activities such as earthworks, compaction, drilling, and the movement of heavy construction

machinery, can cause irreparable damage, or complete destruction and loss of potentially resident cultural heritage objects.

In the event that earthworks are carried out with due vigilance, inadvertent damage to high-value heritage resources can also occur from attempts to relocate movable heritage objects within working areas, in a manner that is not consistent with expert approaches and preservation requirements.

The major significance of potentially destructive impacts on tangible cultural heritage can be reduced to a minor residual status, with the application of multiple compulsory safeguards, including the development and implementation of a bespoke Chance-Find Procedure within construction zones, relevant trainings and expert oversight for construction workers, particularly over the course of earthworks, and immediate reporting of incidental finds to resident authorities.

12.4.1.2 Disruption of local customs and intangible cultural heritage

The vast majority of residents with the project-affected communities are Uzbek, and intangible heritage prevails within the project-affected communities, in form of cookery, arts, and folklore. The local population is also largely Islamic, and conservative cultural values are commonplace across the different regions. Ethnic minorities including Tajik, Turkmen, Kazakh, Russian, Korean, and gypsy peoples also uphold aspects of their native culture, despite their historical assimilation into local communities.

The influx of a considerably large migrant workforce into the Project's host communities poses the risk of cultural fissures, and the disruption of local cultural milieu. The cultural distance between foreign workers and local residents, and a potentially lacking regard to social customs within host communities can create tensions and conflict, particularly within rural and peri-urban communities offering rental accommodation to foreign construction workers.

Moreover, cultural influences from the interaction of local residents with foreign workers can erode cultural values and customs ingrained in long-standing traditions within host communities and thereby undermine their existing cohesion and cultural identity. This impact can be particularly significant within host communities comprising ethnic minorities.

Table 12-3 Overview of potential impacts relating to cultural heritage during construction

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
Degradation and/ or loss of tangible cultural heritage resources	Project sites and access roads, particularly those within Samarkand Region	Major	Undiscovered tangible cultural heritage resources	High	**Major**	**Minor/ Moderate**
Disruption of local customs and intangible cultural heritage	Project-affected communities, and wider districts within Samarkand Region	Moderate	Local customs	High	**Moderate/ Major**	**Minor/ Moderate**

Impact Avoidance and Mitigation Measures

Degradation and/ or loss of tangible cultural heritage resources

- Construction works including land clearance, excavation, grading, and movement of heavy machinery will be restricted to demarcated construction zones within the project sites and designated transit corridors.
- Induction trainings for onboarding the EPC Contractor's construction workforce will include familiarization with any cultural heritage sites located within 1 kilometre of the project sites, potential impacts on undiscovered tangible cultural heritage, related avoidance and mitigation measures, application of the Chance Find Procedure, and designated archaeological staff.
- Refresher trainings and toolbox talks for construction workers will include updated or reiterated information on measures to protect and preserve potentially resident (undiscovered) tangible cultural heritage resources and expert staff dedicated to the management archaeological chance finds.
- The EPC Contractor's code of conduct and trainings on protection cultural heritage will include stringent prohibition of vandalism, theft, misappropriation, and negligent disturbance of suspected chance finds, in violation of the archaeological Chance Find Procedure.
- An archaeological 'Chance Find Procedure' will be developed for construction works within the BESS site.
- The Chance Find Procedure will include a (i) generic guide for the identification of cultural heritage finds, (ii) requirement for work stoppage in the event of chance finds, (iii) protocols for temporary demarcation and avoidance of further disturbance of chance finds, (iv) notification of designated archaeological experts, (v) watching brief for in-situ protection and/or subsequent expert extraction of cultural heritage finds for off-site preservation, (vi) increased vigilance and expert supervision upon confirmation of archaeological chance finds, and (vii) related reporting requirements.
- Pre-construction engagement with the Institute of Archaeology and the Cultural Heritage Agency will be implemented for prior approval of the Chance Find Procedure.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• A designated archaeologist from the Institute of Archaeology will be engaged for an archaeological watching brief (for the duration of construction works) and first response to the identification of potential chance finds. • Construction zones and working areas will be demarcated using temporary fence walls and barricading. • All construction activities will be restricted to demarcated construction zones within the project sites and designated transit corridors. • Stockpiling zones and laydown areas outside of the main project sites (e.g., along the interconnection cable route) will be clearly demarcated to increase the visibility of designated working areas. • A traffic study will be carried out along transit corridors to be used for the transportation of abnormal loads to determine sufficient clearance. • The Traffic Management Plan will include measures to ensure that the movement of project vehicles and machinery is limited to dedicated access roads and construction sites, and off-roading will be prohibited. • Local communities based around the project sites and competent authorities will be familiarized with the Project's community GRM and other dedicated communication channels, to enable the collection of grievances and directives pertaining to tangible cultural heritage resources on platforms that are accessible to all constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse, and choice of confidentiality. **Disruption of local customs and intangible cultural heritage** • Induction trainings for onboarding the EPC Contractor's workers (particularly foreign labourers) will include familiarization with any forms of intangible cultural heritage and customs prevalent within the project-affected communities and the country at large, and highlight the importance of cultural sensitivity (i.e., cognizance and observance of local culture within host communities). • A project-level code of conduct will include stipulations regarding respect for local customs, religious values, and cultural milieu of project-affected communities. The code of conduct will further underscore zero-tolerance for inappropriate and unlawful behaviour within host communities, with a clear set of disciplinary procedures and penal measures for non-compliance. • Local recruitment will be leveraged to ensure peer-led awareness creation around local customs and any prevalent forms of intangible cultural heritage with project-affected communities. • Dedicated residential facilities will be used for accommodating the Project's construction workforce, to the extent feasible. • An Influx Management Plan will be instituted to ensure the implementation of the above safeguards. • Construction workers will operate within the project sites, during working hours (in accordance with the Influx Management Plan). • Dedicated CLOs will perform sensitization engagements within the Project's host communities to create local awareness around the influx of foreign workers, potential cultural differences, and remedial initiatives to prevent and mitigate adverse impacts on local cultural sensitivities.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to adverse cultural influences on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse, and choice of confidentiality.						

12.4.1 Operation phase

Impacts on cultural heritage are not expected to occur in the Project's operational phase and are therefore excluded from the assessment.

12.4.2 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, potential impacts relating to cultural heritage will be the degradation and/ or loss of tangible cultural heritage resources.

For the avoidance and mitigation of these impacts, relevant impact management measures specified in Section 12.4.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

12.5 Monitoring Requirements

Table 12-4 below provides an overview of the key monitoring arrangements for evaluating performance against applicable standards relating to cultural heritage, in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 12-4 Monitoring arrangements for impacts and preventative and mitigation measures relating to cultural heritage

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Degradation and/ or loss of tangible cultural heritage resources	Percentage of construction (earthworks) workers who have received induction trainings in local tangible cultural heritage and the archaeological Chance Find Procedure	- 100% of construction (earthworks) workers in the identification of tangible cultural heritage resources and the archaeological Chance Finds Procedure	- HSSE Training Report	Monthly	- Designated Archaeologist (from Institute of Archaeology) - EPC Contractor HSSE Trainer
	Vigilance of workers to potential cultural chance finds during earthworks	- Daily toolbox talks and on-site supervision for workers engaged in earthworks	- Earthworks sites	Daily during earthworks	- Designated Archaeologist EPC Contractor HSSE Trainer
Disruption of local customs and intangible cultural heritage	Grievances concerning project-related disruption of local customs intangible cultural heritage	- All related grievances are closed out within the shortest practicable duration	- Community Grievance Log	Ongoing	- EPC Contractor CLOs

13 TRAFFIC AND TRANSPORTATION

13.1 Legal Requirements and Standards

13.1.1 National laws and regulations

13.1.1.1 Law on Traffic Safety No. 818-I (1999, amended in 2015)

The law provides for the development of traffic infrastructure, operational traffic management, standards for transit vehicles, related licensing, and other aspects of transportation safety.

13.1.1.2 Decree of Cabinet of Ministers No. 342 (2011) – Regulations on road safety during transportation of large and heavy loads by road transport

This law provides for the transportation of abnormal loads and operation of Heavy Goods Vehicles (HGVs) on public roads within Uzbekistan. The law includes technical standards for HGVs involved in haulage, to ensure the safety of transportation personnel and the public, and the avoidance of transportation-related environmental contingencies.

13.1.1.3 Other legislation

- Decree of Ministry of Transport and State Customs Committee of The Republic of Uzbekistan No.6 (2019) – Criteria and procedure for determining international road transportation of loads.
- Decree of Cabinet of Ministers No. 213 (2014) – Regulations on transportation of loads by road in the Republic of Uzbekistan (Annex to).

13.1.2 Lender requirements

13.1.2.1 IFC and EPFIs

The assessment will be undertaken with due consideration of the recommendations set out within the IFC/World Bank General EHS Guidelines (2007) Section 3.4 Traffic Safety, within Section 3: Community Health and Safety.

13.2 Baseline Conditions

13.2.1 Transport infrastructure

Uzbekistan is a land-locked country with well-developed inland transportation infrastructural and logistical hubs based on multi-modal transit routes for the import, export, and country-wide freight. This infrastructure includes dry ports connecting to the international transport

corridors linked to major seaports in China, Russia, Iran, India, and Western Europe. The corridors include high-capacity railways, and a domestic network of highways measuring a total length of 42,500 km. A total of eight major airports operate within the country, including the Tashkent International Airport located within Tashkent City.

Electronic equipment for the development of the PV power plants, BESS facilities and OTLs will be sourced primarily from China. Construction material and equipment will be delivered to the project sites by road transit.

13.2.2 Road transit corridors

13.2.2.1 Transit from China to Kazakhstan

The Asian Highway 5 (AH5) is the major international roadway connecting Uzbekistan to China. The AH5 runs from the border town of Khorgos in Xinjiang Region, China through Kazakhstan, a nested portion of Kygystan (i.e., between Kazakhstan's border villages of Korday and Chaldovar), Uzbekistan and Turkmenistan. Chinese-sourced project freight will be moved along this highway up to Uzbekistan.

13.2.2.2 Transit From Kazakhstan to Samarkand

The M39 is a major highway connecting the north-eastern extremity of Uzbekistan and Tashkent City to the country's southern border with Afghanistan. From the border village of Jibek Joly in Kazakhstan, the M39 highway will be used for transit towards Samarkand City.

Figure 13-1 provides an overview of the road network that will be used for transportation during construction. The total length of the project traffic corridor from the Kazakhstan border point to the project sites in Nurobod and Pastdargom districts ranges from 380 to 460 km.

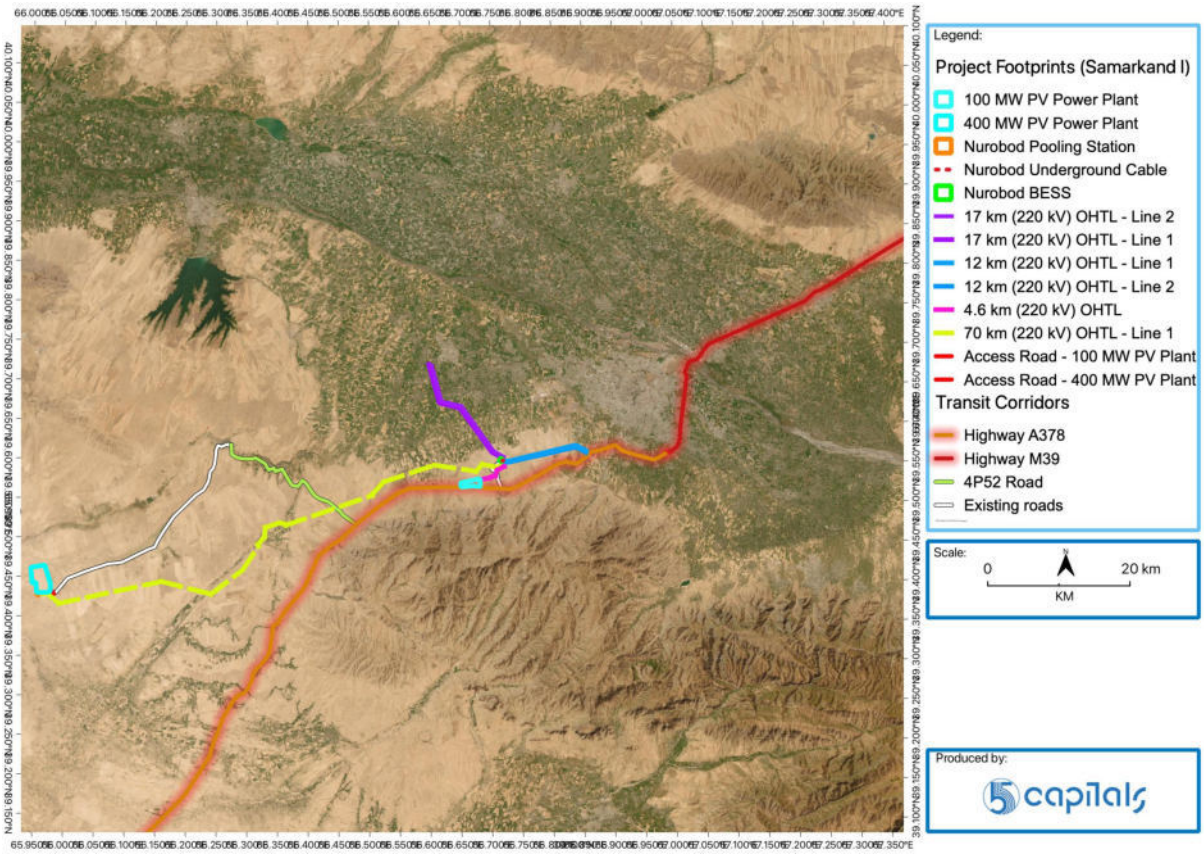


Figure 13-1 Highways and roads connecting the project site to logistical hubs in Tashkent Region

13.2.2.3 Access to 100 MW PV power plant site

From Samarkand City, the A-378 road branching out of the M39 highway will be used for transportation towards Nurobod District. A 70-metre road will connect the A-378 highway to the 100 MW PV power plant site, to enable access for project traffic during construction and operation. A network of service roads will also be established within the site perimeter.

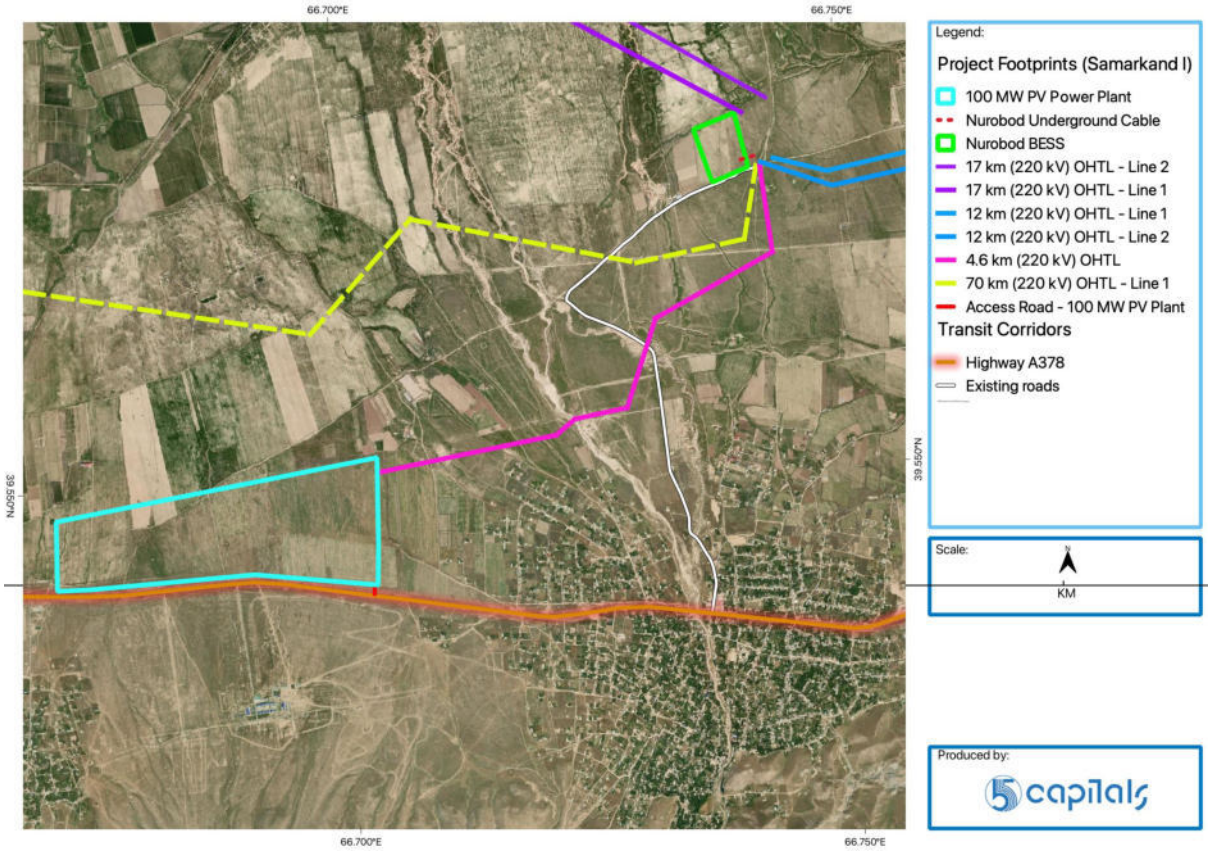
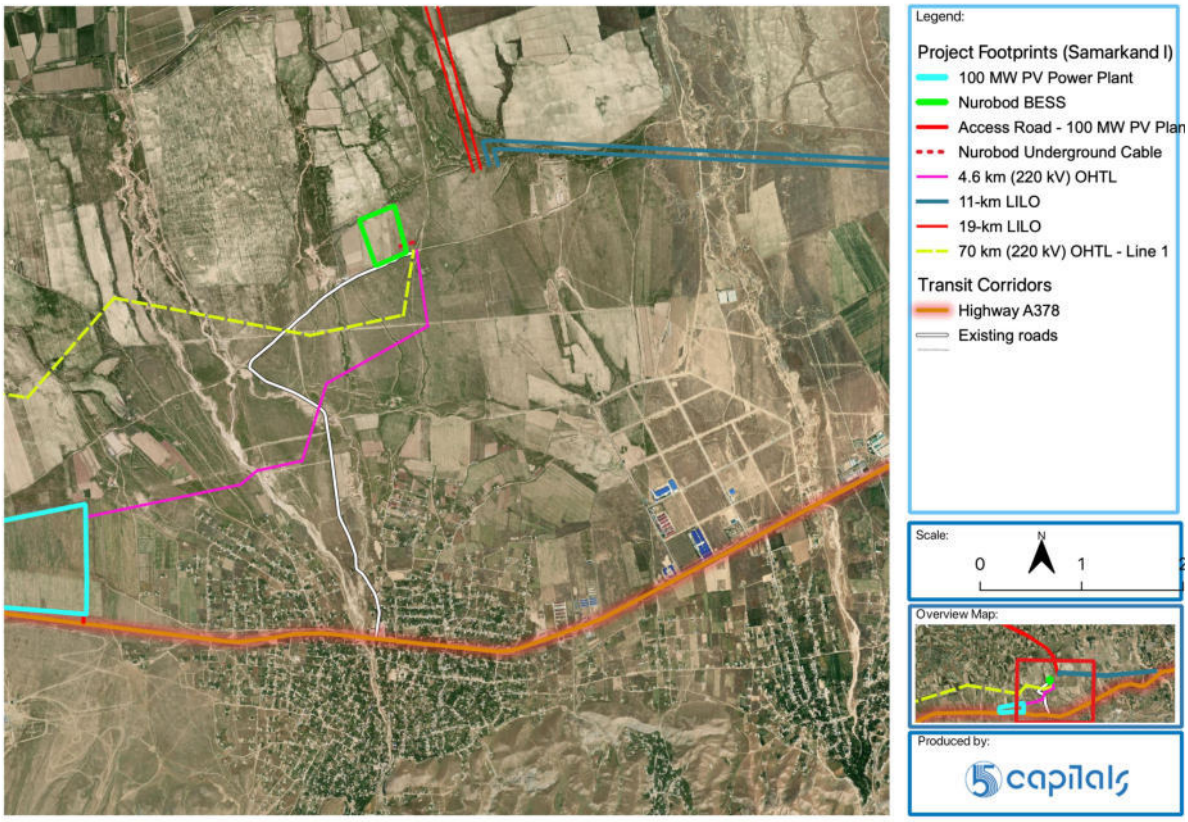


Figure 13-2 Highways, feeder roads and access roads connecting to the Nurobod BESS site

13.2.2.4 Access to the Nurobod BESS site

An existing, 5-km long feeder road connecting the A-378 highway to Pastdargom District will provide access to the Nurobod BESS site during construction and operation. A limited junction will be constructed to link this road with the internal service road network.



13.2.2.5 Access to 400 MW PV power plant and pooling station sites

The transportation route towards the 400 MW PV power plant includes the 4P52 feeder road branching out of the A-378 highway, and a smaller municipal road ranging between Nurobod District Centre and the project sites.

A 696-metre access road will be constructed to link the municipal road with the site, for project traffic during construction and operation. The road will connect to the entry/exit gate, and the interior service road network.

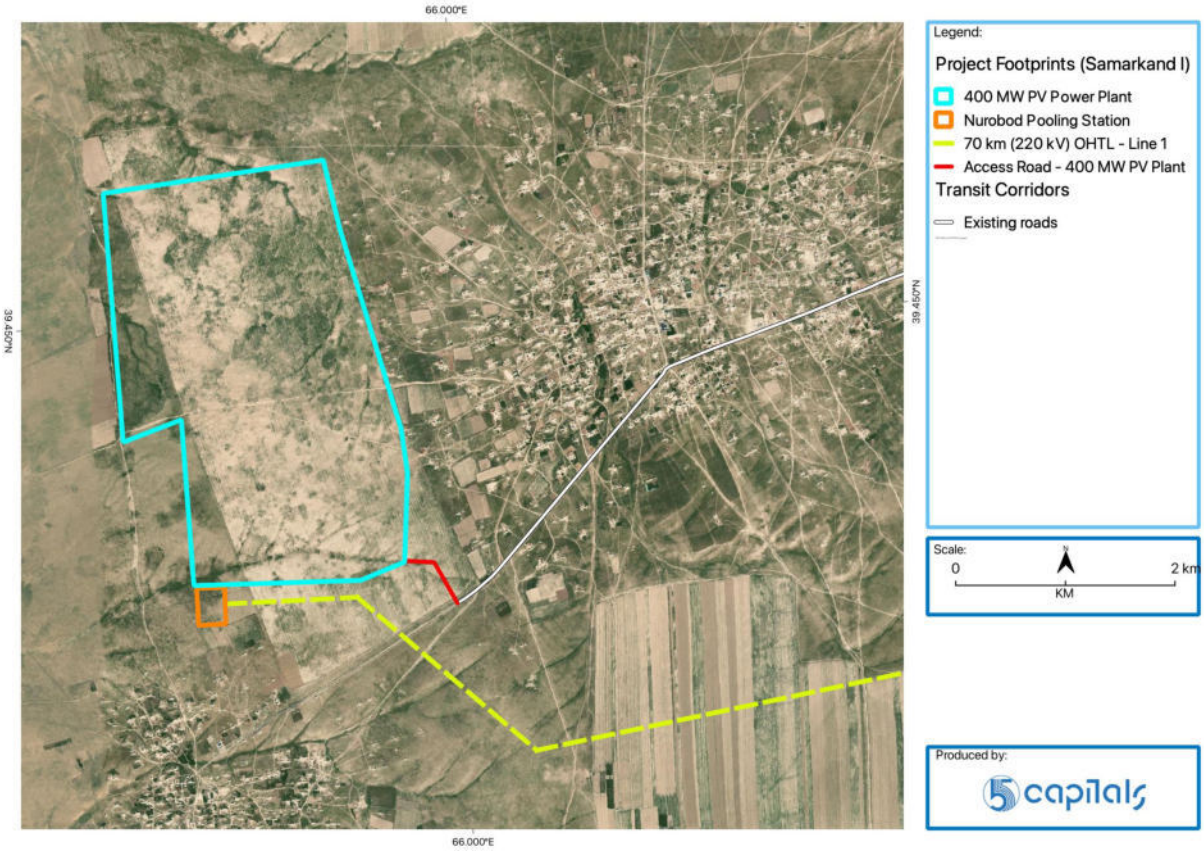


Figure 13-3 Highways, feeder roads and access roads connecting to the project sites

13.2.2.6 4.9-km, 11-km, 19-km and 70-km OTLs

The A-378 highway and multiple existing feeder roads will be utilized for access to the 4.9-km, 11-km, 19-km, and 70-km OTL sites.

13.2.3 Traffic conditions at nearby junctions

13.2.3.1 100 MW PV power plant site

The 100 MW PV plant site is located in a rural location situated alongside the A-378 highway, which links Samarkand Region to Qashqadaryo Region in the country's south-western reaches. The tarmac, dual carriageway is in good condition, as shown in Figure 13-4 below.

Figure 13-4 A-378 highway nearby the 100 MW PV power plant site

A rapid traffic study was conducted as part of the ESIA, to evaluate baseline traffic conditions along the A-378 highway. The survey was conducted on 2 March 2024, to capture traffic patterns between 9 am and 7pm. Traffic volumes were assessed by disaggregated counts for several motor vehicle categories (i.e., heavy to light duty vehicles).

Figure 13-5 below depicts the variation in traffic volumes across the survey duration.

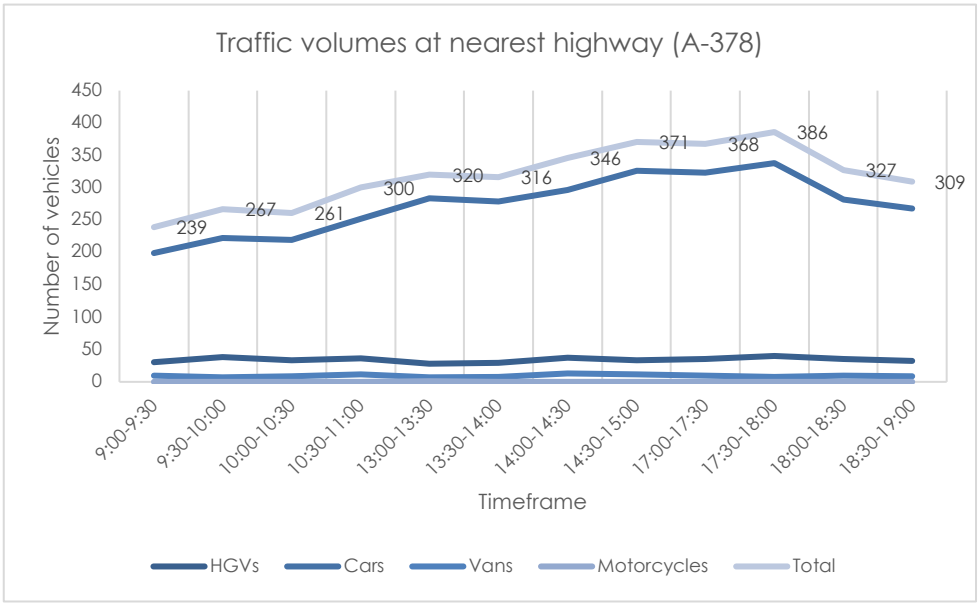


Figure 13-5 Variation in traffic volumes along the A-378 highway section nearby the 100 MW PV plant site

The survey indicated generally moderate traffic volumes along the A-378 highway section nearby the 100 MW PV power plant site, with a mean hourly traffic rate of 317 vehicles. Motor vehicle traffic was fairly steady, peaking at 6pm. HGVs accounted for about 11% of the traffic volume recorded during the survey.

A low frequency of vehicular and pedestrian transit was recorded along the existing tracks within the 100 MW PV power plant site, which is attributable to little to no active land-use within the site and the rural context of the wider project area.

13.2.3.2 Nurobod BESS site

An existing municipal track runs along the southern boundary of the Nurobod BESS site. Motor vehicle and pedestrian traffic along this track was occasional, due to the idle landscape in and around the project site, and smallholder activity further out from the site. Vehicle movements are largely associated with the quarry sites west of the site, farming premises north-east of the site, and the industrial cluster south-east of the site.

Figure 13-6 Dirt track alongside the Nurobod BESS site

A quantitative traffic assessment was not conducted along the track given the insignificant traffic volumes recorded during field reconnaissance and subsequent site walkovers in this location.

13.2.3.3 400 MW PV power plant and pooling station sites

The 400 MW PV plant and pooling station sites are located in a rural locale served by a municipal road connecting the neighbouring settlements to Nurobod District Center. The asphalted, single carriageway is in good condition, as shown in the figure below.


Figure 13-7 Municipal road nearby the 400 MW PV power plant and pooling station sites

A rapid traffic count was conducted using methods described in Section 13.2.3.1 above, to evaluate baseline traffic conditions along the municipal road nearby the project sites.

Figure 13-8 Variation in traffic volumes along the municipal road section nearby the 400 MW PV plant and pooling station sites below depicts the variation in traffic volumes across the survey duration.

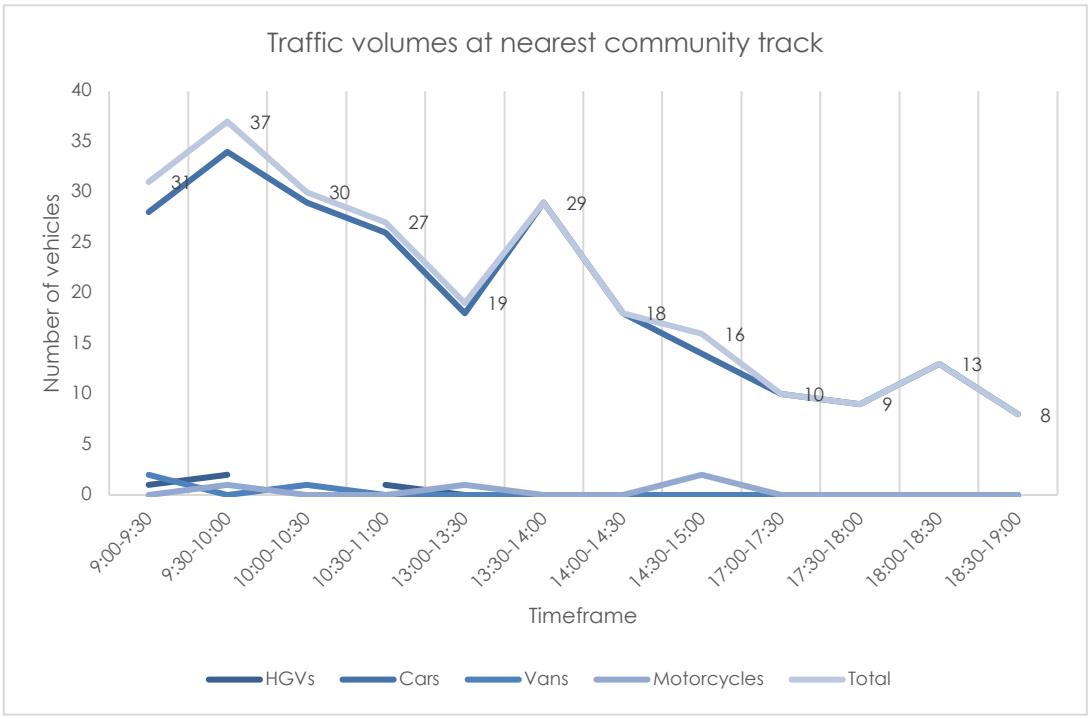


Figure 13-8 Variation in traffic volumes along the municipal road section nearby the 400 MW PV plant and pooling station sites

The survey indicated generally low traffic volumes along the municipal road section nearby the 400 MW PV power plant and pooling station sites, with a mean hourly traffic rate of 21 vehicles. Motor vehicle traffic varied considerably, peaking between 9 and 10 am. HGVs accounted for about 2% of the traffic volume recorded during the survey.

Limited pastoral movement was recorded along existing tracks within the 400 MW PV power plant site, although herding and related stock routes are widespread within the site.

13.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential impacts relating to traffic and transportation within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is provided for each relevant receptor.

Table 13-1 E&S impact receptors – Traffic and transportation

RECEPTOR	SENSITIVITY	JUSTIFICATION
Households and establishments within project-affected communities	Low	Households utilizing existing communal and feeder roads are moderately sensitive to project-related vehicular traffic and related time losses, considering the well-developed network of community roads and foot paths nearby the PV power plant and BESS sites.
Commercial and industrial establishments within project-affected communities	Medium	Commercial and industrial establishments utilizing existing communal and feeder roads are moderately vulnerable to project-related vehicular traffic and related service interruptions, considering the rural to peri-urban context of the project locales, navigability of dirt tracks, and the absence of notable (pre-project) traffic bottlenecks.

13.4 Potential Impacts and Management Measures

13.4.1 Construction phase

13.4.1.1 Increased traffic congestion along public roads

The Project's construction phase is expected to heighten traffic volumes along the entire project transit corridor. Construction traffic will peak during the mobilization period, due to the frequency of materials and equipment transfer. The absence of on-site construction labour camps will also necessitate daily commutes for construction workers.

The surge in project-related traffic may result in increased congestion along low-tier roadways leading towards dedicated access roads. Disruptive congestion may arise along relevant feeder roads and unpaved community tracks in particular, considering the following constraints:

- Speed restrictions and pedestrian crossings close to public places
- Number of transit nodes (i.e., junctions, intersections)
- Public transport stations (e.g., communal bus and taxi stops)
- Relatively low capacity
- Limited navigability of dirt tracks (in the wet season)

In addition, maintenance works along public roads along the Project's transit corridor may compound traffic congestion with temporary roadblocks, road closures and diversions.

Increases traffic congestion and prolonged travel times resulting from project traffic can disrupt local transportation patterns, impede timely access to workplaces and other essential destinations, lead to economic and time losses within affected communities.

The residual significance of this impact can be reduced to a minor magnitude provide appropriate project transit controls are established to alleviate the added pressure on community and feeder roads connecting to dedicated access roads, over the course of construction.

Table 13-2 Overview of potential impacts relating to traffic and transportation during construction

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
Increased traffic congestion along public roads	Feeder and community roads connecting to project-dedicated access roads	Moderate Moderate	Households and establishments within project-affected communities	Medium	**Moderate**	**Minor**
			Commercial and industrial establishments within project-affected communities	Medium	**Moderate**	**Minor**

Impact Avoidance and Mitigation Measures

Increased traffic congestion along public roads

- A traffic study will be undertaken prior to mobilization for construction to identify transportation constraints including traffic congestion hotspots and inadequate road conditions.
- Follow-up engagement with transportation and traffic safety authorities (i.e., district khokimiyats, Ministry of Transportation, traffic police) will be undertaken as part of H&S risk assessments in relation to project traffic and the development of related safeguards, including traffic accident emergency response plans.
- Dedicated access roads will be established within the Project's transit corridor to isolate project traffic, to the extent feasible.
- Suitable by-passes, traffic control signage and personnel (i.e., flagmen etc.) will be established to divert vehicular and pedestrian traffic in the event of upgrading and/or maintenance works along existing public roads that will be utilized for access to the project sites, in consultation with relevant local authorities (i.e., regional and district khokimiyats, road maintenance agencies).
- Project traffic will be organized to avoid peak traffic hours and traffic congestion hotspots to the extent feasible, in consultation with relevant local authorities.
- Transit service for construction labour will include staff buses, to curb the volume and frequency of project traffic.
- Project logistics will be implemented to ensure convoys of construction vehicles (and Heavy Goods Vehicles in particular) are dispatched with maximal load to minimize the number of consignments/ delivery trips to the project sites.
- The parking of project vehicles will be restricted to designated parking bays within the project sites.
- A vehicle breakdown response plan will be developed as part of the Traffic Management Plan, to ensure prompt transposition or towing of immobile vehicles from public and access roads.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Permits for the haulage of bulky and heavy cargo or materials will be obtained from the regional highway administration. • Permits for any transportation of cargo on roads and highways, a relevant permit will be acquired from the State Road Safety Service. • A Traffic Management Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented.						

13.4.2 Operational phase

Significant impacts on traffic and transportation are not expected to occur in the Project's operational phase and are therefore excluded from the assessment.

13.4.3 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, potential impacts relating to traffic and transportation will be similar to those associated with the construction phase.

For the avoidance and mitigation of these impacts, relevant impact management measures specified in Section 13.4.1.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

13.5 Monitoring Requirements

Table 13-3 below provides an overview of the key monitoring arrangements for evaluating performance against applicable standards relating to traffic and transportation, in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 13-3 Monitoring arrangements for impacts and preventative and mitigation measures relating to traffic and transportation

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Increased traffic congestion along public roads	Installation of traffic signage and signposts along all project access roads	- Traffic signage and signposts have been installed along all project access roads	- All project access roads	Weekly during mobilization	- EPC Contractor H&S Officer
	Grievances concerning project-related vehicular traffic along public roads	- All related grievances are closed out within the shortest practicable duration	- Community Grievance Log	Ongoing	- EPC Contractor CLOs

14 SOCIOECONOMICS

14.1 Legal Requirements and Standards

14.1.1 National laws and regulations

14.1.1.1 The Constitution of the Republic of Uzbekistan

The Constitution of Uzbekistan establishes the following fundamental legalities in relation to rights, liberties and duties pertaining to land access, livelihoods, socioeconomic infrastructure, social security, and general civil welfare.

SOCIAL INFRASTRUCTURE

- Articles 48, 49 and 50 provide that all residents have (i) the right to health and qualified medical care, (ii) the right to education, and (iii) the right to a favourable environment and reliable information on its condition.

LAND TENURE

- Article 41 affirms that everyone shall have the right to own property.
- Article 47 states that everyone shall have the right to housing, adding "In the cases and in the manner prescribed by law, the owner, deprived of his or her home, shall be provided with preliminary and equivalent compensation for the cost of housing and the losses incurred by him or her".
- Article 65 follows-up with "Equality and legal protection of all forms of property shall be ensured in Uzbekistan, private property shall be inviolable".

LIVELIHOODS AND POVERTY ALLEVIATION

- Article 43 requires the Government to take measures to ensure employment of citizens, to protect against unemployment and to reduce poverty.
- Article 57 highlights "The Government shall take the measures to improve the quality of life of vulnerable sections of the population, to enable this demographic to fully participate in social and public life and to enhance their ability to provide for their necessities of life independently.
- Article 67 states that entrepreneurs shall, in accordance with the law, have the right to conduct any livelihood/ business activity and choose its strategy independently.

HUMAN RIGHTS

- Article 4 states "The Republic of Uzbekistan shall ensure a respectful attitude toward the languages, customs and traditions of all nationalities and ethnic groups living on its territory and create the conditions necessary for their development".

- Article 19 states that all citizens of Uzbekistan shall have equal rights and freedoms, and shall be equal before the law, without discrimination by sex, race, nationality, language, religion, social origin, convictions and social status.
- Articles 25 and 26 affirm that the right to life is an inalienable right of every human being and shall be protected by law, and that torture, violence or other cruel, inhuman, or degrading treatment or punishment is prohibited. Article 27 adds "No one may be arrested, detained, imprisoned, taken into custody or otherwise restricted in freedom except on lawful grounds".
- Article 34 highlights "The State bodies, organizations, citizens' self-governing bodies and their officials shall allow everyone access to documents, resolutions and other materials, relating to their rights and legitimate interests".
- Article 55 stipulates that everyone shall be guaranteed the right to have his/her case examined by a competent, independent, and impartial court within the time limits established by law in order to have his or her rights and freedoms restored.
- Article 58 states that women and men shall have equal rights.

14.1.1.2 The Land Code (1998, amended in 2022)

The Land Code provides the fundamental framework for the classification and administration of land in the Republic of Uzbekistan. It establishes the principles and requirements for the allocation, utilization, and protection of land. The Code also defines legal forms of individual and collective land tenure, as well as various land categories subject to reservation and conditional reallocation.

PROVISIONS ON LAND OWNERSHIP

- Article 16 provides that all land in the Republic of Uzbekistan is a national treasure which must be managed on a sustainable basis as it underpins the life, economy, and welfare of the population.
- Article 19 life-long inheritable rights to land can be granted for (i) running dekhan/peasant farms, (ii) individual residences, and (iii) collective gardening, exclusively.
- Article 24 species that short-term and long-term (up to 50 years) leasehold ownership of land can be granted for agricultural enterprises and foreign investment enterprises. The Article underscores the prohibition of sub-lease arrangements for land leased from the government.
- Article 28 provides that payment for leased land parcels must be made in form of an initial instalment at the time of the leasehold establishment, and through subsequent 'annual rent' payments. The value of rent for leased land is based on the quality, location and water supply context of a given land parcel.
- Article 33 species the two documents, which serve to demonstrate legal tenure of land parcels, namely (i) state certificate on the right to possess a land plot, (ii) land-use agreements.

- Articles 59 and 60 specify land use categories for land resources in urban and rural jurisdictions, namely (i) land for urban building, (ii) land for common use, (iii) agricultural land use, (iv) forestry land use, (v) industrial, transport, communication and military land use, (vi) restricted land use (for wildlife, hazardous, cultural and recreational land), (vi) water supply land, and (vii) reserve lands.

PROVISIONS FOR LAND EXPROPRIATION

- Article 37 states "Withdrawal of the land parcel or its part for state and public needs is carried out with the consent of the landowner or with the agreement of the land user and lessee following the decision of the towns, viloyats, or the Cabinet of Ministers of the Republic of Uzbekistan". The same article permits landowners with reasonable objection against expropriation of land parcels for public use to appeal the decision on withdrawal in the court of law.
- Article 41 states "Interference into the activity of owners of land parcels, landowners, land users, lessees and owners of households of state, economic and other authorities and organizations is forbidden, with the exception of cases of infringement of legislation by the owners of land parcels, landowners, land users and lessees". The Article mandates compensation or whole refunds for loss of or damage to land assets and lost profits, due to infringement of land rights held by landowners, land-users, and land leasers.
- Article 43 states "Transfer of lands of agricultural purpose into other categories of land for non-agricultural needs is allowed in exceptional cases in accordance with this law and other legislative acts".

LAND ADMINISTRATION FRAMEWORK

In addition, the Land Code establishes the institutional framework for the administration of land in Uzbekistan. The main governmental entities involved in the management of land resources include (but are not limited to):

- The Cabinet of Ministers of the Republic of Uzbekistan (as relevant)
- Council of Ministers of the Republic of Karakalpakstan (as relevant)
- State Assets Management Agency
- State Tax Committee
- Chamber of State Cadastres of the Cadastre Agency
- Regional Khokimiyats

14.1.1.3 The Civil Code (1996, amended in 2022)

The Civil Code (i) defines the legal status of participants in civil relations, (ii) sets out the basis and procedures for implementing the right to property, and (iii) regulates contractual obligations. It further establishes general rules for the withdrawal/ seizure of property, determination of the value of property, and the right to compensation, as well as conditions for deprivation of rights.

The code establishes that any person whose rights have been violated may demand full compensation for the losses caused, unless the law or the contract does not provide compensation for losses in a lower amount. Losses are understood to mean the expenses that the person whose rights have been violated, have produced or will have to produce in order to restore the violated right, the loss or damage to his/her property (real damage), as well as the income/revenue that the person would have received under normal conditions of civil activity if his/her rights had not been violated (lost profit).

- Article 8 provides that the rights to the property which are subject to the state registration shall arise upon the registration of the relevant rights to it, unless otherwise provided by law.
- According to Article 14, if the person has violated the law, revenue received as a result of this will be lost, the person whose rights were violated, has the right to demand compensation along with other losses, lost profits in the amount less than such profits.
- Article 83 defines immovable property as plots of land, subsoil, buildings, constructions, perennial plantings, and other property firmly connected with the land i.e. objects whose displacement without disproportionate damage to their purpose is impossible.
- Article 84 provides that the right of ownership and other real property rights, creation, transfer, restriction, and termination of these rights are subject to state registration. This means that without registration the right to real estate property does not enter into force.

14.1.1.4 Law No 781 on procedures for the withdrawal of land plots for public needs with compensation (2022)

The Law provides for the expropriation of privately held land for public needs. It specifies conditions and procedures for lawful land withdrawal and reallocation and sets out compensation entitlements for legally registered land rights holders.

PROVISIONS ON LAND WITHDRAWAL

- Article 4 specifies 'public need' developments that warrant land withdrawal and reallocation. One amongst these is construction (reconstruction) of roads and railways of republican and local significance, airports, airfields, air navigation facilities and aviation technical centres, railway transport facilities, bridges, subways, tunnels, engineering facilities and lines of the energy and communications system, space activities facilities, main pipelines, engineering — communication networks, irrigation, and melioration systems.
- Article 13 requires the initiator of a project warranting land expropriation to identify the most suitable land parcel (with the least pre-existing priority assets), where technically feasible alternatives are available, and present substantiating documents to the resident Regional Khokimiyat.

- Article 14 provides that "The initiative for the implementation of the project and the withdrawal of land plots in this regard, and relevant substantiating materials, shall be considered by the Cabinet of Ministers of the Republic of Uzbekistan. Based on the results of consideration by the Cabinet of Ministers of the Republic of Uzbekistan, a resolution shall be adopted on the implementation of the relevant project. This Resolution refers to the Presidential Resolution referenced in the project ESIA and LALRP reports.
- Article 14 further states "Where it becomes necessary to withdraw land plots in connection with the adoption by the Cabinet of Ministers of the Republic of Uzbekistan based on a resolution on the implementation of the project for public need, all obligations assigned by this Law shall be performed by the khokimiyat of the relevant region".

PROVISIONS ON VALUATION COMPENSATION FOR LAND WITHDRAWAL

- Article 23 specifies compensation entitlements for legal landholders subjected to land expropriation. These include compensation (at market value) for immovable property on affected land plots, compensation for plots under lifetime/ inheritable ownership, compensation for perennial plantations, and conditional compensation for certain transitional expenses leading up to the restoration of affected property and livelihoods.
- Articles 24 and 25 include several provisions to legalize both monetary and in-kind compensation for land and immovable assets lost on account of land expropriation. These provisions mandate the provision of replacement assets of equal value to those lost, and the delivery of compensation for immovable assets within 24 months from eviction.
- Article 25 states "Compensation to participants in common joint property shall be provided in accordance with their shares in the common property", adding "Compensation shall be provided within the terms specified in the agreement, but no later than six months from the date of conclusion of the agreement, and if the agreement provides for compensation in the form of monetary funds, then such compensation shall be provided no later than one month from the date of conclusion of the compensation agreement".
- Article 25 further provides that "The amount of monetary funds specified as compensation in agreements, from the date of conclusion of which one month has expired at the time of the conclusion of an agreement with all right holders within three months, shall be paid subject to indexation in proportion to inflation officially announced by the State Committee of the Republic of Uzbekistan on statistics in the relevant months".

PROVISIONS ON VALUATION OF AFFECTED PROPERTY

- Article 29 states "Assessment of objects of immovable property subject to demolition, including perennial plantings, as well as rights to a withdrawn land plot, shall be carried out before the start of the procedures for withdrawing the land plot or until the impact of the notice of withdrawal of the land plot on the value of the object of immovable property, as well as the rights to the withdrawn land plot.

- It adds "Assessment of the rights to the withdrawn land plot shall be carried out solely on the basis of documents confirming the state registration of rights to the land plot".

PROVISIONS ON VALUATION OF AFFECTED PROPERTY

The Law further provides for legal recourse for any grievances and objections arising out of land expropriation proceedings.

- Article 34 states "The Compensation Commissions shall preliminarily consider disputes related to the provision of compensation to the right holder in the pre-trial procedure", adding "A party that does not agree with the decision of the Compensation Commission may apply to the court in accordance with the procedure established by legislative acts".

14.1.1.5 Resolution of Cabinet Ministers No. 146 on measures to improve the procedures for granting land plots for urban development activities and other non-agricultural purposes (2011)

The Resolution establishes the procedures for determining the amount of compensation for loss of owned or leased land, and associated loss of agricultural and forestry production.

- Article 2 states "Compensation for losses of owners, users, tenants, and owners of land plots, including lost profits, as well as losses of agricultural and forestry production, is made by legal entities to whom the land plot is provided (allocated), or whose activities cause restriction of rights to the land plot and deterioration land quality.
- Article 5 establishes that "Losses of owners, users, tenants and owners of land plots are determined and compensated in full (including lost profits) in the following cases:

  (i) Seizure or temporary occupation of land.

  (ii) Restrictions on their rights to a land plot in connection with the establishment of security, sanitary and protection zones around facilities including (but not limited to) roads and powerlines.
- Article 6 mandates compensation for (i) privately owned land, (ii) immovable buildings/ structures, (iii) perennial plantings, and (iv) lost profit.
- Article 8 requires that the value of a land plot that is privately owned by legal entities and individuals is determined by appraisal organizations based on its market value at the time the decision to seize the land is made.
- Article 12 establishes that "the cost of lost profits of legal entities associated with the seizure of land plots with the demolition of buildings and structures located on it is determined based on the average annual net income for the last three years, taken from the financial activity report for the relevant years, and the period that is necessary for restoration of activities in a new location".
- Article 12 further provides that "The amount of lost profits from withdrawn agricultural land is determined as the average annual net income received from

the affected land area over the last three years, multiplied by four years which represent transitional time prior to full agricultural restoration on replacement land".

14.1.1.6 Other legislation

The following legislation provides for relevant socioeconomic aspects, including land access:

- Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998
- Urban Planning Code of the Republic of Uzbekistan (2021)
- Presidential Decree No. UP-5495 on measures on cardinal improvement of investment climate in the republic of Uzbekistan
- Resolution of the Cabinet of Ministers No.146 (2011), Appendix No. 2 to the regulation on the procedure for compensation for losses of landowners, users, tenants, and owners, as well as losses of agricultural and forestry production
- Resolution No. 911 of the Cabinet of Ministers (2019) on the procedure for withdrawal of land plots and compensation to owners of immovable property located on the land plot
- Law on Guarantees with Respect to Equal Rights and Opportunities for Women and Men (2019)

14.1.2 Lender requirements

14.1.2.1 ADB

The ADB Environmental Safeguards include the need to assess socio-economic project impacts in ESIA (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues).

Specifically, 'The borrower/client will identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.'

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

ADB SPS Safeguard Requirement on Involuntary Resettlement requires meaningful consultation to be undertaken with affected persons, their host communities and civil society for every project with the potential for involuntary resettlement impacts. Consultation should be undertaken in a manner commensurate with the impacts on affected communities paying particular attention to the need of disadvantaged or vulnerable groups. This Safeguard Requirement also requires the establishment of a grievance redress mechanism to receive and facilitate the resolution of concerns and grievances from affected persons about physical and

economic displacement and other project impacts, paying particular attention to the impacts on vulnerable groups.

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

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

14.1.2.2 IFC and EPFIs

Several of the IFC Performance Standards have elements that relate to socio-economics. Key requirements for the assessment of socio-economic impacts are outlined in PS1, whilst PS5 on Land Acquisition and Involuntary Resettlement has important requirements relating to projects that acquire land or will necessitate physical or economic displacement to PAPs, including compensatory measures.

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

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

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

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

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

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

14.2 Baseline Conditions

14.2.1 Socioeconomics – National and regional context

The following sections encapsulate the socioeconomic context of the project-affected regions and Uzbekistan at large, including the administrative set-up, high-level demographics, economic landscape, and social equity.

14.2.1.1 Geography

Uzbekistan is a double land-locked country bordered by Kazakhstan to the North and North-West, Kygystan to the East, Tajikistan to the South-East, Afghanistan and Turkmenistan to the South, and the Caspian Sea further out West. The country is situated between latitudes 37° and 46° N, and longitudes 56° and 74° E, with an area totalling 448,900 square kilometres.

The landscape is characterized by the Tian Shan and Turkistan Mountain ranges in the country's eastern extremities, the vast Kyzylkum desert and intermediate steppes. The country experiences and arid, continental climate. The Amu Drya and Syr Darya, which extend from the country's mountainous parts, down towards the Aral Sea, are integral to agricultural and

industrial production and the country's overall economy. About 5% of the land is covered by water, with arable land making up less than 10% of the total area.

Figure 14-1 Geophysical map of Uzbekistan

Uzbekistan has a total of 19 cities, most of which are located in the less arid eastern side of the country. Tashkent City is by far the most populous, while Samarkand City and Bukhara City hold third and seventh place in terms of population size.

14.2.1.2 Governmental hierarchy

The central Government of the Republic of Uzbekistan is led by the President, who is headed by the President, who chairs the highest body of the executive government, that is the Cabinet of Ministers. The Cabinet in turn administers a total of 21 ministries, 12 committees, 25 agencies, and 11 inspectorates.

In Uzbekistan, the hierarchy of local government authorities responsible for the coordination and oversight of development planning, delivery of social services and other administrative functions regional and district-level khokimiyats (administrative bodies). The district khokimiyats are subordinate to regional khokimiyats, which are mandated to undertake the overarching coordination and implementation of regional plans encompassing multiple districts, under central government authorities including the various sectoral ministries. The khokimiyats are constituted by multiple line departments, which are responsible for specialized management

within service domains such as land administration, agriculture, trade, industry, water resources, environmental protection, as well as social welfare.

Makhalla leadership units are self-governing organizations, which deliver on constitutional provisions for autonomy at the grass-roots level. Some makhalla leaders are appointed by the local government whereas others are elected by certain makhalla/ community groupings (such as local elders, women etc.). The main figures constituting makhalla-level administration include the following:

- **Makhalla chairperson** – Formal leaders appointed by district khokimiyat committees, who are also referred to as 'kengash'.
- **Aksaqals** – Informal leaders elected by an elderly local elite (i.e., group of senior traditional leaders).
- **Makhalla women's representative** – A matriarch who manages affairs and issues related to women's rights, interests, and welfare, often in both formal and informal capacities.

14.2.1.3 Population

The population of Uzbekistan grown steadily over the past decade and remains the highest within the Central Asian region. By 2023, the national population was estimated at 36,024,000 residents, of whom 18,128,000 were male and 17,896,000 were female.

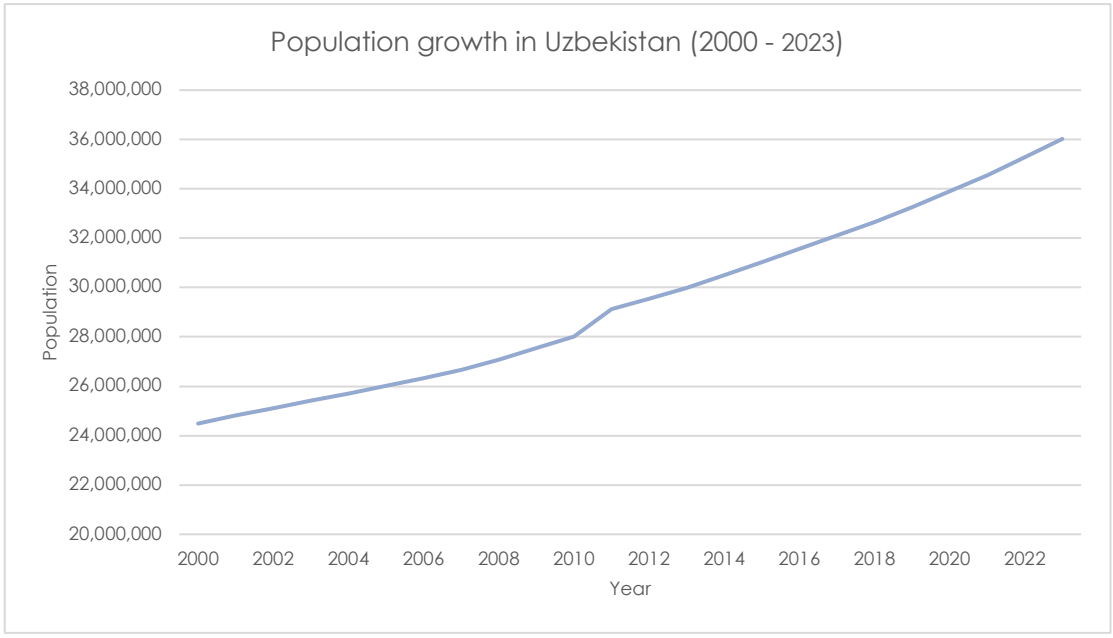


Figure 14-2 Growth rate of Uzbekistan's resident population

The table below presents an overview of the spatial size and population of each project-affected region. In the year 2023, Samarkand ranked as the second most populous region in Uzbekistan, with Tashkent Region retaining the country's largest resident population.

Table 14-1 Area and population of the project-affected regions

No.	Affected Region	Size (km^2)	Number of Districts	Population		
				Male	Female	Total
1	Samarkand	16,770	14	2,073,200	2,045,000	4,118,200

14.2.1.4 Economy

The growth of the national economy over the past two decades has paralleled the uptrend in the size of the national population. Since gaining independence from the Soviet Union in 1991, Uzbekistan has transitioned from a plan-based economy to a market-based economy. This shift has entailed the privatization and modernization of productive sectors, as well as the diversification of the economy.

In recent years, the country's annual GDP climb has averaged 8%, and by 2023, the Gross Domestic Product (GDP) of Uzbekistan reached USD 84.2 billion. The services sector was identified as the main contributor to the GDP, with industry coming second at a 26% contribution, and the agriculture ranking third at 24%.

Formerly, agriculture represented the economic mainstay of Uzbekistan, with the extensive exploitation of the Amu Darya and Syr Darya rivers and pastural lands constituting the surrounding steppe expanse, for irrigated cultivation and livestock farming respectively. With the marketization of the country's economy, private tenure of agricultural land has largely replaced collective agriculture. The expansion of industrial sector has reduced the economy's reliance on agrarian production, which still drives the majority of the country's rural economies.

The major crops produced in Uzbekistan for export include cotton, wheat, rice, and barley, however, fruits and vegetables constitute a sizeable share in exported produce. The local extractives industry, which centres on gold, uranium, copper, oil, and natural gas extraction, accounts for the large remainder of export revenues.

In 2023, Uzbekistan embarked on a strategy to achieve a high-end middle income country status by 2030, through the expansion of its industrial base, among other developments. This trajectory, coupled with continued population growth, will increase the local demand for energy. By 2023, Tashkent Region remained the leading power producer nationally, while Samarkand Region had the second lowest installed power capacity.

The economy of Samarkand Region has grown markedly in recent years, and notable expansion has been achieved within the sectors of agriculture, forestry and fisheries (2.8%),

industry (3.6%), construction (7.4%) and services (3.3%). The region is also endowed with a wealth of natural resources, mainly construction materials such as marble, granite, limestone, carbonate, and chalk. Local agriculture is dominated by cotton and cereal cultivation, wine production and sericulture. Metallurgic industry, food processing, textiles, and ceramics make up the region's leading industry sector. Substantial revenues are also generated within the region's vibrant tourism sector. In 2022, the GDP of Samarkand Region was UZS 74,115 billion, of which UZS 40,000 was generated within the agricultural sector.

14.2.1.5 Ethnicity and cultural fabric

The predominant ethnic demographic of Uzbekistan is the native Uzbek population. Ethnic minorities nonetheless include Tajiks, Kazakhs, Tartars, Karakalpaks and Russians. The national language is Uzbek, however Russian is spoken residually within the country's capital and Russian settlements elsewhere. Besides Russian, the majority of local languages are Turkic, while Tajik is originally Persian.

The culture is predominantly patriarchal, and over 80% of the population identify as Sunni Muslims.

14.2.1.6 Gender mainstreaming

The Government of Uzbekistan has made notable strides in institutionalizing social equity and gender mainstreaming. In furtherance of the entitlements enshrined in the national constitution, in 2019, Law on Guarantees with Respect to Equal Rights and Opportunities for Women and Men was passed to end gender-based discrimination and bolster the protection of women's rights to equality and contribution to the economy and societal development.

National statistics indicate that the country's performance in the pursuit of gender parity within education, employment and sports has remained steady. By 2023, women held 32% of seats in the legislative chamber of the Oliy Majilis of the Republic of Uzbekistan and occupied 28% of managerial roles across institutions. Women have a tenable role in decision making on a household and community level, as women are well-represented within local leadership, and dedicated khokimiyat departments serve to ensure the welfare and economic advancement of resident women.

14.2.2 Socioeconomics – Project-affected districts and communities

The following sections outline the socioeconomic context of the project-affected districts and communities, including the administrative boundaries, local demographics, livelihoods, social services, housing, and land-use patterns.

Following the ESIA scoping, detailed ESIA-stage socioeconomic surveys comprising literature reviews, site walkovers, KIIs, FGDs and strategic household surveys were undertaken within the project-affected communities and districts.

The household-level surveys targeted communities located within 1 kilometre of the PV power plant and BESS facilities clustered in Nurobod and Pastdargom Districts. The first round of the household survey covered a total of 130 households (of 1,925 resident households) in the communities of Sazagan, Chortut and Saroy, while the second round captured 127 households (of 1,614 resident households) in the communities of Olga and Chorvador. Over the course of these surveys, household-level socioeconomic information (including household composition, income sources, access to social services etc.) was gathered using paper-based questionnaires.

Subsequent data collection through community-specific FGDs and detailed district-level KIIs was carried out between 23rd September 2023 and 17 January 2024.

Note: At the time of this assessment, a final round of FGDs and detailed KIIs with the project-affected communities and local authorities, in connection with the LILO OTLs, were underway.

14.2.2.1 Administrative boundaries

The local government jurisdictions relevant to each of the project locations are itemized in the following sub-sections.

100 MW PV POWER PLANT SITE

The 100 MW PV power plant site lies within Nurobod District in Samarkand Region, straddling the communities of Chortut and Sazagan.

Table 14-2 Jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	**Nurobod**	Chortut
		Sazagan

NUROBOD BESS SITE

The Nurobod BESS site is located within Pastdargom District in Samarkand Region, neighbouring the communities of Dustlik MFY and Saroy.

Table 14-3 Jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	**Pastdargom**	Saroy
		Dustlik MFY

400 MW PV POWER PLANT AND POOLING STATION SITES

The 400 MW PV power plant and pooling station sites are located within Nurobod District in Samarkand Region, next to the communities of Olga and Chorvador.

Table 14-4 Jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	**Nurobod**	Olga
		Chorvador

4.9-KM OTL CORRIDOR

The 4.9-km OTL corridor is located within Nurobad District in Samarkand Region, cutting across the communities of Sazagan and Saroy.

Table 14-5 Relevant jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	**Nurobod**	Sazagan
		Saroy

70-KM OTL CORRIDOR

The 70-km OTL is located within Nurobod District in Samarkand Region, extending across a total of 12 communities, which are listed in the table below.

Table 14-6 Relevant jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	**Nurobod**	Chorvador
		Olga
		Jom
		Urtabuz
		Ulus
		Dustlik
		Sarikul
		Mehnatkash
		Chortut
		Sazagan
		Saroy

REGION	DISTRICT	MAKHALLA
	Pastdargom	Elbek

11-KM AND 19-KM (LILO) OTL CORRIDORS

The 11-km and 19-km LILO OTLs traverse parts of Pastdargom District and Samarkand District in Samarkand Region. Relevant jurisdictions are presented in the table below.

Table 14-7 Relevant jurisdictions and affected communities

REGION	DISTRICT	MAKHALLA
Samarkand	Nurobod	Sazagan
		Saroy
		Tepakul
	Pastdargom	Parchakora
		Parcha Chandir
		Dustlik
		Yukori Boganali
	Samarkand	Parranadchilik

14.2.2.2 Population

The population of project-affected districts and makhallas is detailed in the sub-sections below, albeit the statistics are aggregated by district, to provide a succinct overview.

100 MW PV PLANT AND NURUBOD BESS SITES

The population of the project-affected communities (makhallas) in and around the PV power plants, pooling station, and BESS sites in Nurobod and Pastdargom Districts is provided in the table below.

Table 14-8 Population statistics for affected communities nearby the PV power plants sites in Nurobod and Pastdargom Districts

AFFECTED DISTRICT	MAKHALLA	TOTAL POPULATION	MALE POPULATION	FEMALE POPULATION
Nurobod	Chortut	5,625	2,750	2,875
	Sazagan	3,908	1,904	2,004
	Saroy living	3,362	1,358	2,004
	Olga	5,060	2,495	2,565
	Chorvador	2,762	1,326	1,436
	Chekirchi	3,631	1,775	1,856
	Khujalar	2,839	1,326	1,513
	Tinchlik	3,809	2,225	1,584
	Jom	6,678	3,270	3,408
	Urtabuz	5,456	2,693	2,763
	Ulus	4,660	2,402	2,258
	Dustlik	3,895	1,883	2,012
	Sarikul	3,650	1,777	1,873
	Mehnatkash	3,078	1,525	1,553
Pastdargom	Elbek	5,015	2,574	2,441

11-KM AND 19-KM LILO CORRIDOR

The population of the project-affected communities (makhallas) in and around the 11-km and 19-km LILO corridors in Nurobod, Pastdargom and Samarkand Districts is provided in the table below.

Table 14-9 Population statistics for affected communities nearby the 11-km and 19-km LILO corridors in Nurobod, Pastdargom and Samarkand Districts

AFFECTED DISTRICT	MAKHALLA	TOTAL POPULATION	MALE POPULATION	FEMALE POPULATION
Nurobod	Sazagan	4394	2081	2313
	Saroy	4014	2093	1921
	Tepakul	3533	1782	1751
Pastdargom	Parchakora	3285	1671	1614
	Parcha Chandir	2600	1332	1268
	Dustlik	2168	1147	1021
	Yukori Boganali	2706	1338	1368
Samarkand	Parranadchilik	3954	1996	1958

14.2.2.3 Ethnicity and languages

The ethnic profile of the project-affected communities and their respective districts is almost exclusively Uzbek, with ethnic minorities including Tajik, Turkmen, Kyrgyz, Kazakh, Russian, Korean, Tartar and gypsies.

Some of the resident minorities uphold cultural and religious values which differ from native Uzbek traditions and main faiths, while others have assimilated into the dominant culture. Most of this assimilation has occurred over the past century, following the Soviet and world war diaspora.

Local authorities and community representatives consulted over the course of KIIs and FGDs noted that ethnically underrepresented residents are registered Uzbekistan nationals with a good lingual proficiency in Uzbek and Russian. They live and work harmoniously with the Uzbek majority, and no social tensions related to cultural distance and/or marginalization have been reported within all of the project-affected makhallas in Samarkand Region.

14.2.2.4 Indigenous Peoples

The policy framework and legislation of the Government of Uzbekistan do not recognize any section of the national population that can be considered 'Indigenous Peoples' (IPs). The IFC PS7 prescribe the following qualification criteria for IPs in the characterization of project-affected communities:

- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others.
- Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories.

- Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture.
- A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.

According to this guidance, all of the above criteria must be met for any project-affected groupings to be identified as IPs requiring avoidance, mitigation and off-setting measures specified in the IFC PS7.

A review of the national policies and legislation of Uzbekistan, literature survey and consultation with the community development (makhalla) departments of the district- and regional khokimiyats, as well as consultations with the national Cultural Heritage Agency (CHA) indicated that no IPs are presented within the project-affected districts and communities.

On the community level, the ESIA-stage household socioeconomic survey and FGDs with the project-affected communities did not identify any ethnic residents and groupings that qualify as IPs.

14.2.2.5 Social services

EDUCATION

All project-affected communities have reported having one to three resident schools and kindergartens. Higher education institutions are located within district centres and other strategic locations within the affected districts.

Some of the low-income communities, particularly those within Nurobod District, noted chronic challenges within resident educational institutions, including the shortage of books, furniture, IT facilities, and sports facilities.

HEALTHCARE

The majority of project-affected communities indicated the presence of at least one outpatient medical facility, within a three kilometres' distance. For advanced diagnostic and treatment services, patients are referred to larger healthcare facilities centred in their respective districts, towns, and regions.

Despite the limited number of medical practitioners in the less developed, rural parts of affected districts, the majority of communities are satisfied with the existing state of healthcare infrastructure. A notable exception is several medical facilities in Nurobod district, where frequent power outages beset the delivery of basic services.

Please refer to Section 15.2.1 of this Report for additional information on medical infrastructure and morbidity trends within the project-affected districts and communities.

WATER SUPPLY

Sources of water and water supply infrastructure vary widely across the project-affected districts and specific communities. Most urban areas have access to a piped water supply systems operated by state-owned utilities such as Uzsuvtaminot and water resource (ministerial) departments of resident khokimiyats. In the rural parts, water supply alternatives include centralized, piped water supply networks, communal distribution systems (powered by pumps) connecting to rivers and springs, groundwater wells, rivers, and irrigation canals.

Where irrigation canals, seasonal and ephemeral rivers are located, various land-uses and activities must comply with the sanitary and protective buffers specified in relevant legislation. The size of the buffers is proportionate to the flow rate of rivers and dimensions of irrigation canals. Local authorities indicated that best efforts should be pursued to avoid the diversion of canals serving irrigated agricultural landscapes in and around project sites.

(i) Nurobod

No centralized water supply networks exist in the project-affected communities in within Nurobod and Pastdargom Districts (i.e., nearby the PV power plants and Nurobod BESS). Residents of these communities obtain water primarily from spring intakes and a water tanker supplier registered as Suvokava. Some households tap into pump-powered supply systems which draw water from communal spring intakes, at a monthly charge that is billed for each user. The downside to this system is that water abstraction is oftentimes interrupted by power outges. Other households receive regular water supplies from Suvokava at a charge of UZS 65,000 to UZS 90,000 per ton. Low-income community sections prefer to fetch water manually from springs, groundwater wells, irrigation canals, while others use rainfall harvesting systems.

With regard to water supplies for the project, local authorities recommended that contractors engage with Suvokava for tanker services. Otherwise, groundwater wells can be drilled, with prior feasibility studies and permitting by the regional and district offices under the Ministry of Water Resources, and potentially from the State Committee for Geology and Mineral Resources (Goskomgeology). Two main issues highlighted in regard to the latter alternative is that groundwater in local aquifers is saline, and that some groundwater stress has been recorded within the area, and water shortages tend peak in the Spring.

Irrigation canals are absent for the most part of the districts, however small-scale, rudimentary canals have been developed around the seasonal rivers/ streams situated along the 70-km OTL route.

(ii) Pastdargom District

The water supply context in project-affected communities in Pastdarmom District is broadly similar to that of Nurobod District. However, the district benefits from an extensive irrigation system stemming from Dargom River and Zarafshan River. None of the existing canals are

located within the Nurobod BESS and substation sites, however a few canals are located along the 11-km and 19-km OTL corridors.

POWER

All of the affected communities are connected to the national grid. However, the stability of power supply and duration of power outages varies by community. Certain under-developed communities, such as those based around the project sites in Nurobod District, are afflicted by frequent power outages due to:

- Grid congestion, mainly during the winter season
- Failure of dilapidated power distribution network facilities during strong winds and rainfall

Low-income communities within Nurobod and Pastdargom Districts reported frequent (sometimes daily) power outages that last for 3-4 hours. These communities also shared that the power distribution network in place is run down, as it was established in the 1970's. As a result, strong winds and heavy rainfall often damage the distribution poles and cabling, which exacerbates power shortages and hampers basic social and commercial services within schools, clinics, and other establishments.

Rural communities, including those based around the project sites in the districts of Nurobod and Pastdargom lack central heating, and utilize locally harvested firewood and dried manure (tappi) for heating during the winter. Purchased gas is also used for supplementary heating in these communities, albeit to a much a lesser extent.

With regard to power provisioning during the Project's construction phase, local authorities recommended connections to the grid. It was further noted, if the power demand exceeds 10 kW, then the Project Developer should install a dedicated transformer, in collaboration with NEGU and resident (district-level) construction departments.

WASTE DISPOSAL

Please refer to Section 7.2 of this Report for information on the existing infrastructure for the management of general and hazardous waste, and domestic sewage.

TRANSPORTATION

Please refer to Section 13.2 of this Report for information on the existing transport infrastructure and traffic conditions within the project-affected communities.

SOCIAL SECURITY

The social security scheme of Uzbekistan consists of pension payments and a host of welfare interventions for socioeconomically vulnerable households and residents. The forms of social

security available to the project-affected communities in the regions of Nurobod, Pastdargom, include the following:

- Pension instalments
- Need-based monetary donations
- Loans for acquisition of residential property, household and/or SME assets
- Grants for higher education
- Livestock donations for disadvantaged producers
- Donations for non-agricultural SMEs (e.g., sewer machines for women in tailoring businesses)
- Free-of-charge housing schemes
- Free-of-charge agricultural land leaseholds
- Subsidies and debt relief for provision of medical, legal, or basic utility services
- Priority-basis recruitment services for civil, seasonal and/or semi-skilled jobs

Local authorities involved in rendering welfare assistance for vulnerable and marginalized community sections include the (i) socio-economic/makhalla and employment khokimiyat department, (ii) women and domestic affairs makhalla department, as well as community-level the Employment and Poverty Reduction Units (EPRUs). The EPRUs are entrusted with undertaking periodic monitoring of makhallas and registering all vulnerable hosueholds and residents. The criteria for the inventorying of economically challenged community members include (but are not limited to) chronic illness, disability, protracted unemployment, large low-income households/ families, women-headed households, and child-headed households. Individuals and entire households that meet these criteria are enlisted on the following institutional registers:

- **Temir daftari** – A live register (database) for poor and socially vulnerable families
- **Ayollar daftari** – A live register (database) for women in need of welfare assistance
- **Yoshlar daftari** – A live register (database) for young residents from poor and/or marhinalized households

As noted in consultations with relevant authorities in the project-affected districts in Samarkand Region, households living in extreme hardship (i.e., below the national poverty line) account for 2-4% of the total number of resident households.

14.2.2.6 Economy and local livelihoods

NUROBOD DISTRICT

The economy of Nurobod District is centred on agriculture, specifically crop and animal farming. The area of cultivated arable land in the district presently sums to 66,922 hectares. Due to the distance between the agricultural landscapes and the nearest rivers and canals, only about 9% of the crop farms are irrigated. The remainder of crop farms are rainfed. The main types of crops grown across the district include cotton, wheat, legumes, potatoes, tomatoes, corn, and alfalfa. Fruit trees are also grown to a much lesser extent, due to lacking irrigation and soil quality.

During consultations, local authorities and communities highlighted that there is little to no crop cultivation within the project-affected communities based in and around the project sites. This is attributed to the absence of irrigation canals, declining rainfall, and the saline condition of resident soils. Community members noted that previous attempts to utilize groundwater for irrigation water proved futile, as the highly saline water renders the soils barren within a year, and snowmelt does little to restore soil quality (through leaching). Crop farming is therefore not profitable, and small-scale farming is undertaken for subsistence, specifically to provision vegetables and fodder for livestock. The growth of annual and perennial crops is oftentimes stunted, and the produce is barely marketable.

Due to the abject lack of arable soils suitable for profitable crop farming, the majority of residents in Nurobod District primarily engage in livestock farming. The rearing of cattle, sheep and goats in the districts is nonetheless challenged by the lack of permanent water sources for livestock upkeep and the cultivation of fodder. Additionally, a total of 357,000 hectares of pastural land lie within Nurobod District, however the pastures are invariably scant due to the arid, saline nature of resident soils. In the spring, some herders within the communities of Saroy, sazagan, Chortut, Sarikul and Meknatksh extend their stock routes and grazing towards the foothills of the mountainous area south of these communities. Better pastures along the ephemeral creeks in this area are utilized when available. Likewise, supplementary fodder production by subsistence farmers does not provide sufficient yields. Farmers who rear livestock on a subsistence basis are also confronted with high feed prices, in procuring winter reserves, from producers in the nearby Kashkadarya Region.

Figure 14-3 Socio-economic survey in Nurobod District

With regard to industrial production, UZS 6.1 billion UZS worth of non-food products were manufactured in the first quarter of 2023. Further, SMEs within the district include retail stores and textile workshops. Most of the merchandise sold in retail outlets is sourced from Samarkand City. A number of aggregate processing facilities and warehouses are also located within the district.

Due to limited agricultural productivity, deficient infrastructure and limited investments into industry and large enterprises, unemployment rates within the district are quite high. Insufficient opportunities for formal, long-term employment have caused many locals to emigrate to Turkey, Kazakhstan, Russia, and other parts of Uzbekistan. The following graphs present the occupations reported within the project-affected communities around the two project locations in Nurobod district. Outside of agriculture, most residents are employed in governmental institutions and temporary/ seasonal jobs, such as those within the construction sector.

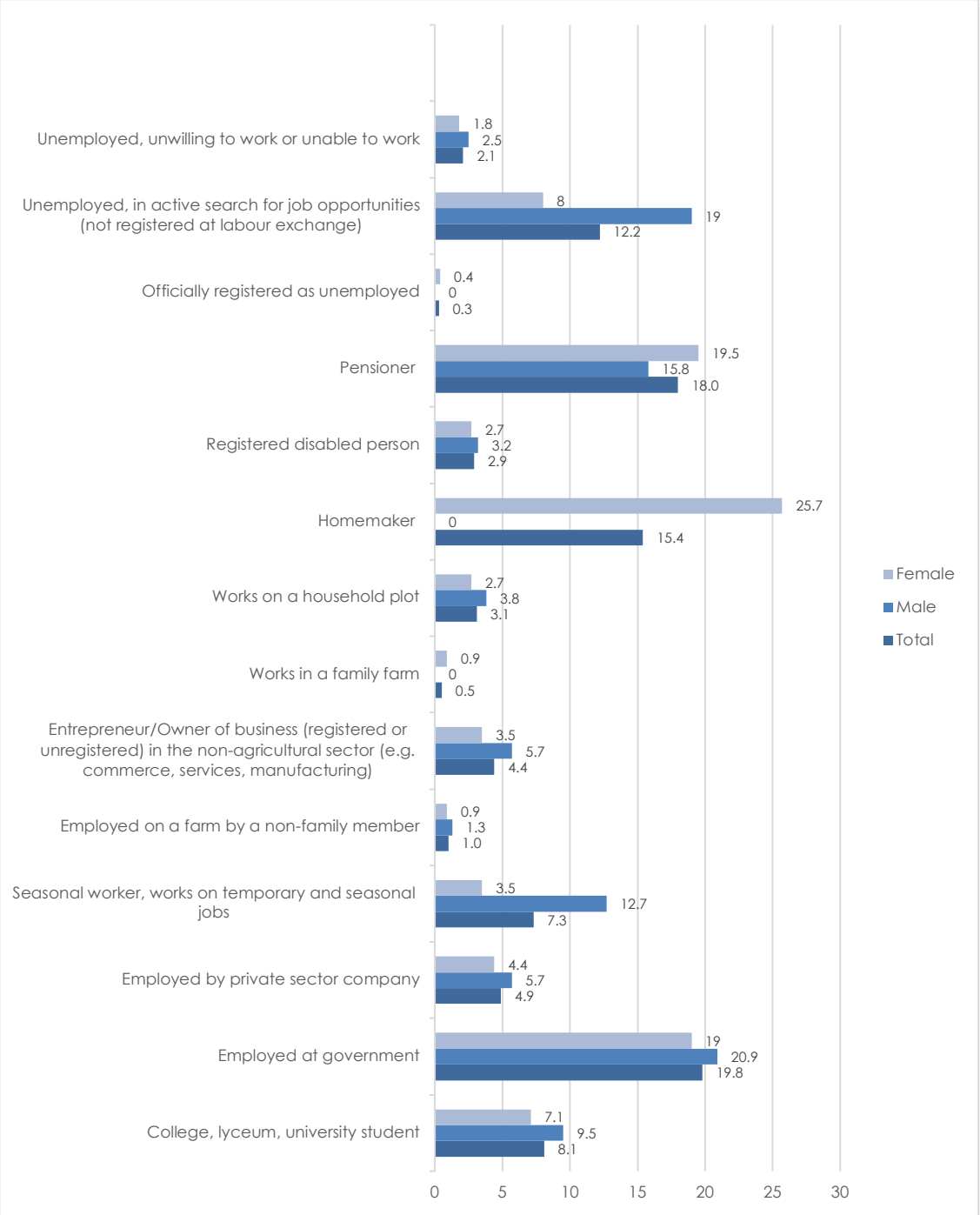


Figure 14-4 Occupations reported by 130 households surveyed within communitis of Sazagan, Saroy and Chortut around the 100 MW PV plant and Nurobod BESS sites

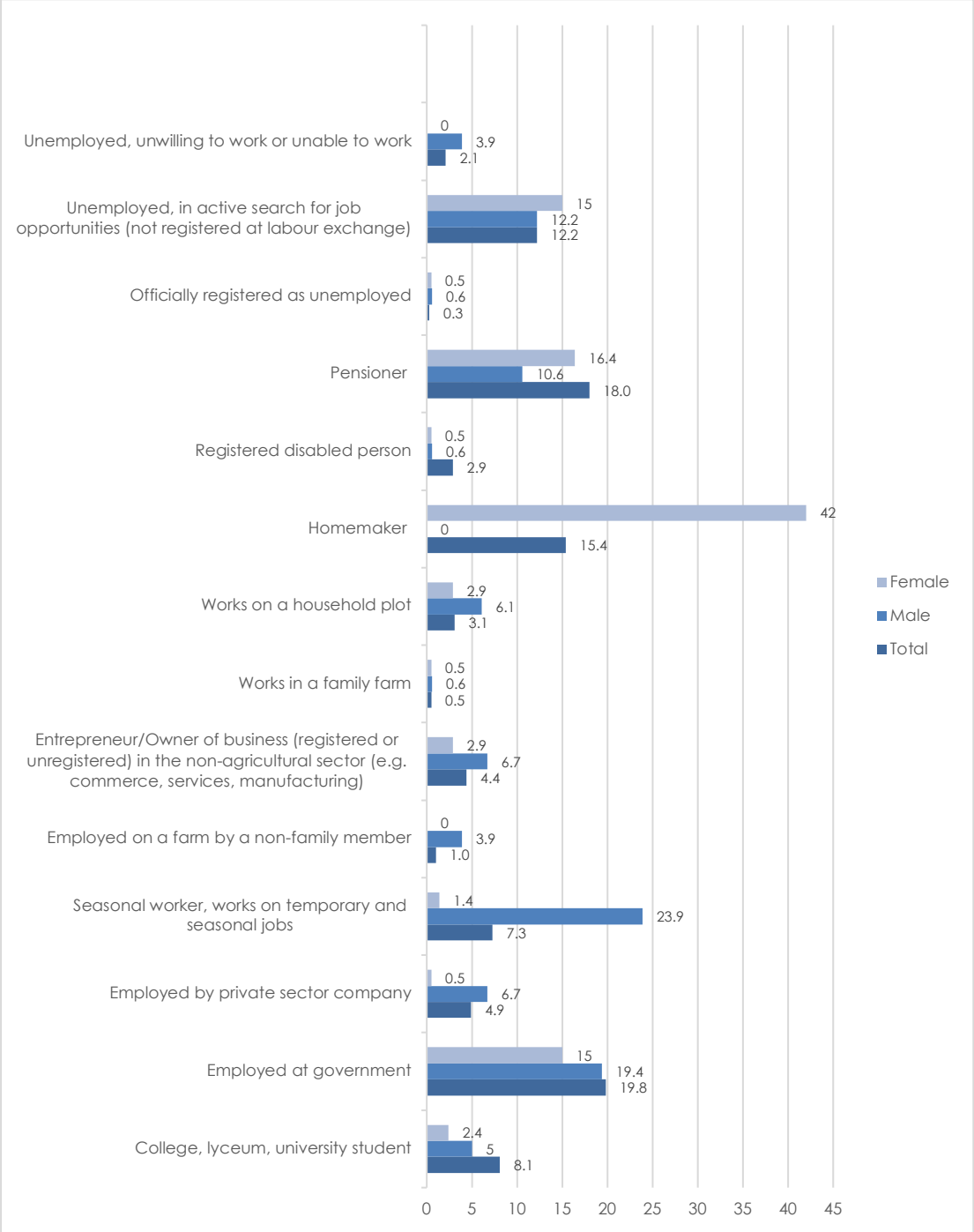


Figure 14-5 Occupations reported by 127 households surveyed within communities of Olga and Chorvador around the 400 MW sites

PASTDARGOM DISTRICT

The economy of Pastdargom district is largely based on agriculture. The local economy is somewhat similar to that of the adjacent Nurobod District. Nevertheless, Pastdargom district is lies closer to the rivers of Zarafshan and Dargom, and therefore benefits from the extensive irrigation scheme stemming from these rivers. Of the 45,000 exploited hectares of arable land

41,803 hectares (93%) are irrigated. Crop farming is dominated by the cultivation of cotton and grain, with other produce including vegetables, corn, alfalfa, and grapes. The total area of pastural land in the district totals 3,600 hectares. Livestock bred in the district include cattle, sheep, goats and poultry.

The southern part of the district is characterized by the arid and saline soils prevalent in Nurobod District. For this reason, both crop and livestock farming are substantially less productive in this general area. Meagre quantities of vegetables and fodder are cultivated on the locals' tomorka (residential) plots. The extent and yield of pastures has declined in recent years, due to decreased rainfall. As a result, fodder is purchased to supplement livestock upkeep.

Besides agriculture, economic establishments within the district include several sand and gravel quarries. Income earning opportunities outside these sectors are limited and unemployment is a serious setback, particularly for women. A considerable fraction of the skilled and semi-skilled labourers and professionals have relocated to urban parts of the country, and the neighbouring countries of Kazakhstan, Russia, and Turkey, in search of better income.

14.2.2.7 Land use

With the progress of the ESIA-stage socioeconomic surveys, an LALRP study was initiated to identify all Project-Affected Persons (PAPs) that are subject to physical and/or economic displacement from the Project's land expropriation process.

The LALRP commenced with an LALRP census entailing cadastral reviews, site surveillance and consultations with community leadership. Following the identification of potentially affected land users, socioeconomic and asset inventory (i.e., valuation) surveys were carried out with the affected households and institutions. The scope of the LALRP encompassed permanent, seasonal, formal and informal land-users, and best efforts were made to involve absentee PAPs.

PRIVATE ASSETS, COMMON RESOURCES AND LAND TENURE

Following the ESIA scoping, detailed ESIA-stage socioeconomic surveys comprising site walkovers, KIIs, FGDs and strategic household surveys were undertaken within the project-affected communities to gain elaborate socioeconomic information.

(i) 100 MW PV power plant

The 100 MW PV plant site lies within a low-priority agricultural zone, which does not include a centralized irrigation system. Due to lacking irrigation systems, and saline, arid soils within this zone, agriculture within this zone is dominated by livestock rearing.

The ESIA and LALRP surveys undertaken identified a total of 19 land-users and 12 farm workers within the site perimeter. All of the Project-Affected Persons (PAPs) are engaged in livestock farming, which mostly includes sheep, with lesser poultry and cattle husbandry. One of the PAPs undertakes small-scale crop farming (gardening) of crops including grapevines, walnuts, and onions. Three of the PAPs have established permanent structures within the site, which include a protected well with a water pumping system, a small farmstead (including shelter, pen, and water chamber), and metallic fencing.

No residential establishments were identified within the site.

Eight of the PAPs are formal landowners, with legal rights to their respective landholdings. One owner is a corporate livestock farming cluster, while the remainder of PAPs registered their plots as small household businesses. All of the landowners stand to lose more than 50% of their landholdings on a permanent basis. Three of the landowners employ a total of 12 farm workers.

The remaining land users are community-based herders with informal rights to small portions of the site.

Figure 14-6 Farm structures and livestock within the 100 MW PV plant site

Private land-use within 500 metres of the site includes livestock rearing, small crop farms and residential property. Most of the livestock structures within this buffer are either temporary or abandoned. The nearest residential establishment is located in Chortut community, about 150 metres North-West of the site.

(ii) Nurobod BESS

The Nurobod BESS site is situated within a low-priority agricultural zone, which does not include a centralized irrigation system. Due to lacking irrigation systems, and saline, arid soils within this zone, land within the site offers little to no agricultural utility.

The ESIA and LALRP surveys undertaken have identified a total of three affected land-users within the site. One of the PAPs is a crop farming business, which held a long-term leasehold agreement with the resident district khokimiyat, prior to the reallocation of land for the Project.

The land has not been cultivated in recent years and no farm workers were identified in connection with the affected property. The remaining two land users are informal herders based in the nearby community of Saroy. These herders undertake seasonal grazing within the site, however, the LALRP survey revealed that alternative grazing areas are available, and the herders stand to lose less than 20% of their existing pastural land.

No farm buildings, herding shelters and residential property were identified within the site.

The nearest residential establishment is located within Saroy community, about 2 km South-West of the site. Commercial establishments in the vicinity of the site boundary include a crop farm 22-130 metres West of the site and a poultry farm 1.3 km East of the site.

Figure 14-7 Crop farm storage (left) and irrigation (right) facilities west of the BESS site

(iii) 400 MW PV power plant and pooling station

The 400 MW PV power plant is located within a low-value agricultural zone, which is not served by any centralized irrigation systems. Due to the arid and saline nature of soils within this zone, crop productivity is notably low.

One land-user was identified over the course of the ESIA and LALRP surveys. The PAP is an agricultural company (LLC) involved in livestock farming, specifically herding and livestock rearing. The company employs two farm workers. Livestock herded on the site mainly comprise sheep and goats.

No farm buildings, herding shelters or residential facilities were identified within the site.

Figure 14-8 Herding (left) and residential front overlooking the 400 MW PV plant site

Private property in the vicinity of the 400 MW PV power plant site includes residential establishments in Olga community East of the site, and Chorvador community located south of the site.

(iv) 4.9-km and 70-km OTLs

The 4.9-km and 70-km OTLs traverse an agricultural zone consisting of numerous crop farms, orchards and sparse, steppe pastures. Main cultivated crops include wheat, alfalfa, apple trees and grapevines. A few streams intersect the corridor, and no major irrigation canals fall within the corridor.

The ESIA and LALRP surveys identified a total of 86 PAPs, the majority of whom are employed in crop farming. A few of the PAPs are employed in livestock rearing. Most of the PAPs are registered as small 'peasant farm' businesses. Further, two large crop-farming enterprises and four large livestock enterprises were recorded. Tomorka and dekhan farm property was not identified within the survey area. Inventoried structures associated with private farm plots include a few fence walls.

No residential establishments were identified along the corridor.

Figure 14-9 Dry steppe and agricultural fields along the 4.9 and 70-km OTL corridor

(v) 11-km and 19-km (LILO) OTLs

ESIA-stage socioeconomic surveys along the LILO indicated a predominant distribution of crop farming land parcels along the 11-km and 19-km LILO corridors. Several livestock farm plots were also recorded within the survey area.

Subsequent LALRP surveys identified a total of 28 and 115 land users within the footprint of the 11-km and 19-km LILO corridors respectively. Nevertheless, LALRP surveys within the LILO footprint were incomplete at the time of this assessment.

Cumulative survey results indicate that the majority of PAPs are crop farmers who engage in the cultivation of annual and perennial crops including corn, wheat, cotton, grapes, alfalfa, apple, peach and cherry trees. The survey has also identified a total of seven landholders with potentially impacted livestock farms, Sheep account for the majority of livestock bred by affected livestock farmers, other livestock including goats and cattle.

Figure 14-10 Abandoned structure (top left) and fruit garden (top right) along the 11-km LILO corridor; Crop cultivation along the 19-km LILO corridor (bottom)

PUBLIC INFRASTRUCTURE

(i) 100 MW PV power plant and Nurobod BESS

Existing utility and public infrastructure identified in and around the 100 MW PV power plant site in the course of the ESIA include the following:

- A regional gas pipeline located about a kilometre north of the site.
- Existing OTL situated along the northern boundary of the site.
- Hazardous waste storage facility located 600 metres north-west of the site.
- Military base located about a kilometre from the site.
- A-378 highway.

No existing utility and public infrastructure were identified in and nearby the Nurobod BESS site.

The distribution of the local communities and infrastructure within and around the 100 MW PV power plant and Nurobod BESS sites is shown in the figure below.

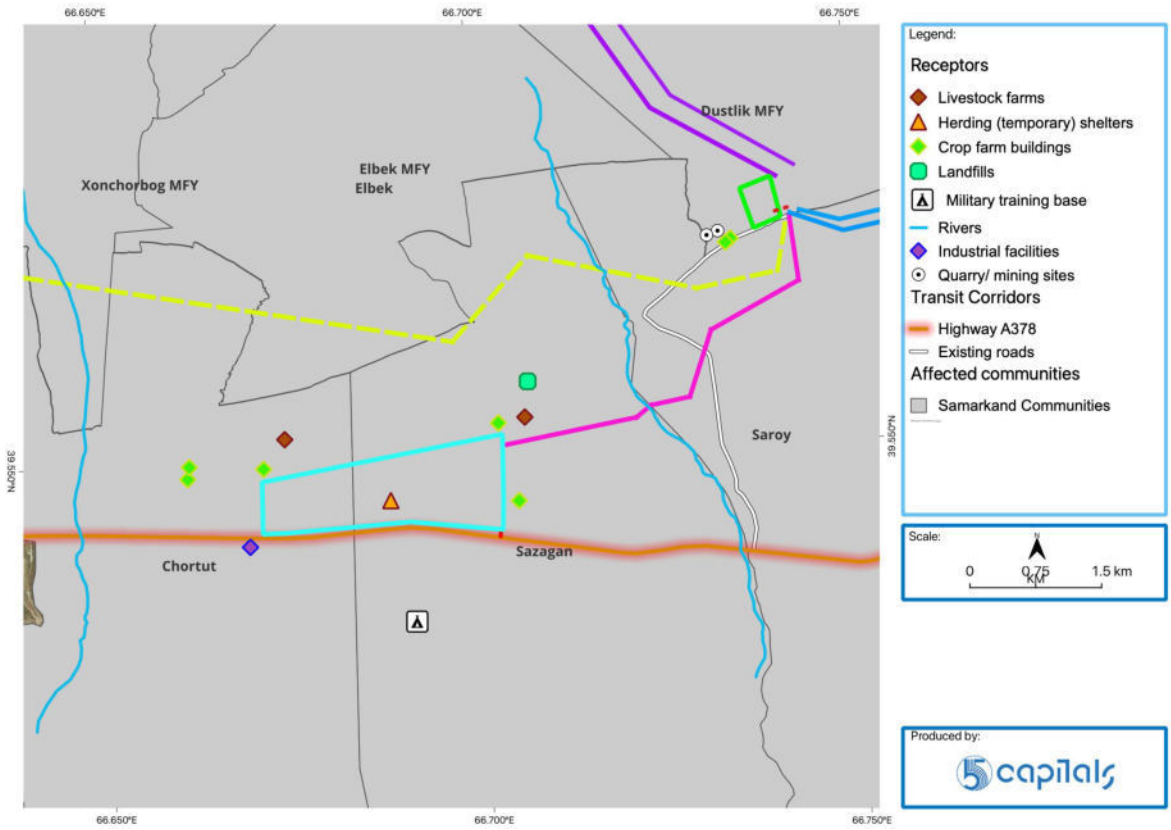


Figure 14-11 Local communities, private property and infrastructure located in and around the 100 MW PV power plant and Nurobod BESS sites

(ii) 400 MW PV power plant and pooling station

Existing utility and public infrastructure provisionally identified in and around the 400 MW PV power plant site include the following a regional gas pipeline located about 500 metres from the site, and a few community dirt roads, which cut across the central portion of the 400 MW PV power plant site.

The distribution of the local communities and infrastructure within and around the 400 MW PV power plant is shown in the figure below.

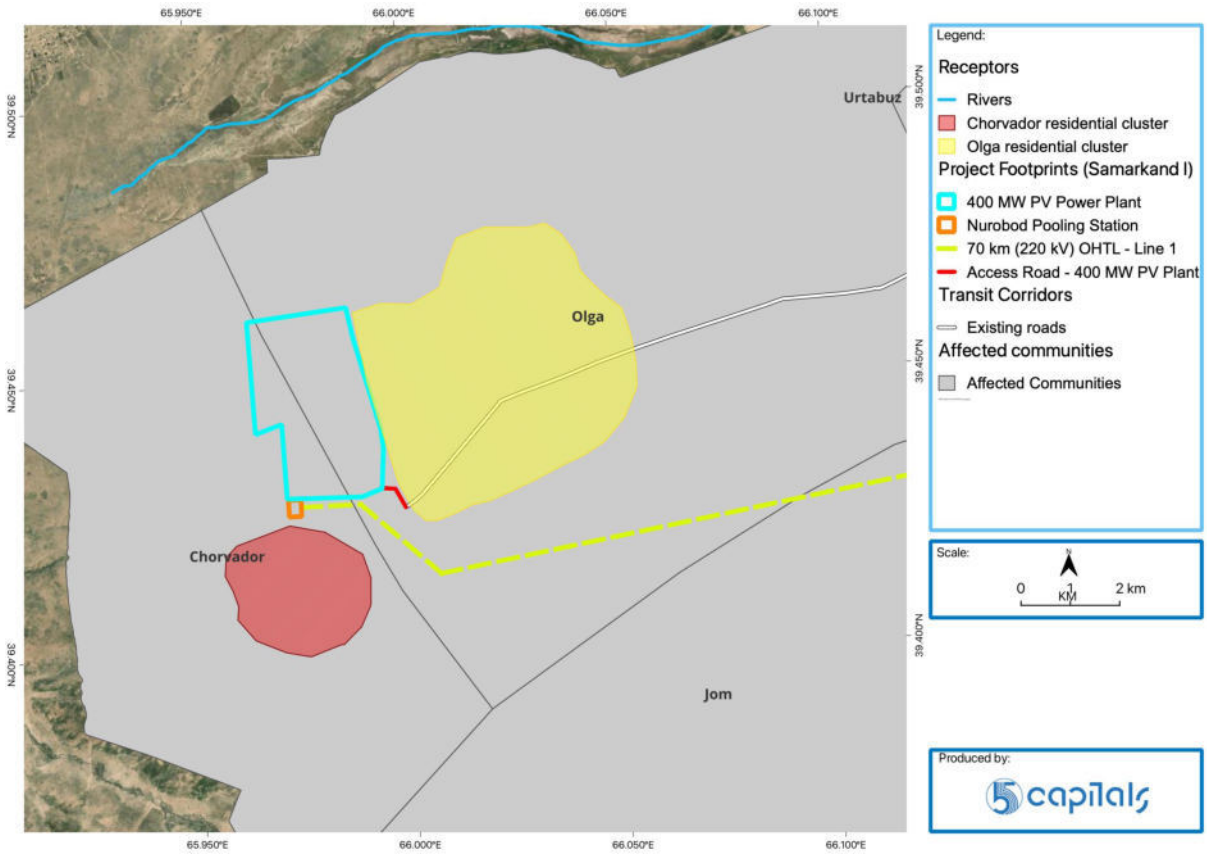


Figure 14-12 Local communities, private property and infrastructure located in and around the 400 MW PV power plant site

(i) 4.9-km, 11-km, 19-km, and 70-km OTLs

Public infrastructure noted along the 19-km LILO corridor includes an irrigation canal, railroad, OTL and a few intersecting dirt roads, while provisionally identified infrastructure along the 11-km OTL includes several community dirt roads.

The 70-km OTL route runs across a dry steppe landscape, intersecting with dirt roads, a railway line and gas pipeline. The distribution of the local communities and infrastructure in and around the OTL corridor is shown in the figure below.

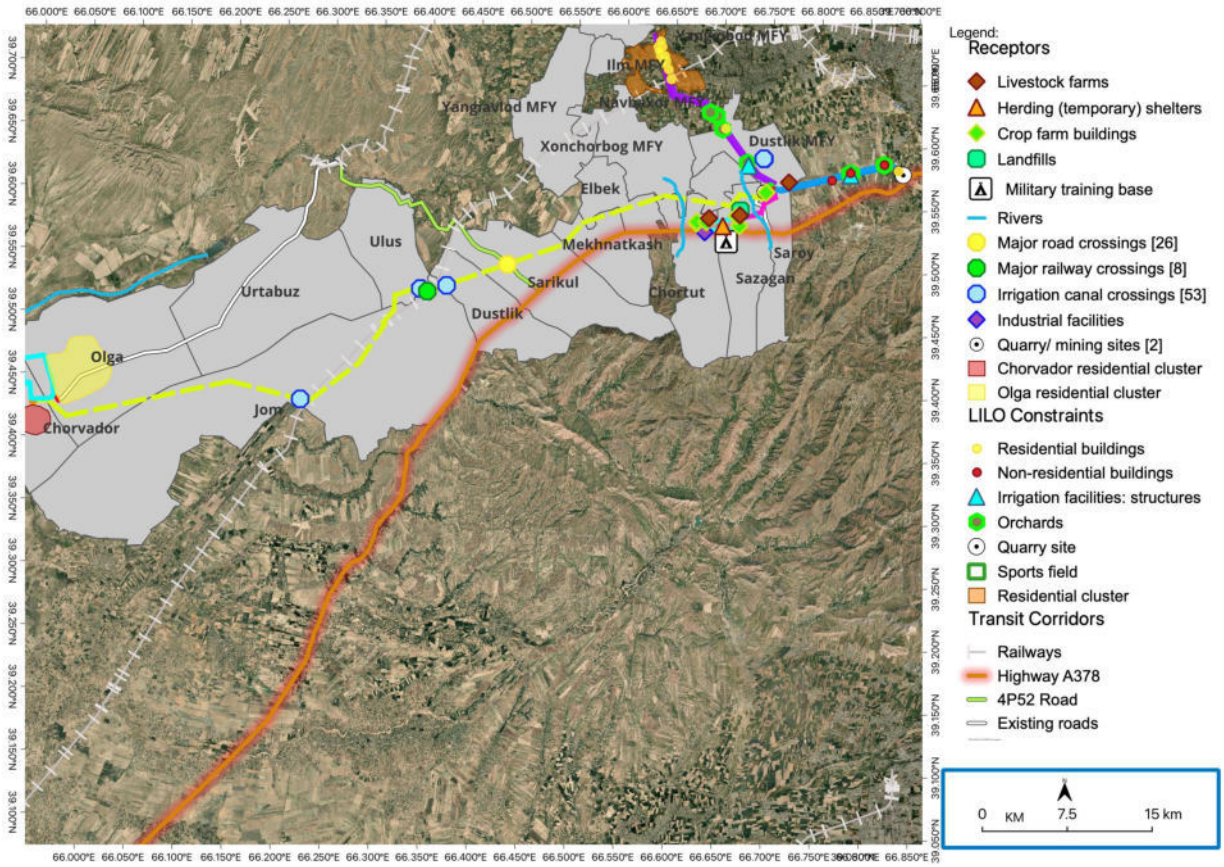


Figure 14-13 Local communities, private property and infrastructure located in and around the interconnection facility (220 kV OTL) corridors

14.2.2.8 Settlement patterns and housing quality

The PAHs are based are largely based within residential clusters constituting the project-affected communities. Resident dwellings can be categorized as detached, single-storey buildings. Locally, construction is undertaken by hired contractors, and in some cases by household members with construction skills.

Some of the buildings exhibit moderate to high civil standards, including brick walls, iron sheet or tile roofing. Rudimentary housing is commonplace in the rural parts on Nurobod District, particularly in residential communities with relatively low-income statuses. The vast majority of residential buildings are owned rather than rented.

Figure 14-14 Residential housing types in affected communities within Nurobod and Pastdargom

14.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential impacts on livelihoods and social infrastructure within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is further provided for each relevant receptor.

Table 14-10 E&S impact receptors – Livelihoods and social infrastructure (socioeconomics)

RECEPTOR	SENSITIVITY	JUSTIFICATION
PAPs: Residents	High	Households that are subject to physical displacement due to exclusion zones along the 19-km LILO corridor are highly vulnerable to associated impoverishment and extreme hardship, considering the predominance of land-based livelihoods in Pastdargom District, and potentially limited wherewithal to cope with resettlement, due to high unemployment rates, among other economic disadvantages.
PAPs: Herders	High	Herding households that are subject to economic displacement due to permanent land-take and access severance during construction are highly vulnerable to associated economic shocks, impoverishment, and hardship, considering the limited extent and quality of pastures nearby the dwellings and grazing areas of affected herders.
PAPs: Other livestock farmers	High	Livestock breeders that are subject to economic displacement due to permanent land-take in Nurobod and Pastdargom Districts have a high vulnerability to associated economic losses. Livestock breeders in general (including those with property along the OTL corridors) are also highly vulnerable to losses and expenditures due to potential physical impacts on livestock watering pools/ canals and aquacultural ponds.

RECEPTOR	SENSITIVITY	JUSTIFICATION
PAPs: Crop farmers	High	Crop farmers and smallholders outside irrigation networks in particular have a moderate to high sensitivity to (i) income losses associated with permanent land-take and land-use restrictions, and (ii) temporary work stoppage and income diminution due to construction works along the OTL corridors.
Project-affected communities and districts	High	Residents within the project-affected communities, particularly those based around the power plant and BESS sites, are highly vulnerable to construction-phase influences on local infrastructure, food, water and housing markets, morbidity, and cultural norms, due to existing livelihood challenges in certain areas (e.g., water and power shortages, unemployment, low crop yields, land-based livelihoods and low income status).
Utilities and social service providers	Medium	Utilities and social service providers operating within the project-affected communities, particularly those based around the power plant and BESS sites, have considerable potential vulnerability in terms of capacity limitations versus increased demand for power, water, waste management, medical and transportation services at the peak of construction.

14.4 Potential Impacts and Management Measures

14.4.1 Construction phase

Please refer to Section 2.3 and Section 4.3 of this report for background information on the site selection and land acquisition process, in relation to the Project.

14.4.1.1 Physical displacement

The development of the Project potentially necessitates physical displacement (i.e., permanent loss of primary residential assets). The legal basis for eminent domain and the resettlement of Project-Affected Households (PAHs) includes the following:

- Permanent land-take for the operational footprint of project facilities, in furtherance of the Land Code, Presidential Resolution No. 207 and subsequent Land Allotment Order (LAO)
- Restriction on residential buildings within the HPZ and SSZ of high-voltage overhead powerlines, to safeguard (i) public health and safety and (ii) grid utility assets, pursuant with the SanPin 0236-07 and Resolution No. 1050. The setback (lateral) buffers for 220kV and 500 kV OTLs measure 25 metres and 30 metres from the outermost OTL conductors line respectively

As narrated in Section 4.3 of this Report, a series of siting and routing alternatives were taken into consideration over the course of feasibility and design studies. The avoidance of priority E&S receptors, including residential assets, was guided by early-stage E&S screenings for project alternatives. The screenings were based on rapid surveys within originally targeted sites, which involved field reconnaissance and cross-cutting consultations with key authorities (i.e., resident district khokimiyats etc.).

The outcomes of the E&S screenings were incorporated into the iterative design process, and provisionally identified residential property was avoided to the extent feasible, taking into account overriding technical constraints. While a total avoidance of residential property was achieved for most of the project sites and corridors, no technically feasible means were available for the avoidance of a cluster of residential plots along the peri-urban section of the 19-km LILO OTL footprint. The extensive residential zone constituting the fringes of Juma Town falls within the impact corridor of all technically feasible OTL route alternatives. The provisional 19-km LILO corridor was selected on the basis of minimum relative impact on private property.

The 19-km LILO is an associated facility, which will be developed by NEGU. The current optimum route submitted to NEGU for independent technical reviews is therefore subject final approval by the Ministry of Energy. The ongoing LALRP surveys for the 19-km and 11-km LILO OTLs are nonetheless based on the provisionally selected LILO routes.

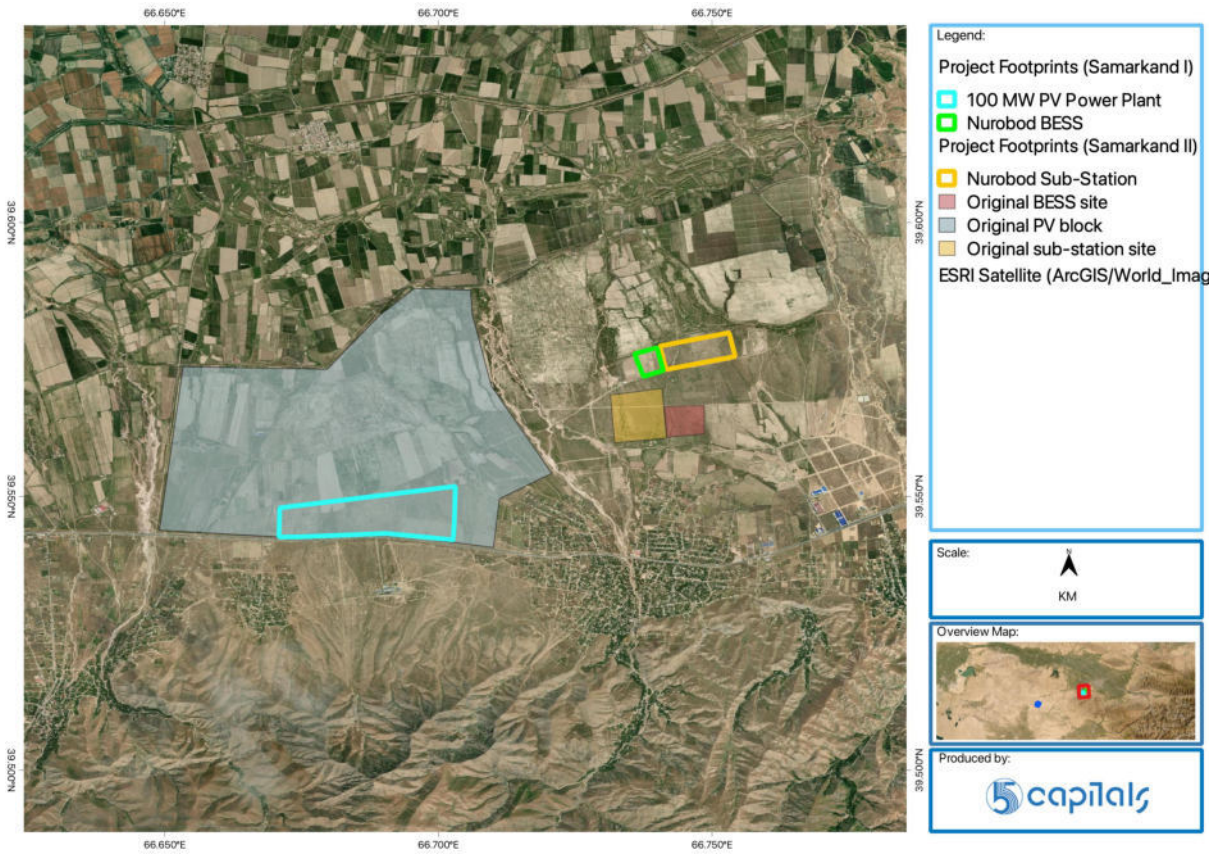


Figure 14-15 Alternative project sites considered at the feasibility stage

Cumulative findings of the ESIA and subsequent LALRP surveys indicate that the project footprint largely overlaps agricultural land, which includes pockets of quarrying sites. In sum, a total of [TBC] landholders are potentially impacted by physical displacement relevant to the 19-km LILO OTLs.

Table 14-11 below provides the total number PAPs subject to physical resettlement and distribution of this count by location and formality of affected land tenure.

Table 14-11 Number of PAPs subject to physical displacement due to land expropriation

Project Site[10]	Land-Take (hectares)	Number of PAPs Subject to Physical Displacement	
		Total	With Informal Tenure
100 MW PV plant site	216	0	0
400 MW PV plant and pooling station sites	800	0	0

[10] The project sites include relevant access road sections potentially requiring construction.

Project Site[10]	Land-Take (hectares)	Number of PAPs Subject to Physical Displacement	
		Total	With Informal Tenure
Nurobod BESS and underground cable sites	16.8	0	0
4.9-km OTL corridor	9.7	0	0
70-km OTL corridor	143	0	0
11-km OTL corridor	[TBC]	0	0
19-km OTL corridor	[TBC]	[TBC]	[TBC]
100 MW PV power plant access road	0.016	0	0
400 MW PV power plant access road	0.273	0	0

At the time of this assessment, the LALRP surveys set to identify households subject to resettlement in connection with the LILO corridor, and to evaluate the individual vulnerability of relevant PAPs were incomplete. While details on the ownership and occupancy of potentially affected property were not fully available, ESIA and early-stage LALRP census outcomes confirmed that several households (property owners and/or tenants) may require resettlement in connection with mandatory HPZ and GSZ requirements.

Considering the predominance of land-based livelihoods, rife unemployment and social capital reported within the affected districts and communities, potential resettlement of PAPs carries the risk of impoverishment, decline in living standards, and a worst-case fallout involving homelessness. These risks are dependent on the delivery of compensation and availability of replacement property of equivalent or greater value within favourable resettlement sites, in terms of:

- Housing quality and liveable amenities
- Space for subsistence farming (e.g., tomorka yards)
- Accessibility of social services (i.e., power, water supply, marketplaces, schools, healthcare facilities, transport services, drainage etc)
- Availability of irrigated/ rainfed arable land
- Availability of critical value chains (e.g., agricultural input suppliers, extension services, etc)
- Availability of employment opportunities for skilled labour
- Access to economically significant social networks
- Security of tenure (i.e., formal versus informal landholdings, lifetime ownership versus leaseholds)

Following the completion of ongoing LALRP surveys along the 19-km LILO corridor, the project LALRP will include statistics for the overall scale of physical displacement, as well as a summary

demographic analysis of potentially displaced PAPs, their pre-project socio-economic vulnerabilities. The LALRP will also detail the existing utility and full replacement value of immovable residential assets, and the preferences of PAPs in terms of resettlement compensation, transitional support and supplementary assistance, for case-by-case mitigation.

The expropriation and re-allocation of land within the 19-km LILO corridor has not commenced pending the approval of the provisionally selected OTL route. Upon subsequent approvals and the establishment of the OTL tower locations, relevant Land Allotment Orders (LAOs) will be issued by the Samarkand region and Pastdargom District Khokimiyats, to launch the acquisition of affected land parcels, for effective construction and subsequent operation.

Risks related to potential resettlement along the corridor will be minimized to achieve a low to moderate residual significance, through the implementation of broad-based mitigation commitments, including the lawful provision of eviction notices, delivery of adequate compensation prior to the onset of eviction, and need-based supplementary assistance for the procurement of suitable property and transportation of moveable assets.

At the LALRP implementation stage, the Project Developer will engage with NEGU to ensure that remedial commitments are delivered upon, in line with the entitlements, safeguards and critical timelines specified in the project LALRP.

14.4.1.2 Economic displacement

The majority of project assets will be established within tracts of land originally designated agriculture, and the acquisition of requisite land potentially triggers economic displacement (i.e., permanent and/or temporary loss of assets and income earnings from withdrawn land and common resources). The legal basis for eminent domain and the consequent relocation of economically significant landholdings and land-use includes the following:

- Permanent land-take for the operational footprint of project facilities, in furtherance of the Land Code, Presidential Resolution No. 207 and subsequent Land Allotment Order (LAO)
- Permanent restrictions on trees and high-rise machinery within the SSZ of high-voltage overhead powerlines, to safeguard grid utility assets, pursuant with the Resolution No. 1050. The setback (lateral) buffers for 220kV and 500 kV OTLs measure 25 metres and 30 metres from the outermost OTL conductors respectively
- Temporary restriction of third-party access to construction areas within the project sites during construction, pursuant with the Land Code and Law No. 781

The project sites and corridors fall within land parcels that are almost exclusively used for agriculture.

As narrated in Section 4.3 of this Report, a series of siting and routing alternatives were taken into consideration over the course of feasibility and design studies. Design efforts to avoid priority E&S receptors, mainly high-value commercial farms, orchards, and alluvial quarries, were guided by early-stage E&S screenings for project alternatives. The screenings were in themselves based on rapid surveys within originally targeted sites, which involved field reconnaissance and cross-cutting consultations with key authorities (i.e., resident district khokimiyats, Ministry of Mining etc.). The outcomes of the E&S screenings were incorporated into the iterative design process and provisionally identified, high-value livelihood and commercial assets were avoided to the extent feasible, taking into account overriding technical constraints. Due to fundamental technical constraints and the ubiquity of sensitive commercial establishments along the 4.9-km, 11-km, 19-km and 70-km OTL corridors, total avoidance was not achievable. The optimal OTL routes were selected on the basis of minimum relative impact on private property.

Table 14-12 below provides the total number PAPs subject to economic resettlement and distribution of the sum by location, specific land-use, and legitimacy of affected land tenure. As shown in the table, the 70-km OTL corridor accounts for the majority of potentially displaced PAPs. Permanent economic displacement is notably limited to the PV power plant and BESS sites. While the majority of inventoried landholdings involve crop farming, the land-use in the PV power plant and BESS sites is mostly livestock oriented.

Note 1: The PAP totals provided in Table 14-12 are provisional, pending the completion of ongoing LALRP surveys within the LILO corridor and OTL design reviews.

Note 2: The locations of OTL towers were not established at the time of this assessment. Accordingly, the number of PAPs subject to a permanent loss of access to land in relation to OTLs is provisional and based solely on restrictions related to the cultivation of perennial crops (trees higher than 4 metres) within the GSZ.

The final sum of PAPs subject to permanent land loss will be defined following the completion of detailed design and the identification of OTL tower sites.

Table 14-12 Number of PAPs subject to economic displacement due to land expropriation

Project Site	Land-Take (hectares)	Number of PAPs								
		Economic Displacement (land users)				Economic Displacement (workers)		Total (land userss and workers)	Permanent Impact	Temporary Impact
		Crop farming	Livestock rearing and herding	Other	Total	Crop farming	Livestock rearing			
100 MW PV plant site	216	1	18	0	19	4	8	31	31	0
400 MW PV plant site	800	0	1	0	1	0	2	3	3	0
Nurobod BESS	25.3	1	2	0	3	0	0	3	0	0
4.9-km OTL	9.7	1	2	311	6	0	0	6	[TBC]	6
70-km OTL	143	77	3	0	80	0	0	80	[TBC]	80
11-km OTL	[TBC]	20	6	2	28	0	0	28	[TBC]	28
19-km OTL	[TBC]	114	1	0	115	0	0	115	[TBC]	115
100 MW PV power plant access road	0.016	0	1	0	1	0	0	1	1	0
400 MW PV power plant access road	0.273	0	1	0	1	0	0	1	1	0
Total	[TBC]	214	35	2	254	4	10	268	36	229

[11] Mixed agriculture (i.e., crop farming and livestock rearing)

In the absence of mitigation, the termination and restriction of access to agricultural land can lead to the impoverishment of affected households, considering the centrality of land-based livelihoods in the vast majority of project-affected communities, and the limited availability of high-yielding agricultural land in certain affected districts.

CROP FARMING

Little to no active crop farming was recorded within the PV power plant and BESS sites, due to the poor (saline, arid) quality of resident soils, absence of irrigation infrastructure, and a downtrend in regular precipitation. According to agricultural experts from the Samarkand region khokimiyat, targeted land parcels constitute some of the least productive agricultural land lots within the districts of Nurobod and Pastdargom.

Extensive land take which potentially defeats the economic viability of affected crop-farming establishments is categorized as total economic displacement, which requires the acquisition of replacement landholdings with equivalent or higher economic productivity. The less extensive but permanent restriction on the cultivation of certain trees and use of high-rise machinery within the GSZ of OTLs will undercut agricultural income from orchards and similar property. Likewise, small but permanent land-take for the establishment of OTL towers may curtail crop farming within small-scale cultivation establishments (such as dekhan and tomorka farms) disproportionally.

In addition, site clearance and restrictions on agriculture within the temporary construction footprint poses the potential for (i) long-term income losses from a material reduction in perennial cultivation, and/ or (ii) short term income losses from missed agricultural cycles for annual crops. Overall, economic impacts on project-affected entities involved in livestock production include the following:

- Diminution of income levels due to material reduction or total loss of landholdings established for commercial and subsistence cultivation
- Income losses associated with the removal of standing, perennial crops
- Losses from the demolishment of immovable crop farming structures
- Expenses associated with the transportation of movable crop farm assets to replacement property
- Losses associated with work stoppage and disrupted agricultural cycles for annual crops, during construction

Potential impacts on relevant establishments along the OTL corridors are subject to review and confirmation, following the establishment of OTL tower locations and related micro-siting efforts.

LIVESTOCK FARMING AND PASTORALISM

With regard to potentially affected herders, the withdrawal of pastural land can intensify existing pressures on remnant pastures, as a large fraction of the resident population in Nurobod and Pastdargom capitalizes on herding and livestock farming, due to the relatively low agrarian potential of local land parcels. A chronically stiff competition for pastural resources can result in a non-sustainable exploitation of pastures, higher pricing of imported and locally grown fodder, and lower pastoral productivity. The pastural yield of land utilized for seasonal grazing within Nurobod and Pastdargom District is notably poor, and livestock herds are therefore rotated across extensive landscapes within the reach of local herders.

Seasonal herders who are potentially impacted by the loss of access to usable grazing areas within the Nurobod BESS and 100 MW PV plant sites are largely based in the communities of Saroy, Chortut, and Sazagan. In this connection, several alternative pastural areas were investigated over the course of LALRP-stage consultations with officials from the resident khokimiyat and SWID Committee offices, and with representatives from local livestock breeding enterprises and affected communities.

Livestock watering sources were not identified within grazing areas in the Nurobod BESS and 100 MW PV plant sites. Consultations with local herders seasonal grazing patterns and stock routes in and around the PV plant and the BESS sites did not indicate the potential for severance of access to other pastural sites during construction and operation, as a number of small community roads radiate from the main tracks located alongside the project sites.

Further, a number of other livestock farming enterprises are potentially impacted by permanent land-take for the establishment of the PV plant, BESS, and OTL facilities, and/or land-use restrictions within temporary construction footprints. These include corporate livestock breeding businesses, some of which were idle at the time of the ESIA.

Overall, economic impacts on land-users involved in livestock production can be categorized as follows:

- Diminution of income due to material reduction or total loss of landholdings established for livestock farming
- Diminution of income from the reduction in usable grazing land and seasonal pastures
- Losses from the demolishment of immovable livestock farming and/or herding structures within the project footprint
- Expenses associated with the transportation of movable livestock farming assets to replacement property or grazing areas

Potential impacts on relevant establishments along the OTL corridors are subject to review and confirmation, following the establishment of OTL tower locations and related micro-siting efforts.

GENERAL IMPACTS

In the absence of mitigation, construction-phase and permanent restrictions on access to privately held agricultural land and informally designated communal pastures will undermine agricultural productivity and related earnings. Economically displaced PAPs with pre-existing socioeconomic vulnerability (e.g., disability, chronic illness, female or headship, informal tenure, and extreme poverty) are particularly prone to extreme hardship and destitution, given a substantially lower capacity to cope with economic shocks resulting from the loss of livelihood assets and associated income streams. Further, PAPs directly engaged in land-based livelihoods are inherently less resilient to the loss of productive landholdings. The matrix below provides the cumulative count of vulnerable PAHs identified over the course of the LALRP survey, and the frequency of each vulnerability element. A total of five PAHs were categorized as vulnerable.

Table 14-13 Number of vulnerable PAHs by socioeconomic vulnerability category

NO	ELEMENT OF VULNERABILITY	NUMBER OF PAHS
1	Physical and/or mental disability	4
2	Chronic illness	1
3	Female household headship child	-
4	Child-headed households	-
5	Informal tenure of affected landholdings/ resources	-
6	Extreme poverty	-
7	IP or refugee status	-
Total number of vulnerable PAHs		***5***

Risk factors relevant to the re-establishment of impacted livelihoods to an equivalent or larger extent in relation to the PAP's pre-project income earning capacity and living standards include (but are not limited to) the following:

- Lack of timely compensation for the reinstatement of livelihood assets at full replacement value (e.g., demolished buildings, closed boreholes etc.)
- Provision of in-kind compensation (replacement property) with a lower productive potential or profitability, relative to that of withdrawn property, and/or unviable distance from PAP's residential locations
- Once-off disbursement of cash compensation without the delivery of basic financial management trainings to PAPs with land-based livelihoods, low-income background, little to no banking experience, and limited knowledge of real

estate procurement and investment means to insure against financial dependency

- Lack of transitional support over the time period leading up to the restoration of prior income levels (e.g., relocation/ transportation assistance, capacity development trainings for pre-project or alternative livelihoods, credit facilities etc.)

Risks related to project-driven economic displacement will be minimized to achieve a low to moderate residual significance, through the implementation of broad-based mitigation commitments, including the lawful provision of eviction notices, delivery of compensation at full replacement value prior to the onset of eviction or access restriction, and need-based supplementary assistance to aid the restoration of lost or stifled livelihoods. In-kind (land-for-land) compensation will be offered and delivered to PAHs with land-based livelihoods, to the extent feasible (i.e., where replacement land is available).

The Project Developer will seek to ensure that remedial commitments are delivered upon, in line with the entitlements, safeguards and critical timelines specified in the project LALRP.

14.4.1.3 Accidental damage to public property and utility service interruptions

The Project's construction phase will involve a varied range of construction operations, including transportation of workers and haulage of heavy machinery and materials, land clearance, and earthworks. A number of specific construction activities present a high risk of inadvertent physical damage to private and public property, outside of the areas demarcated for construction works, which potentially include:

- Intensive compaction works can generate ground-borne vibration at a magnitude that can result in discernible damage to built-up structures. The probability of these damages occurring is primarily dependent on the intensity of ground compaction and intervening distance to nearby buildings, as elaborated in Section 8.4.1.2 of this report. The risk of structural damage is potentially higher for buildings with compromised structural integrity from other underlying factors.
- Ground excavation works can also result in accidental damage to private and public/ utility property. Such damages can occur in instances where marginal deviations from excavation perimeters encounter underground utility assets (e.g., water pipes, underground gas pipelines, telecommunication cabling) and private assets (i.e., crop farms and resident trees etc.). Any impact with high-pressure gas pipelines during foundation works for the installation of the 70-km OTL poses the risk of casualties, catastrophic damage, utility service interruptions, and associated economic losses.
- Civil works involving the alteration and/or construction of drainage systems potentiate inadvertent overflows that can extend towards nearby (off-site) establishments such as communal dirt roads, crop farms, aquacultural ponds and residential establishments.
- Stockpiling and unloading of aggregates and debris within laydown areas and dumping sites can cause inadvertent damage to nearby property (e.g., crop

farms, water sources, aquacultural ponds etc.), especially in instances where the property boundaries are inconspicuous and immediately adjacent to working areas.

- Traffic-related property damage, which includes potential damage to private and public property due to accidental impact from off-roading, incidents involving project vehicles, or accidental damage to overhead cabling during the transportation of high-rise (bulky) equipment. This impact also includes potential damage to unpaved roads, culverts and bridges from the passage of overweight haulage vehicles, and property damage (to road furniture, trees etc) from wide-load haulage.

Besides H&S risks to construction workers and third parties, accidental property damage from the above-mentioned activities can result in the loss of livelihoods assets, resources, and consequent economic losses. Depending on the severity of impact, potential receptors can be subjected to a disruption of essential social and industrial services (e.g., water, gas supply and telecommunication) and associated economic shocks.

14.4.1.4 Increased pressure on public infrastructure and resources

The Project's construction phase poses the risk of heightened pressure on public infrastructure and communal resources, as a result of the following:

- Additional, large demand for water in areas with existing water shortages (i.e., Nurobod district in particular)
- Direct demand for waste management services and facilities, for the disposal of construction waste
- Indirect demand for accommodation facilities and basic social services, as a result of construction-phase labour influx

Construction activities will demand a substantial amount of water, fuel and power. The provisioning of these resources for construction purposes may put a strain on locally available sources of high-quality water, fuel stations and power grid. In Nurobod District, water shortages normally occur in the Spring, whereas power outages are commonplace within all of the project-affected districts during the Winter. Project construction works are also estimated to generate 600 tonnes of waste, which may overwhelm local capacity for waste management within project-affected districts and Tashkent Region at large.

Furthermore, the in-migration of foreign construction workers and local jobseekers from neighbouring districts and regions can create a steep demand for limited public services and facilities. Specifically, access to housing and healthcare centres may become strained in the event that a significant fraction of the construction workforce settles within the host communities. Water supplies for construction activities will likely be tankered to construction sites, considering the saline quality of groundwater in the central project locations (i.e., Nurobod and Pastdargom Districts). Nevertheless, further consultations will be undertaken with

local authorities (i.e., district-level water resources departments) to designate water supply service providers to enable steady (at the peak of construction) without excessive pressure on public water sources used for domestic water supply.

Potential impacts on waste management and transportation infrastructure are discussed in Section 7 and Section 13 of this report respectively.

14.4.1.5 Transient inflation within host communities

The Project's construction phase will create an appreciable demand for construction materials, sustenance supplies (including fresh produce), and miscellaneous support services that can be sourced from local communities at a relatively low cost.

A sustained increase in demand for locally available products and services raises the potential for commercialization of the subsistence-oriented economies existent in some of the project-affected communities. Besides potential increases in the pricing of in-demand commodities and facilities, the responsive transition to a cash-based economy may lead to the emergence of profit-maximizing markets. While these market conditions may benefit the project organization and SMEs, the resultant rise in local living costs poses conversely adverse implications for low-income residents within host communities, especially smallholder communities where crop productivity is already challenged by barren, non-irrigated land (i.e., most affected communities in Nurobod District).

Likewise, housing inflation can potentially add to the economic hardship of financially insecure households and thereby contribute to further impoverishment.

14.4.1.6 Employment creation and capacity transfer

The Project's construction phase is set to employ a peak workforce of ~700 workers, with Uzbekistan nationals anticipated to constitute about 40-60% of the labour. Beyond the extension of skilled and semi-skilled employment on a direct basis, the project will engage numerous local service providers (i.e., contractors) and petty traders (i.e., secondary supply chain), and thereby incentivize the formalization of local SMEs. Potential demand for local offerings within the project-affected communities will abate the current levels of unemployment and contribute to local economic development through income generation and tax returns.

Furthermore, the dissemination of transferable and specialist skills over the course of construction-phase employment will enable capacity transfer, which is anticipated to boost the employability of local recruits and create spill-over benefits for other developments within the project-affected districts, region, and the country at large.

Table 14-14 Overview of potential impacts relating to local livelihoods and social infrastructure (socioeconomics) during construction

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Physical displacement	19-km LILO OTL corridor in Nurobod District	Major	Affected residents	High	**Major**	**Minor/ Moderate**
Economic displacement	PV power plant, BESS and OTL sites within the project-affected communities	Major	Affected herders, crop farmers, and fish farmers	High	**Major**	**Minor/ Moderate**
Accidental damage to public property and utility service interruptions	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Major	Affected residents within project-affected communities	High	**Major**	**Minor/ Moderate**
		Moderate	Affected utilities	Medium	**Moderate**	**Minor**
Increased pressure on public infrastructure and resources	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Moderate	Residents within project-affected communities, districts, and broader Tashkent Region	High	**Moderate/ Major**	**Minor**
			Utilities and social service providers	Medium	**Moderate**	**Minor**
Transient inflation within host communities	Affected communities located nearby the PV power plant, and BESS sites	Moderate	Local communities	High	**Moderate/ Major**	**Minor**
Employment creation and capacity transfer	Affected communities, wider districts and Uzbekistan at large	Moderate	Local labour force	Minor	**Minor Positive**	**Moderate Positive**

IMPACT AVOIDANCE, MITIGATION AND OFFSET MEASURES

Physical and economic displacement

- The assessment of impacts associated with project-related land acquisition and involuntary resettlement, and due livelihood restoration planning, will be carried out by means of a Land Acquisition and Livelihood Restoration Plan (LALRP).

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• The assessment of the Project's resettlement (physical and economic) impacts and provisions for livelihood restoration will be based on a full-scale PAP census, socio-economic and asset surveys. • The above-mentioned LALRP surveys will seek to identify all permanent, seasonal, formal, semi-formal, informal, private and communal/public land-use within the full extent of potentially acquired land. • The LALRP census and asset inventory surveys will be implemented with a widely publicized cut-off date to minimize potential livelihood impacts on any subsequent opportunistic settlers or claimants who will not be considered eligible for compensation based on spurious claims. • Based on the full inventory of potentially impacted land rights holders, the LALRP will make adequate provisions for compensation entitlements and supplementary assistance. • While economically displaced entities will be offered both cash and in-kind compensation, vulnerable PAPs and PAPs whose affected livelihoods are centrally dependent on land and natural resources will be offered in-kind compensation by default. • Livelihood restoration measures will include all practicable means to ensure full and equitable delivery of LALRP benefits to married men and women residing in joint households. • LALRP provisions will be needs-based and gender-informed, to ensure that the living conditions, income status and overall welfare of entities subject to economic displacement are enhanced, or at least sustained to an equivalent extent, relative to pre-project levels. • Compensation and/or transitional support for potentially impacted physical assets, ecosystem services (common resources) and income streams will be provided prior to the onset of impacts and at full replacement value. • Any communal property potentially displaced by the Project will be re-established at suitably situated locations, in close consultation with affected residents and local administration within affected makhallas and districts. • The LALRP will further provide for the monitoring and evaluation of livelihood restoration commitments, to ensure that any shortfalls in implementation outputs, outcomes and impacts relative to pre-set Key Performance Indicator (KPI)targets are identified and remediated. • The Stakeholder Engagement Plan (SEP) for the project will be aligned with the LRP to inform potentially project-affected households and communities about the land acquisition and livelihood restoration process. • The Project's community GRM and relevant sensitization efforts should also be aligned with the LALRP to enable the collection of grievances pertaining to land access and livelihood restoration on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. The GRM will include at least one female CLO to enable dedicated channels for reporting gender-sensitive issues. **<u>Accidental damage to public infrastructure and utility service interruptions</u>** • Construction zones and working areas will be demarcated using temporary fence walls and barricading. • All construction activities will be restricted to demarcated construction zones within the project sites and designated transit corridors.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Continual stakeholder engagement during construction will seek to ensure that communities based around the project sites and nearby residences in particular are notified regarding imminent high-impact noise or vibration, in advance of construction work. • For the PV plant and BESS sites, visual inspection survey will be conducted before the start of any intensive compaction and pile-driving works close to nearby third-party buildings (i.e., within 300 metres), to facilitate future investigation into structural damage attributed to ground vibration from construction works. The survey should be repeated following the completion of such works to identify any unreported damages, for the same purposes. • Utility and drainage clearance surveys based on visual inspections and consultations with local authorities (and where necessary, radar equipment) will be undertaken prior to the establishment of excavation, stockpiling, and construction zones, to identify any buried and above-ground utility assets and drainage infrastructure. Particular attention will be given to the gas pipelines and existing electricity transmission and distribution facilities located within the project sites and their vicinity. • The construction of OTL tower foundations within 500 metres of operational gas pipelines will not begin without consultation with the relevant AsiaTransgaz, Uztransgaz and Hududgaz offices, for an official agreement on potentially applicable technical conditions, setbacks and expert supervision. • Stockpiling zones and laydown areas outside of the main project sites (e.g., along the interconnection cable route) will be clearly demarcated to increase the visibility of designated working areas. • A traffic study will be carried out along transit corridors to be used for the transportation of abnormal loads to determine sufficient clearance. • Relevant permits and approval will be obtained from relevant departments within the resident district khokimiyats, regional highway administration, and the State Road Safety Service offices. • Any temporary blockage of existing drainage and irrigation channels to enable construction works will be avoided to the extent feasible, and drainage bypasses will be constructed where necessary, under the supervision of the irrigation departments of resident district khokimiyats and Ministry of Water. • In the event that the EPC Contractor is mandated to carry out the transportation of waste consignments to off-site waste management facilities, the EPC Contractor shall apply due care in preventing damage to third party waste management assets (e.g., municipal waste management facility assets) and any disruption of associated waste processing operations. • In the event that the EPC Contractor is mandated to carry out the transportation of waste consignments to off-site waste management facilities and accidental damage to any assets within the recipient facility occurs (i.e., upon transit and discharge), the EPC Contractor shall notify all relevant authorities of the incident immediately and coordinate with the operators/ owners of the facilities for immediate repair of damaged assets. • All grievances, claims and observations pertaining to incidental damages associated with construction activities will be recorded and investigated by expert representatives from the EPC Contractor's construction units, local government authorities and utilities (as appropriate).						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance

Follow-up valuation will be undertaken by a qualified government valuer and due monetary or in-kind compensation will be issued at full replacement value.

- Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to incidental property damage on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse.

Increased pressure on public infrastructure and resources

- Local recruitment will be leveraged (for semi-skilled labour in particular) to minimize the pressure on local accommodation, healthcare, water and power supply facilities.
- Follow-up engagement will be carried out with resident district khokimiyats and utilities to ensure that utility and communal infrastructure utilized for the Project's construction phase (i.e., including medical service centres, water supply utilities, waste management service providers and law enforcement agencies) have sufficient capacity to address the Project's demand for social and utility services.
- Medical service facilities (i.e., project clinics) will be established to provide basic medical services to construction workers, prior to ad-hoc referral to well-equipped and nearby hospitals.
- Private hospitals with advanced medical facilities will be utilized to the extent feasible, in preference to public clinics and hospitals located nearby the project sites and labour accommodation centres.
- Off-grid power sources will be utilized for construction activities during periods power shortages and power rationing.
- Dedicated access roads will be established within the Project's transit corridor to isolate project traffic, to the extent feasible.
- Project traffic will be organized to avoid peak traffic hours and traffic congestion hotspots to the extent feasible, in consultation with relevant local authorities.
- Project logistics will be implemented to ensure convoys of construction vehicles (and Heavy Goods Vehicles in particular) are dispatched with maximal load to minimize the number of consignments/ delivery trips to the project sites.
- Transit service for construction labour will include staff buses, to curb the volume of project traffic.
- Commuting assistance (i.e., staff buses) will be provided to workers based within a considerable radial distance from the project sites to reduce the pressure on accommodation facilities within local communities located nearby the project sites.
- Subsequent engagement with Local Government Authorities (i.e., district and regional khokimiyats) will be carried out to identify municipal and commercial waste management facilities with adequate capacity for the treatment and/or disposal of various construction waste streams.
- Subsequent engagement with Local Government Authorities (i.e., district and regional khokimiyats) will be carried out to identify registered and licensed municipal and commercial waste management contractors.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Municipal and commercial waste recycling contractors within the affected districts and region at large will be identified and engaged for the recovery of materials from recyclable construction waste. • Regular monitoring of municipal and commercial waste management service providers will be undertaken to ensure the entities are licensed throughout the duration of services, and the license details of any such service providers will be documented in the Project's E&S permit register and waste transfer log. • A Waste transfer log will be maintained to record and track the generation, storage and segregation of various construction waste streams, as well as the dispatch of waste consignments for off-site treatment and/or disposal, with details on waste management contractors, chain of custody, transportation route to the designated waste management facilities. • Water abstraction permits will be obtained from relevant authorities during the Project's construction and operational phase (i.e., for water abstraction from rivers, canals or aquifers). • Water will not be abstracted from irrigation channels close to the project sites. • Soil, surface water and groundwater pollution prevention and control measures (i.e. including the isolation of waste and chemical storage areas, controlled handover to waste management contractors and effective spill response procedures etc.) will be implemented to avoid and mitigate accidental contamination of sensitive aquifers, drainage channels, irrigation canals and rivers). • Water conservation measures will be implemented, including the use of water-efficient toilets and faucets, maintenance checks to identify and prevent water distribution system losses, and rainwater harvesting where possible. • Water abstraction permits (and any requisite prior risk assessment) will be obtained from the Ministry of Water Resources (i.e., district and regional offices) and Ministry of Ecology, Environmental Protection and Climate Change. • Excavated soil will be stockpiled and preserved within dedicated sites to enable its reuse in backfilling excavations and landscaping as part of site rehabilitation post the completion of construction works. • Induction and refresher trainings for all direct and contracted construction workers will include sensitization to conservation of water and other raw materials, re-use of various products and materials, segregation of waste at source to enable subsequent composting, recycling, treatment, energy recovery and disposal at designated (off-site) waste management facilities. • Regular coordination will be made with relevant authorities on permitting requirements and H&S measures for any instances of on-site storage and project-related transportation of hazardous materials and waste in quantities that exceed regulatory thresholds. • A dedicated Water Management Plan, Soil Management and Erosion Control Plan, Hazardous Materials and Waste Management Plan, Waste Management Plan, Traffic Management Plan, Worker Accommodation Management Plan, Community Health and Safety Plan, Local Recruitment Plan, Influx Management Plan, and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to overburdened utility or communal infrastructure and common resources on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. • Affected communities will be notified about any interruptions to social services resulting from the project, and informed about when any such interruptions are resolved. The project CLOs will engage with local communities on a regular basis to identify any issues/ grievances not submitted through the GRM. **Transient inflation within host communities** • Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to project-induced inflation within host communities on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. • If substantial project-induced inflation is reported as a major (frequent) grievance, the project will consider alternative markets and service providers that are based outside of the project-affected communities. • The procurement process for locally based supply chains will involve qualification criteria focused on index-based pricing. • Commuting assistance (i.e., staff buses) will be provided to workers based within a considerable radial distance from the project sites to reduce the pressure on accommodation facilities within local communities located nearby the project sites. **Employment creation and capacity transfer** • A Human Resources (HR) Policy will be instituted for the project. The policy will highlight a commitment to local content. • The Project's HR Policy will be contractually cascaded from the Project Company down to the EPC Contractor, and any first-tier and/or second-tier recruitment agencies, to ensure that the policy provisions are applied to all contracted labour and supply chains associated with the Project's core business processes during construction. • Employment for the Project's direct and contracted labour as well as the procurement of services from supply chains will be implemented at the community, district, regional and national levels, in order of decreasing priority. • The promulgation of employment opportunities within project-affected communities, districts and the wider region will be undertaken by means of (i) newspaper advertisements, (ii) public announcements by relevant LGAs, (iii) posts at vocational training institutions, (iv) posts at project site entry points, and (v) local community engagements by dedicated CLOs. • Construction-phase recruitment will involve equal-opportunity eligibility criteria based around inherent job requirements (e.g., educational attainment, professional experience, fitness for work etc.), with priority consideration for Uzbekistan nationals. The recruitment process will be free of discrimination on the grounds of gender, ethnicity, religion, income status and other attributes of no bearing on inherent job requirements.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• A minimum (threshold) set of employment vacancies will be reserved for female job candidates from local communities, based on feedback recorded in the project SEP, and these opportunities will be publicized within the project-affected communities such that women are encouraged to apply for suitable jobs under the Project. • Suitably qualified service providers based within the project-affected communities, districts, Tashkent Region, and wider national markets (in order of decreasing priority) will be identified, evaluated and listed in an internal procurement database. Procurement of construction goods and services will provide priority consideration for local service providers. • All project employees and contracted workers will have equitable access to relevant on-the-job trainings, which will enable the dissemination of specialist and transferable skills within the Project's construction phase. • The project HR policy and procurement plans and procedures will include provisions for retaining staff post demobilization/ completion of contract terms, where possible. • Career development programs such as internships, mentorships and professional development plans will be provided for various tiers and sections of project employees and contracted workers, particularly skilled workers paired with expatriate experts not readily available in Uzbekistan. • A Local Recruitment Plan, Labour and Working Conditions Management Plan and Sub-Contractor and Supplier Management Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented.						

14.4.2 Operational phase

14.4.2.1 Augmented power supply and associated economic growth

Over its operational lifetime, the Project will deliver a total 31,623,430 MWh of electricity to the national grid. The added power generation and storage capacity will play a crucial role in addressing the power emergency within the project-affected regions and the country at large. With this contribution, the project is anticipated to bolster economic growth and improve living conditions by reducing dire power outages.

Table 14-15 Overview of potential impacts relating to local livelihoods and social infrastructure (socioeconomics) during operation

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Augmented power supply and associated economic growth	Project-affected regions and Uzbekistan at large	Major	Beneficiaries within grid service areas (i.e., residential, commercial, industrial, and institutional establishments)	Medium	**Moderate/ Major**	**Major**
IMPACT AVOIDANCE, MITIGATION AND OFFSET MEASURES **Augmented power supply and associated economic growth** • Maintenance programs will be developed and executed to ensure efficient power generation for the duration of the Project's operational phase, and equipment will be replaced as prescribed by manufacturers.						

14.4.3 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, several potential impacts relating to local livelihoods and social infrastructure will be similar to those in the construction phase. Specifically, this set of impacts potentially includes:

- Accidental damage to public infrastructure and utility service interruptions
- Increased pressure on public infrastructure and resources
- Employment creation and capacity transfer

For the avoidance and mitigation of these impacts, relevant impact management measures specified in Section 14.4.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

14.5 Monitoring Requirements

Table 15-1 below provides an overview of the key monitoring arrangements for evaluating performance against applicable standards relating to local livelihoods and social infrastructure, in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 14-16 Monitoring arrangements for impacts and preventative and mitigation measures relating to local livelihoods and social services

E&S Impact	Key Performance Indicator/ Parameter	Target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Resettlement impacts (i.e., economic displacement)	**Please refer to the Project's Land Acquisition and Livelihood Restoration Plan (LALRP) for relevant monitoring requirements**				
Incidental damage to third party property	Grievances concerning incidental damage to public or private (third party) property	- All related grievances are closed out within the shortest practicable duration	- Community Grievance Log	Ongoing	- EPC Contractor CLOs
Increased pressure on public infrastructure and resources	Grievances concerning project-related burden on utility and communal infrastructure and resources	- All related grievances are closed out within the shortest practicable duration	- Community Grievance Log	Ongoing	- EPC Contractor CLOs
All socioeconomic impacts	Percentage of community engagements (e.g., FGDs, community meetings) completed in line with the SEP and quarterly schedule.	- 100% of planned community engagements have been completed in line with the SEP	- Stakeholder Engagement log - Meeting minutes and attendance sheets	Ongoing	- Project Company CLOs - EPC Contractor CLOs

15 COMMUNITY HEALTH, SAFETY AND SECURITY

15.1 Legal Requirements and Standards

15.1.1 National laws and regulations

15.1.1.1 Constitution of the Republic of Uzbekistan (1992)

The constitution of the Republic of Uzbekistan lays out an array of constitutional rights, entitlements and duties pertaining to public health and safety, and access to judicial remedies for criminal offences. Key articles in this connection include the following:

- Article 25 states "The right to life is an inalienable right of every human being and shall be protected by law".
- Article 26 states "Human honour and dignity are inviolable. Nothing may be a basis for their derogation. No one shall be subjected to torture, violence or other cruel, inhumane, or degrading treatment or punishment.
- Article 27 states "Arrest, commitment, and confinement are allowed only by a court decision. Without a court decision, a person may not be detained for more than forty-eight hours".
- Article 40 states "Everyone shall have the right to a favourable environment, reliable information about its condition.
- Article 48 states "Everyone shall have the right to health and qualified medical care".
- Article 55 states "Everyone shall be entitled to legally defend his/her rights and freedoms and shall have the right to appeal any unlawful decisions, acts and omissions of State bodies and other organizations, their officials".

15.1.1.2 Resolution of Cabinet of Ministers of Republic of Uzbekistan No.95 on the approval of general technical regulations of environmental safety (2020)

Provides for the establishment of health protection zones and isolation measures for energized national grid components, including electrical sub-stations and powerlines. These exclusion zones and safeguards are intended to prevent negative impacts on human health and ecological receptors, including exposure to hazardous levels of electromagnetic radiation, electrocution, and collision-related avian mortality.

15.1.1.3 Decree of the Cabinet of Ministers of the Republic of Uzbekistan No.1050 on approval of rules for protection of power grid facilities (2018)

This decree establishes the procedure for mandating Grid Security Zones (GSZ) for power grid facilities, as well as special conditions for using land located within these exclusion zones, to

ensure sustainable operation of the said facilities, with minimum risk to public health and safety, as well as vulnerable wildlife.

Grid Security Zones for power grid facilities shall be established on both sides of the power transmission line from the outermost wires and along the perimeter of substations at the following distances for voltages:

- 110kV – 20 meters from each outer-most conductor
- 220kV – 25 meters from each outer-most conductor
- 500kV – 30 meters from each outer-most conductor

The Grid Security Zones (GSZ) applicable to the protection of the Project's 220 kV OTLs is 25 metres from the outermost conductors.

15.1.1.4 San Rules & Norms No. 0236-07 – Sanitary norms and rules to ensure safety for people living near high voltage power transmission lines (2007)

This regulation prescribes the Health Protection Zone (HPZ) for overhead transmission lines planned within areas including human settlements and establishments. The extent of mandatory HPZ is commensurate with the voltage rating of overhead powerlines. The HPZ serves to safeguard the public from hazardous exposure to electromagnetic fields radiating from high-voltage powerlines.

The lateral extent of the HPZ is measures from the outermost conductors along a given overhead transmission line alignment, as follows:

- Up to 110kV/m – 10 meters from each outer-most conductor
- Up to 220kV/m – 15 meters from each outer-most conductor
- Up to 330kV/m – 20 meters from each outer-most conductor
- Up to 500kV/m – 30 meters from each outer-most conductor
- Up to 570kV/m – 40 meters from each outer-most conductor

15.1.1.5 Law on protection of women from harassment and abuse (2019)

The national law provides for the protection of women from all forms of harassment and abuse. While violence against women is recognized in the Criminal Code of Uzbekistan, provisions for the registration, investigation, and prosecution of GBV are not prescribed in the Code.

In furtherance of the Code, the Act established specific procedures for the management of GBV cases for relevant law enforcement authorities and mandates the provision of medical, psychological, legal, economic, and humanitarian support to victims of GBV. In 2020, systems for the issuance of protection orders for victims of GBV were fully instituted across the country.

15.1.1.6 Resolution on measures to improve the system of social rehabilitation and adaptation, and the prevention of domestic violence (2018)

The Resolution No. PP-3827 of the Head of the State dated 07.02.2018 "On measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence" identifies priority areas for improving the system of social rehabilitation and adaptation, prevention of family and domestic violence, and approved the program of practical measures to improve the system of social rehabilitation and adaptation, as well as the prevention of domestic violence.

The Resolution provides for the following key measures:

- Priority areas include improving the social system of rehabilitation, adaptation and preventative measures against domestic violence.
- A program of practical measures to improve the system of social rehabilitation, adaptation and prevention of domestic violence.
- A Center for Rehabilitation and Adaptation for victims of violence, as well as the prevention of suicides in territorial divisions of the Women's Committee of Uzbekistan.
- Public "hot line" on number "1146", for provision of emergency psychological, psycho-therapeutic and legal support and information about organizations that may provide additional assistance.

15.1.1.7 Other relevant legislation

The list of laws and decrees with broad provisions for the protection of public health, safety and security, and other human rights in the context of public wellbeing, includes:

- Decree No. 964 of 5 December 2017 on measures for improvement of the activity of self-government bodies aimed at ensuring employment, firstly for the youth and women
- The National Human Rights Strategy was approved by Presidential Decree on 22 June 2020. No. PD-6012
- Law on guaranteeing equal rights and opportunities for women and men (2019)
- The Law on mediation (2018)
- Law on public control (2018)
- Law on administrative procedures (2018)

15.1.2 Lender Requirements

15.1.2.1 ADB

- Under ADB Safeguard Requirement 1: Environment, the assessment of community health and safety is required in ESIA.

- Specifically, 'The borrower/client will identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.'
- This includes reasonably foreseeable incidents, accidents, and natural impacts (due to the Project) and requires affected communities to be informed. Appropriate provisions must be in place to plan for such events.

15.1.2.2 IFC and EPFIs

IFC Performance Standard 4 prescribes requirements to safeguard local communities from potential risks associated with the Project including impacts associated with introduction of communicable disease, site access and operation, material use etc. The key objectives of PS4 are:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

15.2 Baseline Conditions

ESIA-stage literature review, household socioeconomic survey, and consultations with relevant authorities at the makhalla, district, and regional levels were carried out to obtain information on the health, safety and security context of the project-affected communities, districts, and regions at large. The findings of these studies are discussed in the following sections.

15.2.1 Local morbidity and access to healthcare

15.2.1.1 Local morbidity

At the time of this assessment, information on the prevalence of diseases within the project-affected districts in Samarkand Region was not publicly available. Table 15-1 below presents national statistics for the most prevalent communicable and parasitic diseases in Uzbekistan, over the period 2020-2022.

Table 15-1 Prevalence of infectious and parasitic diseases in Uzbekistan

DISEASES	PREVALENCE (CASES PER 1,000 PAX)		
	2020	2021	2022
Acute intestinal infections	18.9	31.6	58.4
Bacterial dysentery	0.3	0.7	0.9

Salmonella	0.4	0.5	0.7
Typhoid fever and Paratyphoid A, B, C	1	-	2
Respiratory infections	432	525	659
Viral hepatitis	11.5	7.9	29.5
Scarlet fever	1	0.9	3.9
Pertussis	39	2	3
Measles	4.3	-	7
Meningococcal infection	7	7	4
Brucellosis	418	548	546

As shown in Table 15-1 respiratory, gastro-intestinal, and zoonotic infections, and viral hepatitis account for the majority of communicable and parasitic diseases reported within the country.

With regards to morbidity within the project-affected communities, the ESIA-stage socioeconomic survey with project-affected communities based around the project sites revealed that predominant diseases within these settlements include acute respiratory infections and cardiovascular conditions. The chart below indicates the relative frequencies of medical conditions reported by surveyed households.

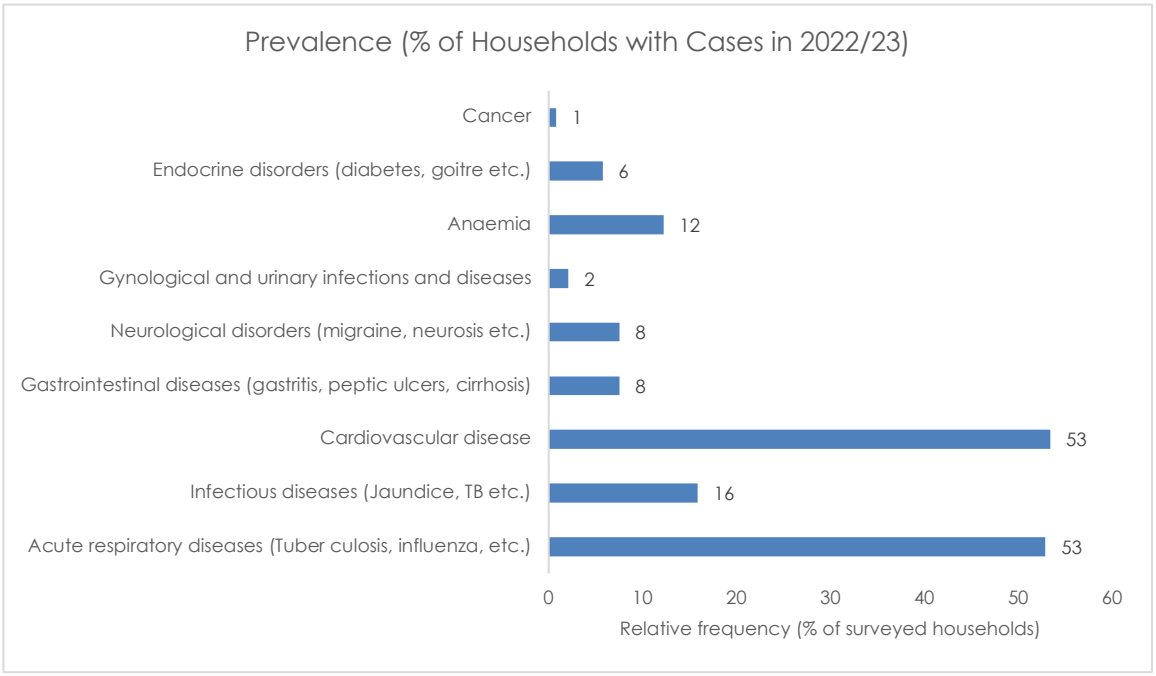


Figure 15-1 Prevalence of various diseases within project-affected communities

15.2.1.2 Access to healthcare

According to national statistics, Uzbekistan's health sector is beset by a shortage of medical practitioners. For the country at large, for every 1,000 residents, the ratio of general doctors to patients is 1:358, while the ratio of average medical workers to residents is 1:94. Access to medical facilities in rural and peri-urban areas is also limited, as one polyclinic serves one to two makhallas (communities) with basic outpatient and emergency services. For advanced and specialized medical services, patients are referred to district and regional hospitals.

Survey results indicate that over 90% of surveyed households within the project-affected communities have access to healthcare facilities within 700 metres of their residential locales. The majority (70%) of survey respondents indicated that they are generally satisfied with the healthcare services available to them, while 22% expressed dissatisfaction with medical facilities and services from local healthcare facilities.

15.2.2 Sanitation and Waste Management

Information on existing facilities for sanitation and waste management with the project-affected communities, districts and regions is provided in Section 7.2 and Section 14.2 of this report.

With regard to public health in the context of environmental pollution, the following authorities are mandated to undertake technical monitoring to ensure compliance with national laws, regulations and guidelines on pollution control and waste management:

- Ministry of Ecology, Environmental Protection and Climate Change – Review and approval of national EIA studies to establish management and monitoring plans for potential impacts related to various development projects.
- Ministry of Health – Regulation and monitoring of the storage, transportation, treatment, utilization (re-use) and disposal of hazardous materials (including hazardous waste streams), in collaboration with the Centre for Sanitary and Epidemiological Supervision.
- Ministry of Mining Industry and Geology – Monitoring of hazardous geological processes and permanent monitoring of groundwater quality, in collaboration with the State Committee on Geology and Mineral Resources.
- Ministry of Emergency Situations – Regulation, inspection and coordination of emergency response facilities and service providers, to ensure successful rescue and public safety in the event of catastrophic and life-threatening contingencies within human settlements and establishments.
- Labour inspectorate undertakes audits relating to labour and working conditions within registered workplaces (with relevant health and safety monitoring).

15.2.3 Security

According to official statistics, the regions of Tashkent and Samarkand rank second and third, with regard to crime rates in recent years. In 2023, the number of crime cases registered in Tashkent Region was 12,430, while that reported for Samarkand was 7,843. According to the United Nations Office on Drugs and Crime, delinquent youth account for 20-30% of crimes recorded in recent years.

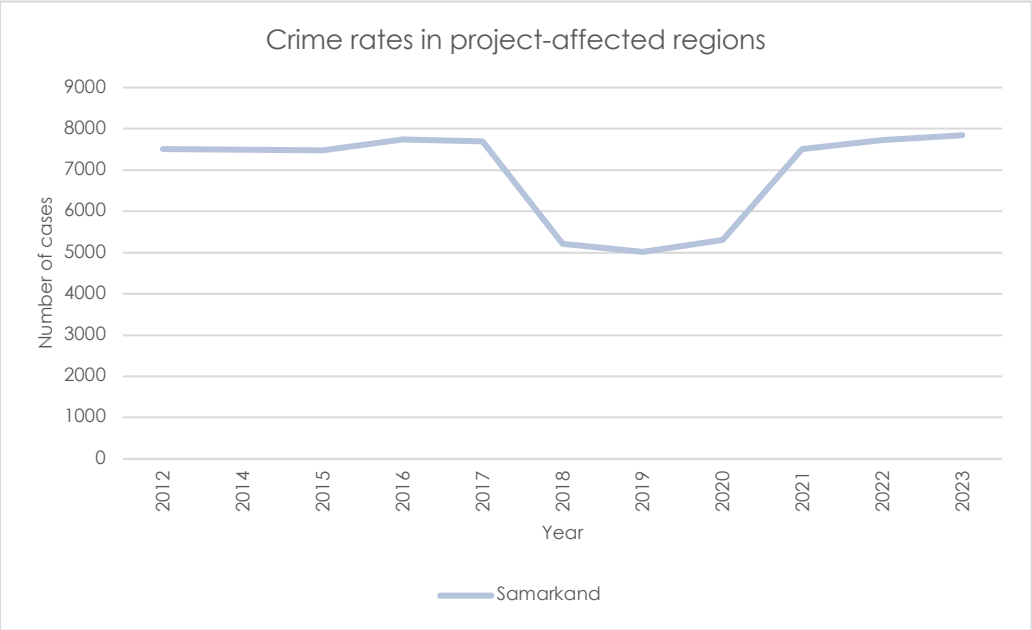


Figure 15-2 Crime trends in project affected region over the past decade

The Ministry of Internal Affairs of the Republic of Uzbekistan is overall responsible for law enforcement and public security in Uzbekistan. Implementing agencies under the ministry include:

- Internal troops
- Uzbekistan National Guard (including local patrol units)
- Police force
- District-level departments of the Ministry of Internal Affairs
- Commercial security service providers

The National Guard is mandated to provide permanent security services for strategic national assets including (but not limited to) power generation and storage facilities.

15.2.4 Gender-based violence, harassment, and exploitation

The cultural context of Uzbekistan is characterized by patriarchal customs, which have historically influenced gender equality in the spheres of education, employment, and national politics. With regard to the prevalence of gender-based human rights violations within the country, various forms of violence, harassment and exploitation have been reported in recent years. A rise in the incidence of Gender-Based Violence (GBV) was reported in the wake of the COVID-19 pandemic and the period leading up to economic resurgence. The most recent GBV survey under the Ministry of Internal Affairs indicates that in 2020, local law enforcement agencies issued more than 8,430 protection orders to ensure the security of GBV victims. Law enforcement records showed that 4,330 of these cases involved physical abuse, with emotional abuse accounting for the remainder of the cases.

Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) held as part of the ESIA indicate that no instances of gender-based violence and harassment have not been reported in the project-affected communities and wider districts, in relation to construction labour for development projects. However, a few cases of domestic (spousal) abuse and petty crimes involving female victims were cited within the districts of Nurobod, Jomboy, Sharof Rashidov, Zafarobod. Local authorities and community members indicated that the following entities provide several forms of support for victims of gender-based violence:

- Department of internal affairs, in district khokimiyats
- Local police and prosecution offices
- Public safety inspectors
- Department for gender equality and the protection of women's rights, in district khokimiyats
- Women leaders involved in makhalla committees
- District medical associations

Local women leaders constituting makhalla committees play an instrumental role in managing GBV. These matriarchs are appointed by residents, based on demonstrable insight into social issues within their respective communities, experience in community work, and a strong local standing. They are also entrusted with monitoring women's affairs and preparing periodic plans for interventions to assist vulnerable female residents and female-headed households.

Competent authorities designated for GBV response provide medical, psychological, legal and subsistence support to GBV victims, free of charge. Medical aid is provided through local polyclinics, while social counselling is provided by women leaders representing the relevant makhalla committees and district khokimiyats. Local law enforcement, notably police offices and public safety inspectors provide legal orientation and execute prosecution as

appropriate. Safety certificates are issued for victims requiring extended protection from perpetrators/ offenders. Welfare and bespoke livelihood support initiatives are also provided on an ad-hoc basis, whereby vulnerable GBV victims are registered on the 'Notebook of Women in Need' (i.e., Ayollar Daftari). The GBV response measures are provided free of charge.

15.2.5 Emergency response and rescue services

In Uzbekistan, training, planning and emergency response to fire, floods and other disasters is coordinated by the Ministry of Emergency Situations. Civil emergency warning, response and rescue service providers include:

- Regional departments for emergency response and rescue services and district fire brigades, which operate directly under the Ministry of Emergency Situations.
- Territorial operational management centres for forecasting emergency (natural disasters) and monitoring public safety, which operate under the National Centre for Management and Response to Emergency Situations.

A number of commercial fire response and rescue entities also provide fire emergency services, particularly within urban centres in Samarkand Region.

15.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential impacts on community health and safety within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is provided for each relevant receptor.

Table 15-2 E&S impact receptors – Community health and safety

RECEPTOR	SENSITIVITY	JUSTIFICATION
Local communities and the general public	High	Residents within affected communities located around the project sites have a potentially high vulnerability to various health, safety and security incidents, due to a lacking awareness around construction H&S safeguards and protective equipment.

15.4 Potential Impacts and Management Measures

15.4.1 Construction Phase

15.4.1.1 Spread of communicable diseases and increased local morbidity

National health statistics and the ESIA-stage stakeholder consultations revealed that the most prevalent diseases within the project-affected districts include Hepatitis A, various respiratory

infections, such as Tuberculosis, and several life-threatening vector-borne diseases. Underlying contributors to the local morbidity within some of the project-affected districts include inadequate water supply and sanitation, and lacking access to specialized healthcare facilities.

The influx of migrant male workers from distant locations in and out of Uzbekistan, and the lack of on-site labour accommodation camps can establish a close interface between the labourers and residents of host communities based around the project sites and off-site labour accommodation facilities. Worker-community intermingling will be particularly common within makhallas offering rental housing for construction workers.

The influx of migrant workers into local communities poses the risk of cross-infections and increased incidence of communicable diseases. Disease groupings of particular relevance include:

- Respiratory infections, such as tuberculosis and COVID-19, which can break out due to overcrowding and close interactions within public or shared spaces.
- Water-borne diseases, including diarrhoea and Hepatitis A, which can erupt as a result of improper disposal of construction office sewage and faecal contamination of domestically utilized surface and groundwater sources).
- Sexually Transmitted Infections (STIs), including HIV/AIDS. High prevalence groups of particular concern potentially include commercial sex workers and long-haul truck drivers.

The in-migration of workers from relatively urban and foreign locations into local communities may also alter local disease profiles, with an increased prevalence of non-communicable diseases such as cardio-vascular disease, hypertension, diabetes, and cancer. This epidemiological shift can heighten the burden on existing under-equipped healthcare facilities serving rural districts and communities.

15.4.1.2 Community health and safety incidents

Areas designated for construction activities pose a broad range of physical, chemical, and biological hazards associated with construction activities, materials, equipment and machinery. The majority of these hazards pose health and safety risks to construction workers. Nevertheless, a number of construction-phase activities and contingencies present H&S risks to third parties, such as residents within local communities based around the project sites and access tracks. In the context of H&S risks, third party receptors such as neighbouring residents are predisposed to H&S accidents, due to a limited awareness of H&S hazards and the lack of Personal Protection Equipment (PPE).

An overview of the key construction-phase H&S risks to third party receptors potentially situated in and around the project sites is provided below:

ROAD TRAFFIC ACCIDENTS

The Project's construction phase will necessitate frequent and extensive transportation of equipment, materials, and construction workers. Large volumes of construction traffic along public and project-dedicated access roads carries the risk of road traffic accidents including vehicular collisions and accidents involving vehicular impact on pedestrians, which can result in property damage, injury, and fatalities. Potential risk factors for this category of accidents include (but are not limited to) limited visibility due to fugitive dust, inadequately serviced vehicles, lack of traffic safety signage along access roads, and negligence of project vehicle drivers or road users.

ELEVATED LEVELS OF AMBIENT DUST

Construction activities such as vehicular transit along unpaved access roads, land clearing, excavation, and grading, loading, offloading and stockpiling of aggregates pose the potential for the generation and dispersal of dust. Substantially elevated levels of ambient dust and particulate matter can adversely impact the health of human receptors within establishments located within the vicinity of dust-prone construction zones within the project sites and dedicated access roads.

ACCIDENTAL EXPOSURE TO HAZARDOUS MATERIALS

The Project's construction phase will entail the transportation, handling and storage of hazardous construction materials and waste (e.g., sewage, fuel, solvents, used oils etc.). Third party receptors may be exposed to hazardous substances through accidental discharges (e.g., traffic accidents involving haulage vehicles, spills, combustion products from accidental fires etc.), trespassing and unauthorized access to materials/waste storage facilities. An elaboration on the exposure pathways of off-site human receptors to soil, groundwater, and surface water contamination, as a result of inadvertent spills, is provided in Section 6.5.1.3 of this report. Contingencies involving the exposure of third-party receptors to hazardous substances can culminate in acute sickness, chronic disease and/or fatalities.

FIRE HAZARDS AND RELATED ACCIDENTS

Construction works within the project sites will involve activities that may involve accidental damage to utility assets with a fire/ explosion hazard. Accidental encroachment of utility setback zones and introduction of ignition sources (e.g., hot works, smoking) close to flammable materials and/or gas leakages can result in explosion, deflagration, and fire outbreaks. Such events may cause third-party casualties (i.e., severe injury and fatalities) outside of designated construction zones and site boundaries.

Besides the risks discussed above, trespassing, and unauthorized access to project sites and facilities during construction can further lead to H&S accidents from impact with moving (on-site) construction machinery, falls into excavations, and electrocution from contact with live conductors, amongst other potential impacts.

15.4.1.3 Criminal and abusive offences against local community members

GENERAL RISKS

The project's construction phase will involve extensive work over a planned duration of two years. The breadth and scale of construction phase activities are anticipated to proliferate employment and commercial opportunities within communities based around the project, and thereby expand local cash-based economies.

The rise in commercial activity and the influx of a diverse construction workforce is likely to drive an uptrend in criminal activity within the project sites and host communities. Based on information on crimes within the region, crimes that can expected to increase at the height of construction include theft, as well as personal violence, harassment, and intimidation amidst worker-community interactions. In the context of the project, groupings with a propensity to use force in perpetrating crime or addressing actual or perceived security incidents include the poor and unemployed youth (particularly those with delinquent backgrounds) as well as the project's security personnel.

Project security workers may incur confrontations involving excessive use of force or intimidation against community members (e.g., in the event of minor misdemeanours and borderline security incidents). Nevertheless, the risk of excessive use of force by security personnel is very low as a well-trained National Guard workforce will provide security services during the Project's construction phase, based on mandates and protocols which broadly align with both national (constitutional and statutory) and international (UN) standards for the protection of human rights. In the unlikely event that a private security company is hired by the EPC Contractor/ Project Company for interim or supplementary security services, the risk of abusive misconduct and undue assault on civilians will be managed by a number of safeguard measures including pre-employment background checks for security companies and individual candidates, as well as specialized trainings on the restrained and proportionate use of force.

In addition, the intermix of foreign workers and residents within recreational, commercial, and residential facilities within the project-affected communities can result in tensions which may instigate hate crimes. Furthermore, project-induced pressure on local resources and infrastructure can also give rise to related strife and criminal acts of aggression.

GENDER-BASED VIOLENCE, HARASSMENT, AND EXPLOITATION

The advent of a male-dominated construction workforce potentially including high-earning migrant workers can potentiate the imbalance of power between men and women within the project-affected communities. Patriarchal traditions and gender stereotyping may result in the financial exploitation of women engaged in the project workforce, particularly within informal supply chains.

Additionally, women from socioeconomically vulnerable households are particularly prone to various forms of exploitation, harassment, and assault from project workers. Worker groupings that are often associated with acts of aggression against women include security guards and long-haul truck drivers, as these labourers are more likely to encounter women in isolation (i.e., away from crowded locations and/ or during night shifts). Moreover, a sizeable fraction of the male workforce potentially includes migrant male workers with circumscribed work routines and lack of conventional socialization. This set-up raises the risk of sexual exploitation of locally based women, some of whom may gravitate towards project-spurred micro-enterprises.

The project also presents the risk of domestic/ intimate partner GBV. These incidents can arise as a result of spousal or familial disapproval of women's employment in project work, and discord resulting from any project-induced adverse impacts on local livelihoods (i.e., declining household income from the diminution of grazing lands). Women at a higher risk of exposure to project related GBV and SEA include women belonging to marginalized and/or vulnerable groups (i.e., destitute residents, illegal immigrants, commercial sex workers etc.), as they typically incur social ostracism, possess little to no wherewithal for judicial remedies, and are disproportionally dependent on menial work rendered by large projects. Nevertheless, affected communities and local authorities did not report the incidence of GBVH cases on prior and ongoing construction projects, thus the likelihood for these crimes is effectively low.

Table 15-3 Overview of potential impacts relating to community health and safety during construction

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Spread of communicable diseases and increased local morbidity	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Major	Local communities and general public	High	**Major**	**Minor/ Moderate**
Community health and safety incidents	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Major	Local communities and general public	High	**Major**	**Minor/ Moderate**
Criminal and abusive offences against local community members	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Moderate	Local communities and general public	High	**Moderate/ Major**	**Minor/ Moderate**

IMPACT AVOIDANCE AND MITIGATION MEASURES

Spread of communicable diseases and increased local morbidity

- Induction trainings focused on the prevention and control of communicable diseases and Sexually Transmitted Infections (STIs) in particular will be delivered to the Project's construction workforce, and refresher trainings will be provided periodically.
- Periodic wellness campaigns will be organized to sensitize the construction workers and local communities based around labour accommodation facilities and project sites to potential transmission of communicable diseases as a result of construction-induced influx of labour and economic scavengers. These campaigns will offer free diagnostic services for diseases of key concern, counselling services and information on healthcare services for further medical attention, in collaboration with relevant local NGOs where possible.
- Construction workers showing symptoms of sickness will be allowed leave from duty and directed to the Project's medical facilities or hospitals for testing and treatment as appropriate. Workers with serious respiratory diseases will be quarantined or provided with face masks as necessary, to reduce the spread of air borne infections that can spread to host communities.
- Dedicated residential facilities will be used for accommodating the Project's contracted workforce, to the extent feasible.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Residential facilities for the Project's construction workers will be selected based on the welfare and safety criteria specified in local legislation and the IFC/EBRD guidelines for workers' accommodation. Self-sufficient residential facilities with various sanitary conveniences and dedicated (internal) recreational amenities will be given priority consideration. • Gatherings for job solicitation at the entry points to construction sites will not be permitted, and all project employment applications will be channelled through a local recruitment agency and the EPC Contractor's procurement office. • Community members will receive briefings/ sensitization to project employment applications, and suitable job openings, over the course of stakeholder engagement during construction (and occasionally during operation). • The project's code of conduct will proscribe the use of alcohol, drugs and commercial sex activities within labour accommodation areas and working areas, which can reduce the spread of sexually transmitted infections (STIs) within host communities. • The construction workforce will receive indication and refresher trainings on measures for proper sanitation, management of waste and hazardous materials, and emergency response to chemical and waste spills. • Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to increased incidence of communicable diseases within host communities on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. • A Water Management Plan, Hazardous Materials and Waste Management Plan, Worker Accommodation Management Plan, Community Health and Safety Plan, Local Recruitment Plan, Influx Management Plan, and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. **<u>Community health and safety incidents</u>** • Induction and refresher trainings on construction-related health and safety hazards to community/ public health and safety will be delivered to the Project's construction workforce. • A traffic study will be undertaken prior to mobilization of construction resources to identify transportation constraints including traffic congestion hotspots and inadequate road conditions. • Follow-up engagement with transportation and traffic safety authorities (i.e., district khokimiyats, Ministry of Transportation, traffic police) will be undertaken as part of H&S risk assessments in relation to project traffic and the development of related safeguards, including traffic accident emergency response plans. • All construction activities will be restricted to demarcated construction zones within the project sites and designated transit corridors. • Project traffic and non-project traffic will be segregated, to the extent feasible, using traffic flagmen and signage. • Public access to the project sites will be restricted using procedural and engineering controls including site fencing, issuance of administrative identification documents to all direct and contracted construction workers, security checks at entry gates, as well as electronic access control systems and video surveillance for any high-risk or high-value facilities within project sites.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Public access to the Project's dedicated access roads will be restricted to the extent feasible (i.e., using dedicated traffic signage, reflective barricading and flagmen). • Project traffic will be subject to differential speed limits and the speed of all project vehicles along road sections within settlements will not exceed 30 km/hr. • Subject to the outcomes of the Project's traffic study and related H&S risk assessment, speed bumps and cautionary signposts will be installed along any access road sections cutting across sensitive communal locations, in addition to speed limits (e.g., crossing points, crowded social service centres, marketplaces etc.). • Creation of local awareness around construction-related health and safety hazards will be implemented through routine community H&S sensitization and periodic traffic safety campaigns involving local authorities. • Project vehicles will be serviced regularly to prevent breakdown and failure that can result in traffic accidents involving members of the general public along the Project's transit corridor. • Recruitment of project vehicle drivers and industrial/ heavy goods vehicles in particular will involve qualification criteria such as license status, adequate experience, familiarity with traffic H&S safety, visual tests and professional references. • Drivers will receive induction trainings in defensive driving and precautions against protracted shifts and fatigue that can result in impaired performance and traffic accidents. • A dedicated code of conduct will include a total proscription of work under the influence of alcohol and substance abuse for the Project's construction workforce. • Regular construction health and safety sensitization for the project-affected communities will include familiarization with project traffic and related H&S risks and incidents. • Frequent and random alcohol testing should be undertaken for project vehicle drivers on duty. • Subject to the outcomes of the Project's traffic study and related H&S risk assessment, traffic safety measures will include spot checks using radar equipment and/or the engagement of fleet management service for GPS-enabled speed tracking for high-risk and long-distance trips. • Night-time trips should be limited to the extent feasible, and journey management plans should be prepared and approved for any such trips. • Suitable by-passes, traffic control signage and personnel (i.e., flagmen etc.) will be established to divert vehicular and pedestrian traffic in the event of upgrading and/or maintenance works along existing public roads that will be utilized for access to the project sites, in consultation with relevant local authorities (i.e., regional and district khokimiyats, road maintenance agencies). • Public access to all construction zones within the project sites will be restricted by means of fencing, barricading, prominent signage and notice boards. • the EPC contractor will mobilize adequate Health and Safety (H&S) workers for the Project, including H&S training personnel, inspectors, traffic controllers and medical aid providers, amongst other personnel.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Dust suppression measures, including but not limited to wetting down access road surfaces (using water bowsers), covering trucked aggregate loads, implementation of various speed controls, and the siting of any concrete batching plants downwind of unavoidable community receptors with a sufficient buffer. • The construction workforce will receive indication and refresher trainings on measures for proper sanitation, management of waste and hazardous materials, and emergency response to chemical and waste spills. • Provision of adequate sanitation facilities within on-site and/or off-site worker accommodation camps and offices (including hand-washing facilities, cleaning, and disinfection services etc.) • Establishment of adequate facilities for the collection and storage of general (non-hazardous) waste, including waste bins, solid waste storage sheds, septic tanks etc. • Establishment of adequate facilities for temporary storage of hazardous materials and waste, with appropriate roofing, impermeable base/lining, containment vessels/ structures, drip trays, and spill response kits to prevent the contamination of ambient soil, groundwater and surface water. • Installation of smoke alarms, fire response equipment and fire hazard (including no-smoking) signage, as well as the establishment of internal (trained) fire emergency response teams and third-party fire response service providers. • Use of licensed waste management contractors for transfer and disposal of general and hazardous waste to designated third-party facilities for waste recycling, treatment, and disposal. • Restriction of unauthorized (public) access to on-site waste and hazardous material storage facilities (e.g., skip containers, warehouses) through prominent signage, container labels/manifests, access controls, surveillance, and local sensitization (of affected communities). • The EPC Contractor's Health and Safety (H&S) team will include specially trained first aid providers and fire emergency responders. • Regular H&S monitoring will be carried out by the Project Company's and EPC Contractor's relevant H&S staff. This line of monitoring will include (i) inspections to ensure the implementation of H&S safeguards in work procedures/ activities, and (ii) maintenance inspections and testing to ensure the structural integrity, mechanical integrity and overall operability of construction equipment and engineering controls for prevention of on-site and off-site H&S accidents. • Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to H&S incidents within host communities on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. • A dedicated Traffic and Transportation Management Plan, Hazardous Materials and Waste Management Plan, Community Health and Safety Plan, and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. **Criminal and abusive offences against local community members**						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• A project-level code of conduct will underscore the Project's commitment to the protection of human rights and zero-tolerance for inappropriate and unlawful behaviour within host communities, with a clear set of disciplinary procedures and penal measures for non-compliance. • Reasonable efforts will be made to sensitize dedicated site security management teams to the standards set out in the National Guard to the UN Code of Conduct for Law Enforcement Officials and Voluntary Principles on Security and Human Rights (i.e., exceptional conditions for the application of force as a last resort, in a manner that is (i) cautious, (ii) proportionate to the extent of a given threat to project workers and assets and (iii) compliant with national laws on the use of lethal force). • Where applicable, the recruitment of the project's security personnel will involve a vetting or screening procedure to ensure that candidates under consideration have no record of implication in unlawful use of force and other forms of human rights violations (including gender-based violence). • The EPC Contractor's security department will regularly engage with the local police force and relevant Local Government Authority (LGA) units to obtain information on the incidence of crime within local communities based around the project sites and the wider host districts, as part of security management. • Emergency medical response and ambulatory hospital transfers will be provided for any injuries and casualties resulting from security incidents. • Local law enforcement authorities will be notified immediately, upon the occurrence of security incidents, to enable official investigation, apprehension, and prosecution. • A gender policy or policy statement integrating into the Project's overarching HSSE Policy will be instituted for the project. The policy will highlight the definition and prohibition of gender-based exploitation, harassment, and violence. • Thorough induction and refresher trainings on gender-based exploitation, harassment and violence will be delivered to the Project's construction workforce. • The Project's CLOs will undertake routine awareness creation and trainings to sensitize local communities to the project's gender policy commitments, appropriate reporting channels for gender-based exploitation, harassment and violence, and specialized recourse in the event of any such violations being reported. • Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to security incidents and the violation of human rights violations within host communities on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. • For all incidents involving gender-based exploitation, harassment and violence within local communities, the EPC contractor will extend immediate professional, survivor-centred, and free-of-charge support to victims, with efforts to ensure that victims are afforded total security, dignified treatment, and volition with regard to confidentiality and legal action. Support to victims of GBV or SEA will include medical, psychological, and financial support, as well legal advisory assistance, and voluntary engagement of law enforcement authorities, for official investigation and prosecution.					

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• The Project's community GRMs will include at least one female CLO and other focal points (e.g., makhalla leaders and district-level community development and gender sections) as to ensure that dedicated channels exist for reporting gender-sensitive concerns as well as incidents involving gender-based exploitation, harassment, and violence. • A dedicated Community Health and Safety Plan, and Emergency Preparedness and Response Plan, Influx Management Plan, Hazardous Materials and Waste Management Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented, in coordination with relevant LGA departments and the local police force.						

15.4.2 Operational phase

15.4.2.1 Community health and safety incidents

The Project's operational phase will involve commissioning and commercial operation of the PV plant, BESS, and interconnection facilities. These operations present a number of health and safety risks to communities based around the project sites and other third-party receptors (i.e., general public) potentially present in and around the project sites and transit corridors, as outlined below.

ELECTROCUTION ACCIDENTS

At the operational stage, the Project's power generation, storage and transmission infrastructure will be energized and operated on a full-time basis. Unauthorized public access to restricted operational facilities may result in electrocution accidents due to inadvertent contact with conductors. Electrocution from live components constituting high-voltage equipment can culminate in severe injury and fatalities. Accidental direct or indirect contact with the buried BESS interconnection cable conductors can also result in severely injurious and/or fatal electrocution incidents.

ELECTROMAGNETIC FIELD (EMF) HAZARDS AND RELATED INCIDENTS

The energization and operation of the overhead and underground powerlines will generate electromagnetic fields (EMF) around the high-voltage conductors. The strength of the EMF around powerlines decreases with increasing distance from the lines and with attenuation from intervening media such as concrete/metallic shielding structures and trench overburden. A number of studies have linked extended exposure to EMF underneath and close to high-voltage overhead powerlines to adverse health effects, which include chronic and potentially fatal conditions such as cancers (i.e., Leukemia etc.). The violation of mandatory Health Protection Zones (HPZs) for the Project's OTL therefore poses a significant hazard to human health.

TRAFFIC ACCIDENTS

The Project's operational phase will entail the daily transportation of O&M workers, and occasional transfer of equipment and materials for maintenance purposes. The movement of project vehicles along transit corridors presents the inherent risk of road traffic accidents which may result in injury, fatalities, property damage and roadkill (involving herded livestock).

FIRE HAZARDS AND RELATED ACCIDENTS

The PV plant and BESS facilities include a wide range of electrical equipment which is prone to overheating from current overloads and thermal runaway. Fire contingencies can occur in

the unlikely event of protracted overheating within the PV plant and BESS sites. Uncontrolled fire can spread to sensitive utility assets and other third-party establishments located nearby the PV plant and BESS sites, and thereby result in significant H&S accidents, property damage and associated economic losses.

Table 15-4 Overview of potential impacts relating to community health and safety during operation

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Community health and safety incidents	Affected communities located nearby the PV power plant, BESS, OTL corridor, underground cable, and (new) access road sites	Major	Local communities and general public	High	**Major**	**Minor/ Moderate**

IMPACT AVOIDANCE AND MITIGATION MEASURES

Community health and safety incidents

- Induction and refresher trainings on operational health and safety hazards to community/ public health and safety will be delivered to the Project's contracted O&M workforce.
- All O&M activities will be restricted to the project sites and designated Rights of Way.
- Public access to the project sites will be restricted using procedural and engineering controls including site fencing, issuance of administrative identification documents to all direct and contracted O&M workers, security checks at entry gates, as well as electronic access control systems and video surveillance for any high-risk or high-value facilities within project sites.
- Creation of local awareness around operational health and safety hazards will be implemented through periodic community H&S sensitization.
- Project vehicles will be serviced regularly to prevent breakdown and failure that can potentiate traffic accidents involving members of the general public along the Project's transit corridor.
- Recruitment of project vehicle drivers and industrial/ heavy goods vehicles in particular will involve qualification criteria such as license status, adequate experience, familiarity with traffic H&S safety, visual tests and professional references.
- Drivers will receive induction trainings in defensive driving and precautions against protracted shifts and fatigue that can result in impaired performance and traffic accidents.
- A dedicated code of conduct will include a total proscription of work under the influence of alcohol and substance abuse for the Project's construction workforce.
- Suitable by-passes, traffic control signage and personnel (i.e., flagmen etc.) will be established to divert vehicular and pedestrian traffic in the event of upgrading and/or maintenance works along existing public roads that will be utilized for access to the project sites, in consultation with relevant local authorities (i.e., regional and district khokimiyats, road maintenance agencies).
- The O&M Contractor will employ Health and Safety (H&S) staff for the Project's operational phase.
- The O&M Contractor's Health and Safety (H&S) team will include specially trained first aid providers and fire emergency responders.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• The O&M workforce will receive induction and refresher trainings on measures for proper sanitation, management of waste and hazardous materials, and emergency response to chemical, waste spills and fire response. • Regular H&S monitoring will be carried out by the relevant H&S staff under the Project Company and O&M Contractor. This line of monitoring will include (i) inspections to ensure the implementation of H&S safeguards in work procedures/ activities, and (ii) maintenance inspections and testing to ensure the structural integrity, mechanical integrity and overall operability of O&M equipment, and engineering controls for prevention of on-site and off-site H&S accidents. • The overhead transmission line components beyond the Project sites will be monitored to ensure full compliance with the Health Protection Zone (i.e., 15 meters from each outer most conductor for 220 kV powerlines) and the grid protection zone (i.e., 25 metres from each outer most conductors for 220 kV powerlines). • Installation of smoke alarms, fire response equipment and fire hazard signage, as well as the establishment of internal (trained) fire emergency response teams and third-party fire response service providers. • Local communities based around the project sites will be familiarized with the Project's community GRM, to enable the collection of grievances pertaining to H&S incidents within host communities on platforms that are accessible to all local constituencies and free of manipulation, interference, intimidation, service charges and restrictions on arbitration, judicial recourse, and choice of confidentiality. • A dedicated Hazardous Materials and Waste Management Plan, Community Health and Safety Plan, and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented.						

15.4.3 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, potential impacts relating to community health and safety will be similar to the above-described construction-phase impacts. Specifically, this set of impacts potentially includes community health and safety incidents.

For the avoidance and mitigation of these impacts, relevant impact management measures specified in Section 15.4.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

15.5 Monitoring Requirements

Table 15-5 below provides an overview of the key monitoring arrangements for evaluating performance against applicable standards relating to community health and safety in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 15-5 Monitoring arrangements for impacts and preventative and mitigation measures relating to community health and safety

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Construction phase					
Spread of communicable diseases	Grievances concerning project-related incidence of communicable diseases	- No positive trends for grievances concerning project-related incidence of communicable diseases	- Community Grievance Log	Ongoing	- EPC Contractor CLOs
Community health and safety incidents	Percentage of local sensitization engagements on construction-related health and safety for local communities completed in line with SEP/ CHSP	- 100% of local sensitization engagements on construction-related health and safety for local communities, completed in line with SEP/ CHSP	- Stakeholder Engagement Log/ Meeting Minutes	Quarterly	- EPC Contractor CLOs
	Number of significant H&S accidents involving third parties	- Zero significant H&S accidents involving third parties	- H&S Accidents Log	Ongoing	- EPC Contractor H&S Officer
Criminal and abusive offences against local community members	Percentage of direct and/or contracted security personnel who have been screened for past implications in inappropriate use of force and/or abuse of power	- 100% of direct and/or contracted security personnel have been screened for past implications in inappropriate use of force and/or abuse of power	- Recruitment records	Upon recruitment	- EPC Contractor HR Officer
	Grievances concerning project-	- Related grievances are closed out within the	- Community Grievance Log	Ongoing	- EPC Contractor CLOs

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
	related crimes and/or violation of human rights	shortest practicable duration			
All community health, safety and security risks and impacts	Percentage of community engagements and sensitization to construction health and safety (e.g., FGDs, community meetings) completed in line with the SEP and quarterly schedule.	- 100% of planned community engagements have been completed in line with the SEP	- Stakeholder Engagement log - Meeting minutes and attendance sheets	Ongoing	- Project Company CLOs - EPC Contractor CLOs
Operational phase					
Community health and safety incidents	Percentage of H&S accidents involving third parties (e.g., local communities) investigated and addressed through corrective (remedial and preventative) actions within the shortest practicable duration	- 100% of accidents involving third parties (e.g., local communities) have been investigated and addressed through corrective (remedial and preventative) actions, within the shortest practicable duration	- H&S Accidents Log - Police Report - Medical Report - Significant Accident Notification Report - Significant Accident Investigation Report - Corrective Action Plan (CAP)	Upon occurrence	- O&M Contractor H&S Officer

16 LABOUR AND WORKING CONDITIONS

16.1 Legal Requirements and Standards

16.1.1 National laws and regulations

The following legislation and regulations pertain to the protection of labour rights in Uzbekistan:

16.1.1.1 Constitution of the Republic of Uzbekistan (1992)

Key constitutional provisions in regard to labour rights include:

- Everyone shall have the right to decent work, to free choice of profession and occupation, favourable working conditions that meet the requirements of safety and hygiene, to fair remuneration for work without any discrimination and not below the established minimum wage, as well as the right to unemployment protection in the manner prescribed by law.
- The minimum wage shall be determined taking into account the need to ensure a decent standard of living for a person.
- It shall be prohibited to refuse to hire women, dismiss them from work and reduce their wages on the basis of pregnancy or having a child.
- Any forced labour shall be prohibited, except as punishment under the court decision, or in some other Instances specified by law.
- Any form of child labour that poses a threat to the health, safety, morality, mental and physical development of the child, including those that prevent him or her from getting an education, shall be prohibited.
- The amount of pensions, allowances and other types of social welfare established by law, may not be set lower than the officially fixed minimum consumer expenditure.
- Trade unions express and protect the social and economic rights and interests of workers.
- Membership in trade unions is voluntary.

16.1.1.2 Labour Code of the Republic of Uzbekistan (1995, amended in 2021)

The principal law on labour rights and welfare in Uzbekistan sets out the following requirements:

- The main health and safety provisions in the labour law include H&S requirements, employees' obligation to comply with H&S standards, procedures and use of PPE, additional H&S measures for disabled employees, reporting and investigating accidents etc.

- The labour code also specifies collective bargaining through collective contracts and agreements as a way of regulating labour relations and harmonising social and economic interests of both the employer and the employees.

16.1.1.3 Other pertinent legislation

The list of other laws and regulations providing for fair and safe working conditions and benefits include the following:

- Law "On the Employment of the Population" No. 642 of 20.10.2020
- Joint Decree of the Ministry of Labour and Social Protection of the Population (No. 7) and the Ministry of Healthcare (No. 13) "On approval of the list of jobs with unfavourable working conditions, where the employment of persons under 18 years is prohibited" registered by the Ministry of Justice of the Republic Uzbekistan, dated July 29 2009, No. 1990
- Decree of the Cabinet No. 133 of 11 March 1997 to approve normative acts necessary for the realization of the Labour Code of the Republic of Uzbekistan.
- Decree of the Cabinet of the Ministers No. 1011 of 22 December 2017 "On Perfection of the Methodology of Definition of Number of People in Need of Job Placement, including the Methodology for Observing Households with Regard to Employment Issues, also for the Development of Balance of Labour Resources, Employment and Job Placement of Population".
- Decree of the Cabinet of the Ministers No. 965 of 5 December 2017 "On the Measures for Further Perfection of the Procedure of Establishment and Reservation of Minimum Number of Job Places for the Job Placement of Persons who are in need of Social Protection and Face Difficulties in Searching Employment and Incapable of Competing in Labour Market with Equal Conditions".
- Decree No. 964 of 5 December 2017 "On the measures for Improvement of the Activity of Self-Government Bodies Aimed at Ensuring Employment, firstly for the Youth and Women".
- The Protection of Women Against Harassment and Violence Act (2019).
- The National Human Rights Strategy was approved by Presidential Decree on 22 June 2020. No. PD-6012.
- Law on guaranteeing equal rights and opportunities for women and men (2019).
- The Law on Mediation (2018).
- Law on Public Control (2018).
- Law on Administrative Procedures (2018).

16.1.2 Lender requirements

16.1.2.1 ADB

- The Environmental Safeguard requirements necessitate The Borrower/client to, 'provide workers with safe and healthy working conditions and prevent

accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.'

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

16.1.2.2 IFC and EPFIs

The following applicable IFC Performance Standards aim to identify and ensure that social and economic impacts of a project are addressed in the relevant areas, in particular:

- Performance Standard 2: Labour and Working Conditions;
- In accordance with IFC Performance Standard 2 (Labour and Working Conditions) there is a requirement to align with the following conventions:
- ILO Convention 29 on Forced Labour.
- ILO Convention 87 on Freedom of Association and Protection of the Right to Organize.
- ILO Convention 98 on the Right to Organize and Collective Bargaining.
- ILO Convention 100 on Equal Remuneration.
- ILO Convention 105 on the Abolition of Forced Labour.
- ILO Convention 138 on Minimum Age (of Employment).
- ILO Convention 182 on the Worst Forms of Child Labour.
- ILO Convention 111 on Discrimination (Employment and Occupation).
- UN Convention on the Rights of the Child, Article 32.1; and
- UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families.

16.2 Baseline Conditions

An overview discussion on the context of labour rights and construction labour trends in Uzbekistan and China is provided in the following sections, in relation to specific risks inherent in the Project's foreseeable organization (i.e., Project Company, EPC Contractor and supply chain).

16.2.1 Forced Labour

The following sections provide a preliminary account of the labour rights context in Uzbekistan, with high-level coverage of emerging labour rights issues in the globally dominant solar manufacturing industry in China.

16.2.1.1 China

Recent literature highlights notable incidents and regional trends involving the infringement of institutional and internationally chartered human rights, notably those related to labour and working conditions, in China. In the context of the solar manufacturing industry, the main PV products on the global markets include the following:

- Polysilicon and aluminium.
- Ingots.
- Wafers.
- Cells.
- Modules.

Official statistics reported for the year 2021 indicate that Chinese manufacturing companies account for the majority of the global manufacturing capacity for solar PV products. Specifically, Chinese-based producers have dominated the markets for metallurgic grade polysilicon, PV wafers, cells and modules.

Recent studies report that a sizeable fraction of established manufacturers and suppliers constituting international solar PV panel supply chains have favoured cost competitive upstream producers of polysilicon, which is the main raw material for the production of nested PV panel components. The cost advantage of these producers is reported to lie in industrial policies and labour transfer programs that involve forced labour within the Xinjiang Ughur Autonomous Region (XUAR).

A recent literature review published by the Breakthrough Institute indicates the existence of systemic oppression of Ughur, Kazakh and Kyrgyz minorities in China. Developing research by frontline NGOs in the human rights advocacy arena avers that these ethnic communities have historically been subjected to persecution and coercive labour programs, which allocate these demographics to exploitative and repressive industrial complexes located in XUAR. Documented research further indicates that minorities targeted to forced labour in XUAR are employed in quartzite rock mining and the production of polysilicon, aluminium, metallization pastes as well as coal-fired electricity for metallurgical factories. Reported violations of human rights within XUAR include the involuntary recruitment of targeted minorities, the detention of labourers in worker camps located far from their communities, abject exploitation, poor living

and working conditions, political indoctrination, and extreme penal measures for acts of resistance and insubordination.

16.2.1.2 Uzbekistan

According to the latest Trafficking in Persons Report issued by the United States Department of State, Uzbekistan has not yet attained full compliance with minimum standards for the elimination of human trafficking, although significant progress towards these standards has been realized. In 2019, there were 95 reported victims of human trafficking, 89 of whom were victims of sexual exploitation. While most of the victims were exploited abroad, 15 endured exploitations within the country. The report highlights that Uzbekistan's efforts include steps to end to the systematic mobilization of students, teachers, and health care personnel for the annual cotton harvest, and granting international, third-party observers' unimpeded access for monitoring purposes. There has been a steady decline in reported human trafficking cases, compared to 208 in 2018, 440 in 2017 and 714 in 2016.

In July 2019, a Decree of the President of the Republic of Uzbekistan titled Additional Measures to Further Improve the System of Combating Trafficking in Persons and Forced Labour, entered into force. It transformed the Interdepartmental Commission of the Republic for Combating Human Trafficking into a National Commission under the guidance of the President of the Senate. The Commission comprises two sub-committees chaired by the Ministry of Internal Affairs and the Ministry of Employment respectively. Regional commissions were created in each of the Country's regions and a national rapporteur was eventually appointed.

In August 2020, the country's 2008 law on human trafficking was amended as new concepts, preventive measures, and a procedure to identify victims of human trafficking (including minors and their rights), were introduced. While listing the main policy lines in this sector, the law provides a specific definition of the status of the National and Territorial Commissions for combating human trafficking and forced labour, as well as the powers of the Council of Ministers. The relevant government agencies include the General Prosecutor's Office and the Ministry of Employment and Labour Relations. A new chapter on human trafficking prevention has been introduced in the legislation, with measures ranging from ongoing monitoring and awareness raising campaigns on dangerous situations to the development and implementation of educational programs in public and private educational establishments. The Ministry of Internal Affairs will create a unified database for human trafficking crimes, with information on traffickers, victims and the various types of exploitation. The new law introduces a two-stage procedure to identify the victims of human trafficking. When individuals are granted the status of victim of human trafficking they are entitled to rehabilitation and social integration programs, according to the outcome of the final investigation carried out by the Territorial Committee (United States Department of State, 2021).

CHILD LABOUR

In 2019, Uzbekistan achieved appreciable progress in action towards the elimination of the worst forms of child labour. The government took active measures to prevent the use of child labour in the cotton harvest, including by introducing criminal penalties for repeat violations of hazardous work prohibitions, doubling the number of labour inspectors, and conducting extensive awareness-raising on child labour laws and penalties for violations. The government also established a new National Commission on Combating Trafficking in Persons and Forced Labour and adopted a new roadmap to combat trafficking in persons and forced labour. However, children in Uzbekistan engage in the worst forms of child labour, including in commercial sexual exploitation. Although the government made meaningful efforts in all relevant areas, laws prohibiting the commercial sexual exploitation of children do not meet international standards. Uzbekistan also has not carried out a national child labour survey to determine the prevalence of child labour in sectors other than cotton production.

Surveys conducted by UNESCO and ILO have shown that about 5% of children in Uzbekistan are engaged in work during studies, and 4.3% are fully devoted to employment. Whilst the surveys have indicated that children below the age of 18 years are chiefly employed in the agricultural and service industries, children were also shown to engage in sex trafficking transnationally, and also internally in brothels, clubs, and private residences. Children in institutions were also shown to be vulnerable to sex trafficking. The table below provides an overview of the sectors and occupations reported to employ minors in Uzbekistan.

Table 16-1 Sectors and Work Streams Employing Child Labour in Uzbekistan

SECTOR/ CATEGORY OF LABOUR	ACTIVITY
Agriculture	• Cultivating silk cocoons. • Preparing land for crop planting.
Services	• Vending. • Car washing. • Collection of scrap metals. • Refurbishing school grounds and facilities. • Vending in markets.
Categorical Worst Forms of Child Labour	• Commercial sexual exploitation, sometimes as a result of human trafficking. • Forced labour in cultivating silk cocoons. • Forced labour in construction, non-cotton agriculture, and cleaning parks, streets, and buildings.

With regards to child labour in agriculture and the cotton cultivation sub-sector in particular, the Government of Uzbekistan abolished the oppressive quota system that governed cotton production in some parts of Uzbekistan in 2020. Under the pre-existing cotton production quota system, regional and local officials were mandated to mobilize sufficient labour to meet production targets assigned to farmers, and child workers were recruited with onerous working conditions. Vestiges of child labour in cotton farming are reported to employ children in a

supporting capacity, whereby older children assist in harvesting to supplement household income (United States Embassy in Uzbekistan, 2022).

The following table provides a summary of key mechanisms for the Government's coordination of efforts towards the eradication of child labour in Uzbekistan.

Table 16-2 Mechanisms for Governmental Coordination of Child Labour Eradication Requirements Set out in Uzbekistan's Legal Framework

SECTOR/ CATEGORY OF LABOUR	ACTIVITY
National Commission on Combating Trafficking in Persons and Forced Labour (National Commission)	• Coordinates state and local entities' efforts to combat trafficking in persons and forced labour; • Analyses and monitors efficacy of government programs to address trafficking in persons and forced labour; • Organizes international cooperation on combating human trafficking and forced labour; • Provides legal and policy recommendations for improvement of government efforts in these areas. Chaired by the National Rapporteur on Combating Trafficking in Persons and Forced Labour. Comprises the two sub-commissions on combating human trafficking and on forced labour, respectively. The Minister of Internal Affairs heads the Sub-Commission on Combating Trafficking in Persons and the Minister of Labour heads the Sub-Commission on Combating Forced Labour. In 2019, the National Commission drafted and adopted a roadmap to combat trafficking in persons and forced labour, and roadmaps for the cotton harvest, a national plan for work with international organizations, and a media plan.
National Rapporteur on Combating Trafficking in Persons and Forced Labour (National Rapporteur)	Chairs the National Commission on Combating Trafficking in Persons and Forced Labour. • Reports annually to the President on trafficking in persons and forced labor issues, government efforts to punish perpetrators, and services for victims of human trafficking and forced labor crimes. • Conducts public awareness-raising activities related to human trafficking and forced labor. (35) In 2019, the National Rapporteur convened the National Commission monthly.
Local Commissions for Combating Human Trafficking and Forced Labour (Local Commissions)	• Ensure timely and rigorous implementation of all laws and regulations, including those issued by the National Commission, related to trafficking in persons and forced labour. Local Commissions mirror the structure of the National Commission, with sub-commissions on trafficking in persons and on forced labor, respectively. Local Commissions are chaired by the regional hokim (governor) and provide monthly reports to the National Commission.

CONSTRUCTION LABOUR

Uzbekistan has achieved steady economic development over the past few decades, with the expansion of private sector businesses and progressive policy reforms geared towards the country's transition to a market-based economy. The country's labour force has grown at a rate of 350,000 to 370,000 people per year. Moreover, work and education draw many rural residents to the cities, especially Tashkent and Andijan. Daily migration has been reported to influence the employment rate and culture of rural residents, besides improving the ties between rural and urban communities.

The construction industry is amongst the leading labour-intensive contributors to the national economy, other such sectors being agriculture and manufacturing. In addition, the cross-cutting service sector holds the most potential for job creation. The construction sector, along with agriculture and industry employ about 60% of the labor force accounting for Small to Medium Enterprises (SMEs), with the remainder of labour engaged in the services sector. The leading demographics for informal labour within the country's construction sector and other industries are males, rural residents, and workers with relatively low educational attainment. With regards to the gender distribution, construction represents the second most dominant sector for male recruitment, with 25% of the national male labour employed in construction. Conversely, only 0.6% of the national female labour have been shown to hold occupations within the construction sector (Anderson *et al*, 2020).

INADEQUATE WORKING CONDITIONS

The prevalence of indecent working conditions across different economic sectors in Uzbekistan is not well documented. The law provides for a national minimum wage and establishes a standard workweek of 40 hours and requires a 24-hour rest period. The law further provides for paid annual holidays and overtime compensation as specified in employment contracts or as agreed with an employee's trade union. Such compensation may be provided in the form of additional pay or leave. The law states that overtime compensation should not be less than 200 percent of the employee's average monthly salary rate. Additional leave time should not be less than the length of actual overtime work. An employee may not work more than 120 hours of overtime per year, but this limitation was not generally observed, particularly in the public sector. The law prohibits compulsory overtime. According to a national human rights report issued by the United States Department of State for the year 2020, Government effectively enforced these laws in the formal economy. Penalties for violations of wage and overtime laws were not commensurate with those for similar crimes, such as fraud.

The Ministry of Employment and Labor Relations establishes and enforces occupational health and safety standards in consultation with unions. According to the law, health and safety standards should be applied in all sectors. The government effectively enforced these laws in the formal economy. No data was available on enforcement of these laws in the informal

economy. Penalties for violations of occupational health and safety laws were not commensurate with those for crimes, such as negligence.

The most common violations committed by private sector employers were violations of wage, overtime, and occupational health and safety standards. Although regulations provide standards for workplace safety, workers reportedly worked without necessary protective clothing and equipment at some hazardous job sites. More specific information was not available on sectors in which occupational safety violations were common, as well as on specific groups of workers who worked in dangerous conditions or without needed safety equipment. In July media reported doctors, nurses, and workers at quarantine centers were being forced to sign waiver letters promising not to make claims against the government if they contracted COVID-19. In March the country joined the Commonwealth of Independent States' Interstate Council for Industrial Safety to improve its industry safety standards. The government did not provide statistics on industrial accidents (United States Department of State, 2020).

OCCUPATIONAL HEALTH AND SAFETY

The most common violations committed by private sector employers were violations of wage, overtime, and occupational health and safety standards. Although regulations provide standards for workplace safety, workers reportedly worked without necessary protective clothing and equipment at some hazardous job sites. More specific information was not available on sectors in which occupational safety violations were common, as well as on specific groups of workers who worked in dangerous conditions or without needed safety equipment. In March 2020 the country joined the Commonwealth of Independent States' Interstate Council for Industrial Safety to improve its industry safety standards (United States Department of State, 2021).

COLLECTIVE BARGAINING

The Labour Code of Uzbekistan allows workers to form and join independent unions and bargain collectively. According to a national human rights report issued by the United States Department of State for the year 2020, despite the legal status of these laws, no independent labour unions were reported to operate in the country, by 2020. The law neither provides for nor prohibits the right to strike, but it prohibits antiunion discrimination. The law on trade unions states that workers may not be fired due to trade union membership, but it does not clearly state whether workers fired for union activity must be reinstated. Volunteers in public works and workers employed by individuals without documented contracts do not have strong legal protections of their rights.

There was no public information available regarding government enforcement of applicable laws, since there were no known cases of attempts to form independent unions. The law

provides penalties for violating freedom of association laws. Penalties were not commensurate with those for other laws involving denials of civil rights, such as discrimination. The government amended the law on "professional unions, rights, and guarantees of their activities." Despite legal protections for profession unions, workers had not successfully formed or joined independent unions. Workers continued to worry that attempts to create independent alternative unions would be repressed. Unions remained centralized, controlled by, and dependent on the government.

The state-run Federation of Trade Unions of Uzbekistan included in its ranks more than 35,000 primary organizations and 14 regional trade unions, according to official reports. Regional and industrial trade unions remained state managed. In addition, Government-organized unions did not undertake independent bargaining on behalf of their members. Government ministries, including the Ministry of Agriculture, in consultation with the Federation of Trade Unions, continued to set wages for government employees and production quotas in certain sectors. The government allowed for the establishment of market-based prices in a larger number of sectors than in previous years. In the emerging private sector, management established wages or negotiated them individually with persons who contracted for employment. Labour arbitration agencies within Uzbekistan were also found to have significant capacity gaps along the development process (United States Department of State, 2020)[12].

16.3 Receptors

The following table provides an overview of E&S impact receptors in the context of potential impacts relating to labour and working conditions within the Project's Areas of Influence (AoI). A sensitivity rating and corresponding description is provided for each relevant receptor.

Table 16-3 E&S impact receptors – Labour and working conditions

RECEPTOR	SENSITIVITY	JUSTIFICATION
Job candidates	Medium	Job candidates within host communities, districts, wider Uzbekistan and Chinese-based labour markets have are potentially sensitive to risks associated with exclusion from employment opportunities, given the generally high unemployment rates in project-affected communities and prevalence of disadvantaged community segments.

[12] Bureau of Democracy, Human Rights and Labour, United States Department of State. 2020. Country Report on Human Rights Practices (Uzbekistan)

RECEPTOR	SENSITIVITY	JUSTIFICATION
Direct and contracted workers	Medium	Direct and contracted workers employed by the Project Company, EPC Contractors and sub-contractors have a potentially are moderately vulnerable to risks associated with exploitative, abusive, and harmful working terms and conditions, and those relating to indecent living conditions.
Supply chain workers	HIgh	Supply chain workers have the highest sensitivity to critical labour risks, including forced and child labour and unsafe working conditions, due to the foreign location of supply chain enterprises and Project Developer's limited leverage over globally dominant PV module suppliers.

16.4 Potential Impacts and Management Measures

16.4.1 Construction phase

16.4.1.1 Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices

The Project's construction phase is set to employ an estimated total of 700 workers. About 40-60% of the direct and contracted construction labour will be sourced locally. As the EPC Contractor is anticipated to be Chinese based, the majority of the remaining contracted workforce will be expatriated from China, however foreign recruitment will be limited to specialized labour.

While most of the Project Company's direct workers will be recruited internally, a combination of recruitment channels will be used for the procurement of the substantially larger contracted workforce, both with Uzbekistan and abroad. Depending on the accessibility of in-demand contracted labour, the EPC Contractor (and sub-contractors) will undertake employment for certain labour sections internally and outsource the remainder of labour procurement to recruitment agencies within Uzbekistan and China, as appropriate.

Recruitment mechanisms for construction-phase labour may involve discriminatory and/or exploitative practices which may inhibit fair and equitable access to job opportunities and employment terms/ benefits. This risk potentially applies to recruitment agencies with unscrupulous recruitment procedures. Discriminatory recruitment practices may deny suitably qualified job candidates equitable access to employment on the basis of bribery, nepotism, sexual harassment, and/or biased consideration on the basis of personal attributes of no bearing on inherent job requirements (e.g., gender, religion, ethnicity etc.).

Likewise, exploitative recruitment practices may deny job candidates and recruits equitable employment benefits or legal entitlements (e.g., remuneration, overtime compensation, health insurance professional development, leave entitlements, freedom of association and

right to engage in trade unions). In addition, workers may be recruited without the establishment of transparent, comprehensive, and mutually accessible employment contracts to document mutual obligations (i.e., job requirements, length of employment, related legal entitlements) and ensure satisfactory performance and sound employee-management relationships.

16.4.1.2 Poor working and living conditions

Upon recruitment, construction workers and contracted labourers in particular may be subjected to working and living conditions that do not meet minimum welfare requirements prescribed in relevant national legislation (i.e., national constitution, Labour Code), binding ILO conventions and lender requirements. Workers may experience onerous routines with protracted working durations, absence of rest breaks, and lacking access to dining and potable water facilities/ supplies, and insufficient sanitary facilities, amongst other inadequacies.

In addition, any potential facilities for centralized worker accommodation may fail to meet national and international standards for the accommodation of construction labour (including Law on Occupational Safety and Health, the IFC/EBRD guidelines for workers' accommodation etc.), due to cramped conditions, poor ventilation, lacking sanitation facilities and gendered in-house facilities. Burdensome and inconvenient working and living conditions may impinge on workers' rest, stress levels, performance, job satisfaction and general wellbeing.

16.4.1.3 Occupational health and safety incidents

Construction workers, particularly contracted workers and labourers engaged in on-site construction activities are subject to a wide range of occupational physical, chemical, and biological hazards which potentiate injury, sickness, and fatalities. Key construction-phase hazards within the project sites and transit corridors include (but are not limited to):

- Work at height
- Lifting and manual handling of heavy objects
- Pinch points and moving parts
- Moving vehicles
- Fire and explosion
- Electrocution
- Slips, trips and falls
- Heat stress
- Exposure to airborne dust

- Exposure to hazardous materials (i.e., via inhalation, skin contact)
- Snake bites
- Communicable diseases (e.g., airborne respiratory infections etc.).

The lack of H&S risk assessment to eliminate critical hazards, comprehensive H&S training oriented to general and specific areas of work, provision of Personal Protective Equipment (PPE), H&S monitoring for contracted and sub-contracted workers, emergency response plans and other crucial safeguards may result in H&S accidents, which may culminate in severe injury, sickness, and fatalities.

The type of hazards attributable to construction sites will vary significantly depending on the construction methods employed and the degree of control implemented by the EPC Contractor and sub-contractor(s). It is therefore important that the EPC Contractor and designated sub-contractors demonstrate full consideration of health and safety risks as part of the selection process for construction methods (to be established in method statements) and that these risks are appropriately mitigated. This will also necessitate the implementation of systematic processes to ensure that such risks are adequately managed and that workers have requisite safeguards to undertake their works safely.

16.4.1.4 Forced labour

The use of independent recruitment agencies to facilitate the employment and management of construction labour and contracted workers (under EPC Contractor and sub-contractors) in particular poses the risk of unscrupulous and exploitative recruitment and management practices. Further to the risks outlined in Section 16.4.1.1, corrupt recruitment practices may involve surreptitious arrangements for forced labour in form of work that is:

- Bonded
- Subject to unlawful and exploitative deposits, penal charges and terminal wage deductions
- Imposed or bound through confiscation of valuable personal documentation or property
- Coerced through intimidation and/or assault
- Characterized by late payments and/or non-monetary payments
- Characterized by restrictions on freedom of movement

Forced labour typically targets marginalized and/or repressed communities and individuals, such as trafficked persons, and prisoners. It is characterized by repressive and exploitative schemes to sustain worker dependency and enable profiteering.

The Project's potential reliance on a Chinese-based solar panel supply chain poses a high risk of forced labour within its upstream supply chain, as most Chinese based PV suppliers have been linked to manufacturing facilities in the XUAR.

16.4.1.5 Child labour

Until recently, residual employment of minors (i.e., individuals below the age of 18 years) was prevalent in Uzbekistan's cotton production sector. While targeted governmental interventions have eliminated this form of child labour to a large extent, the national Labour Code of Uzbekistan allows the employment of minors in labour that is not economically exploitative, hazardous, or detrimental to children's health, physical, mental, spiritual, moral, or social development. As described in the sub-section above, the engagement of in-country recruitment agencies presents the potential of unscrupulous and exploitative recruitment practices, which may involve minors below the age of 18 and unlawful employment arrangements for minor recruits.

The risk of child labour is comparatively high for the Project's potentially foreign contracted and supply-chain workforce, particularly for the Tier 4 PV module supply chain workforce. The elevated risk of forced labour within this tier of PV module supply presents a commensurate likelihood for the worst form of child labour, including debt bondage, slavery, trafficking, and other modes of forced labour.

16.4.1.6 Workplace harassment, violence and other security incidents involving project workers

Project workers, particularly contracted and supply chain labourers are subject to a range of human rights violations, in the form of workplace intimidation, harassment and assault. Female workers are further at risk of sexual violence, harassment and exploitation in the workplace. Acts of workplace aggression and other hostile transgressions representing the violation of human rights can be perpetrated by co-workers, particularly those in superior positions. Sexual exploitation and abuse typically involve female workers in subservient roles, particularly migrant workers who have lesser support systems and awareness of in-country legal recourse.

Further, criminal and abusive acts towards project workers can also be inflicted by third party offenders. Attacks on project workers can occur in the event of theft, robbery, and sexual abuse. Personal violence and hate crimes involving project workers can also occur in the unlikely event of community protests.

Table 16-4 Overview of potential impacts relating to labour and working conditions during construction

E&S IMPACT	AREA OF INFLUENCE	IMPACT MAGNITUDE	POTENTIAL RECEPTORS (DIRECT AND INDIRECT RECEPTORS)	RECEPTOR SENSITIVITY	PRE-MANAGEMENT IMPACT SIGNIFICANCE	RESIDUAL IMPACT SIGNIFICANCE
Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices	Project-affected communities, districts, and wider Uzbekistan; Foreign labour markets	Moderate	Job candidates	Medium	**Moderate**	**Negligible/ Minor**
Poor working and living conditions	Project sites and labour accommodation facilities	Major	Direct and contracted workers	Medium	**Moderate**	**Minor**
Occupational health and safety incidents	Project sites and labour accommodation facilities	Major	Direct and contracted workers	Medium	**Moderate/ Major**	**Minor/ Moderate**
Forced labour	Uzbekistan and China	Major	Direct and contracted workers	Medium	**Moderate**	**Minor**
			Supply chain workers	High	**Major**	**Minor/ Moderate**
Child labour	Uzbekistan and China	Major	Direct and contracted workers	Medium	**Moderate**	**Minor**
			Supply chain workers	High	**Major**	**Minor/ Moderate**
Workplace harassment, violence and other security incidents involving project workers	Project sites and labour accommodation facilities	Major	Direct and contracted workers	Medium	**Moderate**	**Minor/ Moderate**

IMPACT AVOIDANCE AND MITIGATION MEASURES

Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices

- A Human Resources (HR) Policy will be instituted for the project. The policy will highlight a commitment to equal-opportunity recruitment and fair employment terms, in addition to promoting gender equality and local content in this respect.
- The Project's HR Policy will be contractually cascaded from the Project Company down to the EPC Contractor, and any first-tier and/or second-tier recruitment agencies, to ensure that the policy provisions are applied to all contracted workers.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Induction trainings for all direct and contracted construction workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers. • The recruitment of all project workers will involve equal-opportunity eligibility criteria based around inherent job requirements (e.g., educational attainment, professional experience, fitness for work etc.). The recruitment process will be free of discrimination on the grounds of gender, ethnicity, religion, income status and other attributes of no bearing on inherent job requirements. • Employment for the Project's direct and contracted labour as well as the procurement of services from supply chains will be implemented at the community, district, regional and national levels, in order of decreasing priority. • Employment terms and benefits with all direct and contracted workers will be stipulated in form of bilateral employment contracts, which will be documented in Uzbek, Russian, Chinese, and English, as appropriate. • Bilateral employment contracts for all direct and contracted workers will expressly state the workers' legal rights and entitlements, which are to include (but not be limited to) the duration of employment, workstation(s), working hours, description of duties or general responsibilities, remuneration and overtime compensation, health insurance, leave and pension entitlements, as well as the notice period for termination of the contract agreement. • Bilateral employment contracts for all direct and contracted workers will not infringe the workers' legal rights to collective bargaining through registered trade unions, and any negotiated agreements with relevant trade unions will be incorporated into the employment contracts of all affected workers. • HR procedures and bilateral employment contracts for contracted workers will not prohibit legitimate collective bargaining between employers (designated contractors in particular) and worker unions (including elected union representatives) and issue of collective grievances through the worker GRM. • Remuneration packages for direct and contracted workers will be provided on a fair and equitable basis, taking into account legally established minimum wage, benchmarks for similar jobs within the relevant sector and project location, the cost of living, provisions for health insurance and other fringe benefits, as well as level of experience. • Any changes to employment contract agreements for direct and contracted workers will be discussed and mutually agreed upon, prior to the contract changes being officially documented and effected. • The promulgation of employment opportunities within project-affected communities, districts and the wider region will be undertaken by means of (i) newspaper advertisements, (ii) public announcements by relevant LGAs, (iii) posts at vocational training institutions, (iv) posts at project site entry points, and (v) local community engagements by dedicated CLOs. • Suitably qualified service providers based within the project-affected communities, districts, region and wider national markets (in order of decreasing priority) will be identified, evaluated and listed in an internal procurement database. Procurement of construction goods and services will provide priority consideration for local service providers.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• All project employees and contracted workers will have equitable access to relevant on-the-job trainings, which will enable the dissemination of specialist and transferable skills within the Project's construction phase. • Career development programs such as internships, mentorships and professional development plans will be provided for various tiers and sections of project employees and contracted workers, particularly skilled workers paired with expatriate experts not readily available in Uzbekistan.. • The gender profile of the Project's direct and contracted workforce will be reviewed on a regular basis, with a view to ensuring a sufficient representation of women within construction labour to the extent feasible. • The nationality profile of the Project's direct and contracted workforce will be reviewed on a regular basis, with a view to ensuring a sufficient representation of Uzbekistan nationals within construction labour to the extent feasible. • A Labour and Working Conditions Management Plan and Sub-Contractor and Supplier Management Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse, and choice of confidentiality. **<u>Poor working and living conditions</u>** • A Human Resources (HR) Policy will be instituted for the project. The policy will highlight a commitment to equal-opportunity recruitment and fair employment terms. • The Project's HR Policy will be contractually cascaded from the Project Company down to the EPC Contractor, and any first-tier and/or second-tier recruitment agencies, to ensure that the policy provisions are applied to all contracted workers. • A code of conduct will be developed alongside the HR Policy and cascaded accordingly. • Induction trainings for all direct and contracted construction workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers. • Remuneration packages for direct and contracted workers will be provided on a fair and equitable basis, taking into account legally established minimum wage, benchmarks for similar jobs within the relevant sector and project location, the cost of living, provisions for health insurance and other fringe benefits, as well as level of experience. • Remuneration will be discharged to all workers in a timely manner, as specified in employment contracts. • Residential facilities that meet the EBRD/ IFC guidance for labour accommodation will be used for accommodating the Project's contracted workforce. • Welfare facilities and basic workplace services will be provided free of charge (i.e., drinking water, food, on-site medical services, transportation between accommodation facilities and work stations).						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Residential facilities for the Project's construction workers will be selected based on the welfare and safety criteria specified in local legislation and the IFC/EBRD guidelines for workers' accommodation. Self-sufficient residential facilities with various sanitary conveniences and dedicated (internal) recreational amenities will be selected. • Routine inspections and audits will be undertaken to demonstrate adequate maintenance of the Project's accommodation and welfare facilities, and continual performance on relevant housing and safety standards. • Food catering and potable water supply services will be provisioned for direct and contracted workers during working hours within the project sites, through the engagement of accredited personnel or vendors. • Dedicated medical facilities will be established on project sites to enable the provision of first aid and basic medical check-ups, prior to referral to nearby hospitals for further diagnostic and treatment service. • Construction workers showing symptoms of sickness will be allowed leave from duty and directed to the Project's medical facilities or hospitals for testing and treatment as appropriate. Workers with serious respiratory diseases will be quarantined or provided with face masks as necessary, to reduce the spread of air borne infections that can spread to host communities. • Adequate and conveniently located sanitation facilities, including toilets, ablution, drenching, handwashing and sanitizing facilities will be provided within the project sites. • Adequate and conveniently located facilities for the disposal of domestic and medical waste will be provided within the project sites. • Transit service for construction labour will include staff buses, culturally appropriate living and working conditions for women. • Worship facilities (e.g., prayer rooms) will be provided for the Project's direct and contracted workforce within the project sites, particularly for Muslim workers. • A Worker Accommodation Management Plan, Community Health and Safety Plan, Labour and Working Conditions Management Plan, Labour Working Conditions Management Plan, and Occupational Health and Safety Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Occupational health and safety incidents** • A Health Safety Security and Environmental (HSSE) Policy will be instituted for the project. The policy will highlight a commitment to preventive and protective measures to safeguard the health, safety and security of the Project's construction workforce. • The Project's HSSE Policy will be contractually cascaded from the Project Company down to the EPC Contractor and any sub-contractors, to ensure that the policy provisions are applied to all contracted workers.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Construction workers will be provided with a safe and healthy work environment, taking into account inherent risks and specific classes of hazards associated with the project. • An Occupational Health and Safety (OHS) management system taking into account specific risks associated with the project, legal requirements and duty of care will be developed and implemented. • Safeguard measures to ensure the health and safety of direct and contracted workers will include default efforts to eliminate workplace hazards that pose the risk significant Health and Safety (H&S) incidents (i.e., serious injury, chronic occupational disease and/or fatalities). • Where complete elimination of major workplace hazards is not feasible, subsequent consideration will be given to substituting high-risk facilities with safer technology or modifying the working environment and processes to lessen the hazards. • Efficient disposition of facilities within construction working areas, provision of adequate equipment to minimize manual labour, job rotations and resting breaks will be implemented to prevent and mitigate against over-exertion. • Efficient disposition of facilities within construction working areas, adequate housekeeping and designation of unobstructed walkways across working areas will be implemented to prevent and mitigate against slips and at-grade falls. • Provision of ladders, scaffolding, railing, and fall arrest equipment such as full-body harness (where necessary), as well as demarcation, timely covering and backfilling of fall hazard zones, will be implemented to prevent and mitigate against falls from a heights. • Designation of exclusive roads for the movement of construction machinery, dedicated walkway, marked crossing points, on-site traffic controllers and machine guards, establishment of buffer/ clearance zones from unloading/ discharge zones and provision of Personal Protective Equipment (PPE) such as helmets and safety goggles will be implemented to prevent and mitigate against impact from fast-moving objects. • Designation of exclusive zones for the operation/movement of construction machinery, dedicated walkways, marked crossing points, on-site traffic controllers, establishment of clearance zones from heavy moving machinery, use of reflective vests for personnel operating nearby heavy moving machinery, use of back-up alarms for heavy mobile machinery and use of adequate certified lifting machinery will be implemented to prevent and mitigate against impact from moving machinery. • Measures for ensuring sufficient ventilation in areas with evaporative, fugitive, aerosol and exhaust emissions will be implemented, and dust suppression measures will be commensurate to dust generation. • Excavation safety measures (i.e., shoring, sloping and benching) will be implemented for any deep and/or unstable excavations. • Preventative and mitigating measures for the handling, storage and transportation of hazardous (i.e., toxic, flammable or explosive) materials will be implemented as part of relevant Standard Operating Procedures (SOPs), based on continual hazard assessment. • Material Safety Data Sheets (MSDSs) for any hazardous materials that will be stored, handled and transferred within the project sites will be communicated to relevant workers in a clear and understandable manner, as part of targeted trainings and SOPs. Copies of the MSDSs will also be made readily accessible in any on-site HAZMAT storage facilities, with efforts to ensure that precautionary signage and descriptions are provided in Uzbek, Russian, Chinese and English.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Fire detection and suppression systems as well as the establishment of emergency exits, assembly points and emergency medical response, will be implemented. • Regular fire emergency response and spill emergency drills will be organized to ensure sufficient preparedness for incidents of fire outbreak and chemical/ waste spills. • Sufficient and specialized Personal Protection Equipment (PPE) including (but not limited to) safety boots, helmets, ear plugs/ mufflers, eye protection, overalls and gloves will be provided for construction workers engaged in various risk-presenting activities, in conjunction with regular training on the proper use of the PPE. • Recruitment of project vehicle drivers and industrial/ heavy goods vehicles in particular will involve qualification criteria such as driving license status, adequate experience, familiarity with traffic H&S safety, visual tests and professional references. • Utility and drainage clearance surveys based on visual inspections and consultations with local authorities (and where necessary, radar equipment) will be undertaken prior to the establishment of excavation, stockpiling and construction zones, to identify any buried and above-ground utility assets and drainage infrastructure. Particular attention will be given to the gas pipelines and existing electricity transmission and distribution facilities located within the project sites and respective 200 metre buffers. • All energized facilities and system components will be labelled accordingly to indicate the hazard of electrocution. • High-voltage equipment will be placed on hard-standings above ground level and housed with access controls and clear warning signage. • Routine maintenance checks will be carried out to ensure the integrity and insulation of power system components and electrical equipment. • Electrical systems, equipment and metallic enclosures for heavy electrical machinery will be grounded accordingly. • Regulatory vertical clearance will be observed for any construction activities carried out underneath existing (operational) overhead powerlines, including the passage of heavy goods vehicles and high-rise structures underneath OTLs. • All workplace H&S incidents (i.e., accidents and near-misses) will be reported and documented for expert investigation and root-cause analysis, and subsequent remedial action to prevent re-occurrence. • Food catering and potable water supply services will be provisioned for direct and contracted workers during working hours within the project sites, through the engagement of accredited personnel or vendors. • Dedicated medical facilities will be established on project sites to enable the provision of first aid and basic medical check-ups, prior to referral and transfer to nearby hospitals for further diagnostic and treatment services. • Construction workers showing symptoms of sickness will be allowed leave from duty and directed to the Project's medical facilities or hospitals for testing and treatment as appropriate. Workers with serious respiratory diseases will be quarantined or provided with face masks as necessary, to prevent or control the transmission of air borne infections within host communities. • Adequate and conveniently located sanitation and welfare facilities, including toilets, ablution, drenching, handwashing, and sanitizing facilities will be provided within the project sites.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• An adequate number of waste bins will be placed for the collection of non-hazardous construction waste to minimize littering. • Dedicated bins will be placed around any on-site kitchen, office and resting facilities to enable the collection and temporary storage of putrescible waste. On-site bins and skips dedicated to this waste stream will be covered and regularly emptied/ replaced to prevent the pest infestation. • The EPC Contractor's Health and Safety (H&S) team will include specially trained first aid providers and fire emergency responders. • Regular H&S monitoring will be carried out by the Project Company's and EPC Contractor's relevant H&S staff. This line of monitoring will include (i) inspections to ensure the implementation of H&S safeguards in work procedures/ activities, and (ii) maintenance inspections and testing to ensure the structural integrity, mechanical integrity and overall operability of construction equipment and engineering controls for prevention of on-site and off-site H&S accidents. • Induction trainings for all direct and contracted construction workers will include familiarization with a safety-oriented workplace culture, construction workplace H&S hazards and safeguards, essential PPE, hygienic requirements, emergency preparedness and response, H&S incident reporting requirements, as well as various obligations and prohibitions related to the prevention of significant H&S incidents. • Periodic refresher trainings and daily tool-box talks will be provided updated or reiterated information on (i) general workplace H&S hazards and safeguards, and (ii) targeted H&S instruction for specific construction activities. • Induction and refresher trainings for all direct and contracted construction workers will cover hygiene, housekeeping and sanitation, the waste management hierarchy, construction-related waste streams, relevant categories of hazardous materials and waste, the impacts of hazardous materials and waste on human health and ecosystems, as well as requirements and safeguards for the handling, storage and transposition of various hazardous and non-hazardous construction materials and waste streams. • A Waste Management Plan, Hazardous Materials and Waste Management Plan, Occupational Health and Safety Plan, Emergency Preparedness and Response Plan, and Sub-Contractor and Supplier Management Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Forced labour** • A Human Resources (HR) Policy and Supplier Code of Conduct will be instituted for the project. The policy will highlight zero tolerance for any forms of forced labour within the Project's direct, contracted, and primary supply-chain workforce. • The Project's HR Policy and Supplier Code of Conduct will be contractually cascaded from the Project Company down to the EPC Contractor, sub-contractors, suppliers and any directly contracted and/or sub-contracted recruitment agencies, to ensure that the policy provisions are applied to the to all workers associated with the Project's core business processes during construction.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• The recruitment of all project workers will involve equal-opportunity eligibility criteria based around inherent job requirements (e.g., educational attainment, professional experience, fitness for work etc.), with priority consideration for Uzbekistan nationals. The recruitment process will be free of discrimination on the grounds of gender, ethnicity, religion, income status and other attributes of no bearing on inherent job requirements. • Employment terms and benefits with all direct and contracted workers will be stipulated in form of bilateral employment contracts, which will be documented in Uzbek, Russian, Chinese and English, as appropriate. • Bilateral employment contracts for all direct and contracted workers will expressly state the workers' legal rights and entitlements, which are to include (but not be limited to) the duration of employment, workstation(s), working hours, description of duties or general responsibilities, remuneration and overtime compensation, legally mandated health insurance, leave and pension entitlements, as well as the notice period for termination of the contract agreement. • Bilateral employment contracts for all direct and contracted workers will not infringe the workers' legal rights to collective bargaining through registered trade unions, and any negotiated agreements with relevant trade unions will be incorporated into the employment contracts of all affected workers. • Remuneration packages for direct and contracted workers will be provided on a fair and equitable basis, taking into account legally established minimum wage, benchmarks for similar jobs within the relevant sector and project location, the cost of living, provisions for health insurance and other fringe benefits, as well as level of experience. • Any changes to employment contract agreements for direct and contracted workers will be discussed and mutually agreed upon, prior to the contract changes being officially documented and effected. • Induction trainings for all direct and contracted construction workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers. • The EPC Contractor's CLOs will communicate to project-affected communities the general eligibility criteria for the employment of direct and contracted project workers and the Project's zero tolerance policy on forced labour, as part of continual local engagement during construction. • The procurement process for the Project's EPC Contractor contractual stipulations for initiatory and annual supply chain due diligence for the full term of the EPC contract. Supply chain due diligence efforts will include (i) supply chain mapping and high-level labour risk screening, (ii) Self-Assessment (SA) audits, (iii) traceability audits for sourcing contracts for specific Bills of Materials (BoMs), and ad-hoc on-site audits for high-risk supply chain businesses. • The EPC Contractor will develop and implement a Corrective Action Plan (CAP) for any verified incidents of non-compliance with the Project's policy requirements and standards for forced labour, such that relevant performance gaps are remediated within the remedial timeframe specified in the CAP. • A Sub-Contractor and Supplier Management Plan, Supply Chain Management Plan (or Responsible Sourcing Procedure, as appropriate) including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Child labour** • A Human Resources (HR) Policy and Supplier Code of Conduct will be instituted for the project. The policy will highlight labour restrictions for workers under the age of 18 and prohibition of labour for workers under the age of 16 within the Project's direct, contracted and primary supply-chain workforce. • The Project's HR Policy and Supplier Code of Conduct will be contractually cascaded from the Project Company down to the EPC Contractor, sub-contractors, suppliers and any directly contracted and/or sub-contracted recruitment agencies, to ensure that the policy provisions are applied to the to all workers associated with the Project's core business processes during construction. • The recruitment process for the Project's direct and contracted workers will involve the screening of official personal identification documents (i.e., national ID, passport etc.) for the purposes of age verification. • Induction trainings for all direct and contracted construction workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers. • The EPC Contractor's CLOs will communicate to project-affected communities the general eligibility criteria for the employment of direct and contracted project workers and the Project's policy restrictions on child labour, as part of continual local engagement during construction. • The procurement process for the Project's EPC Contractor contractual stipulations for initiatory and annual supply chain due diligence for the full term of the EPC contract. Supply chain due diligence efforts will include (i) supply chain mapping and high-level labour risk screening, (ii) Self-Assessment Questionnaire (SAQ) audits, and ad-hoc on-site audits for high-risk supply chain businesses. • The EPC Contractor will develop and implement a Corrective Action Plan (CAP) for any verified incidents of non-compliance with the Project's policy requirements and standards for child labour, such that relevant performance gaps are remediated within the remedial timeframe specified in the CAP. • A Sub-Contractor and Supplier Management Plan, Supply Chain Management Plan (or Responsible Sourcing Procedure, as appropriate) including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Workplace harassment, violence and other security incidents involving project workers**						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Public access to the project sites will be restricted using procedural and engineering controls including site fencing, issuance of administrative identification documents to all direct and contracted construction workers, security checks at entry gates, as well as electronic access control systems and video surveillance for any high-risk and/or high-value facilities within project sites. • Professional security personnel will be hired to undertake on-site security monitoring including CCTV surveillance, site entry checks, and patrols for high-risk and/or high-value facilities within the project sites. • The recruitment of the project's security personnel will involve a vetting or screening procedure to ensure that candidates under consideration have no record of implication in unlawful use of force and other forms of human rights violations (including gender-based violence). • Reasonable efforts will be made to sensitize dedicated site security management teams to the standards set out in the National Guard to the UN Code of Conduct for Law Enforcement Officials and Voluntary Principles on Security and Human Rights (i.e., exceptional conditions for the application of force as a last resort, in a manner that is (i) cautious, (ii) proportionate to the extent of a given threat to project workers and assets and (iii) compliant with national laws on the use of lethal force). • The EPC Contractor's security department will regularly engage with the local police force and relevant Local Government Authority (LGA) units to obtain information on the incidence of crime within local communities based around the project sites and the wider host districts and develop the Project's security arrangements. • Emergency medical response and ambulatory hospital transfers will be provided for any injuries and casualties resulting from security incidents. • Local law enforcement authorities will be notified immediately, upon the occurrence of security incidents, to enable authoritative response, official investigation, apprehension, and prosecution. • An Occupational Health and Safety Plan and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented, in coordination with relevant LGA departments and the local police force. • **<u>Gender Risk – Gender Based Violence and Harassment</u>** • The workers will be provided with information regarding worker code of conduct in local languages as part of their employment contract which will include provisions for reporting, investigations, termination and disciplinary action against those who perpetrate gender violence and harassment. • The EPC Contractor will implement the Project specific GBVH Policy. This policy will align with ACWA Power's GBVH policy and will list out the unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including ACWA Power's Environmental & Social Management System Implementation Manual.					

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• The EPC Contractor will conduct mandatory regular training and awareness raising for the workforce about gender-based violence and harassment towards local community members and their colleagues especially women and the availability of a grievance mechanism to report any GBVH/SEA/SH cases. • Training will be provided to GBVH focal point on the risks of GBV/SEA/SH and information provided on how to deal with any GBV/SEA/SH related cases. • The workers will be made aware of the laws and regulations that make sexual harassment and gender-based violence a punishable offence which is prosecuted. • Ensure inclusion of a balanced representation of women on the HSE team who will be easily relatable and approachable to female workers. • Project personnel in charge of receiving GBVH/SEA/SH grievances will be provided with appropriate training on how to handle such complaints. It is recommended that the personnel are trained in coordination with any GBVH organizations working in the Project area where available. • Female workers will be included in the grievance redress committee to help female workers and host community female members raise their grievances. • Regular consultations will be undertaken with women on their concerns about the project. • The EPC Contractor will work to identify a suitable labour pool locally in order to minimize the need for bringing large number of workers from other regions or countries. This could also help the EPC Contractor in cutting cost associated with provision of accommodation facilities if the majority of the workers are sourced locally. • Provision of opportunities for the workers to regularly return to their families who may be located far from the Project site. • The EPC Contractor will provide opportunities for workers to have access to entertainment opportunities away from the host communities. • EPC Contractor will allow submission and investigation of anonymous sexual harassment complaints by workers and host community members and protect the confidentiality of the complainants. • The EPC Contractor will work in close coordination with the local authorities in investigating any complaints relating to gender violence and harassment in the host communities where it relates to Project workers. • The EPC Contractor will provide targeted training (including in life skills such as leadership and decision-making) and awareness raising to vulnerable workers such as women. • The EPC Contractor will prepare a Gender Equality and GBVH/SEA/SH Policy in line with Uzbek and lenders requirements. This will include provision of training to workers, subcontractors and suppliers on GBVH associated risks.						

16.4.2 Operational phase

16.4.2.1 Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices

The Project's operational phase is set to employ an estimated total of 20 workers. A large fraction of the O&M workforce will be sourced locally, and foreign recruitment will be limited to specialized labour.

While most of the Project Company's direct workers will be recruited internally, a combination of recruitment channels will be used for the procurement of skilled workers, both with Uzbekistan and abroad. Depending on the accessibility of in-demand O&M specialists, the O&M Contractor will undertake employment for certain labour sections internally and outsource the remainder of labour procurement to recruitment agencies within Uzbekistan and abroad, as appropriate.

Recruitment mechanisms for operations-phase labour may involve discriminatory and/or exploitative practices which may inhibit fair and equitable access to job opportunities and employment terms/ benefits. This risk potentially applies to recruitment agencies with unscrupulous recruitment procedures. Discriminatory recruitment practices may deny suitably qualified job candidates equitable access to employment on the basis of bribery, nepotism, sexual harassment, and/or biased consideration on the basis of personal attributes of no bearing on inherent job requirements (e.g., gender, religion, ethnicity etc.).

Likewise, exploitative recruitment practices may deny job candidates and recruits equitable employment benefits or legal entitlements (e.g., remuneration, overtime compensation, health insurance professional development, leave entitlements, freedom of association etc.). In addition, workers may be recruited without the establishment of transparent, comprehensive, and mutually accessible employment contracts to document mutual obligations (i.e., job requirements, length of employment, related legal entitlements) and ensure satisfactory performance and sound employee-management relationships.

16.4.2.2 Occupational health and safety incidents

O&M workers are subject to a wide range of occupational physical, chemical, and biological hazards which potentiate injury, sickness, and fatalities. Key construction-phase hazards within the project sites and transit corridors include (but are not limited to):

- Work at height (i.e., for collector sub-station and LILO maintenance)
- Lifting and manual handling of heavy objects
- Moving vehicles

- Fire and explosion
- Electrocution
- Heat stress
- Exposure to hazardous materials (i.e., via inhalation, skin contact)

The lack of H&S risk assessment to eliminate critical hazards, comprehensive H&S training oriented to general and specific areas of work, provision of Personal Protective Equipment (PPE), H&S monitoring for direct and contracted workers, emergency response plans and other crucial safeguards may result in H&S accidents, which may give rise to severe injury, sickness, and fatalities.

16.4.2.3 Forced labour

The use of independent recruitment agencies to facilitate the employment and management of contracted workers (under the O&M Contractor and any sub-contractors) poses the risk of unscrupulous and exploitative recruitment and management practices.

As elaborated in Section 16.4.1.4, the Project's potential reliance on a Chinese-based solar panel supply chain poses a significant risk of forced labour within its upstream supply chain, for the procurement of spare PV modules for operational maintenance.

16.4.2.4 Child labour

As described in the sub-sections above, the engagement of in-country recruitment agencies for contracted and sub-contracted O&M workers presents the potential of unscrupulous and exploitative recruitment practices, which may involve minors below the age of 18 and unlawful employment arrangements for minor recruits.

At the Project's operational stage, the risk of child labour is largely associated with the Project's foreign supply-chain workforce, particularly the upstream nexus for Tier 4 PV module suppliers. The elevated risk of forced labour in this connection presents a commensurate likelihood for the worst forms of child labour, including debt bondage, slavery, trafficking, and other modes of forced labour.

16.4.2.5 Workplace harassment, violence and other security incidents involving project workers

Project workers, particularly contracted workers are subject to a range of human rights violations, in the form of workplace intimidation, harassment and assault. Female workers are further at risk of sexual violence, harassment, and exploitation in the workplace. Acts of workplace aggression and other hostile transgressions representing the violation of human rights can be perpetrated by co-workers, particularly those in superior positions. Sexual

exploitation and abuse typically involve female workers in subservient roles, particularly migrant workers who have lesser support systems and awareness of in-country legal recourse.

Further, criminal and abusive acts towards project workers can also be inflicted by third-party perpetrators. Attacks on project workers can occur in the event of theft, robbery, and sexual abuse.

Table 16-5 Overview of potential impacts relating to labour and working conditions during operation

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices	Project-affected communities, districts, and wider Uzbekistan; Foreign labour markets	Moderate	Job candidates	Medium	**Moderate**	**Negligible/ Minor**
Occupational health and safety incidents	Project sites (work stations and sites)	Major	Direct and contracted workers	Medium	**Moderate**	**Minor**
Forced labour	Uzbekistan and China	Major	Direct and contracted workers	Medium	**Moderate/ Major**	**Minor/ Moderate**
			Supply chain workers	High	**Major**	**Minor/ Moderate**
Child labour	Uzbekistan and China	Major	Direct and contracted workers	Medium	**Major**	**Minor/ Moderate**
			Supply chain workers	High	**Moderate**	**Minor**
Workplace harassment, violence and other security incidents involving project workers	Project sites (work stations and sites)	Major	Direct and contracted workers	Medium	**Major**	**Minor/ Moderate**

Impact avoidance and mitigation measures

<u>Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices</u>

- A Human Resources (HR) Policy will be instituted for the project. The policy will highlight a commitment to equal-opportunity recruitment and fair employment terms, in addition to promoting gender equality and local content in this respect.
- The Project's HR Policy will be contractually cascaded from the Project Company down to the O&M Contractor, and any recruitment agencies, to ensure that the policy provisions are applied to all contracted workers.
- Induction trainings for all direct and contracted construction workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers.

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• The recruitment of all project workers will involve equal-opportunity eligibility criteria based around inherent job requirements (e.g., educational attainment, professional experience, fitness for work etc.). The recruitment process will be free of discrimination on the grounds of gender, ethnicity, religion, income status and other attributes of no bearing on inherent job requirements. • Employment for the Project's direct and contracted labour as well as the procurement of services from supply chains will be implemented at the community, district, regional and national levels, in order of decreasing priority. • Employment terms and benefits with all direct and contracted workers will be stipulated in form of bilateral employment contracts, which will be documented in Uzbek, Russian, and English, as appropriate. • Bilateral employment contracts for all direct and contracted workers will expressly state the workers' legal rights and entitlements, which are to include (but not be limited to) the duration of employment, workstation(s), working hours, description of duties or general responsibilities, remuneration and overtime compensation, health insurance, leave and pension entitlements, as well as the notice period for termination of the contract agreement. • Bilateral employment contracts for all direct and contracted workers will not infringe the workers' legal rights to collective bargaining through registered trade unions, and any negotiated agreements with relevant trade unions will be incorporated into the employment contracts of all affected workers. • Remuneration packages for direct and contracted workers will be provided on a fair and equitable basis, taking into account legally established minimum wage, benchmarks for similar jobs within the relevant sector and project location, the cost of living, provisions for health insurance and other fringe benefits, as well as level of experience. • Any changes to employment contract agreements for direct and contracted workers will be discussed and mutually agreed upon, prior to the contract changes being officially documented and effected. • The promulgation of employment opportunities within project-affected communities, districts and the wider region will be undertaken by means of (i) newspaper advertisements, (ii) public announcements by relevant LGAs, (iii) posts at vocational training institutions, (iv) posts at project site entry points, and (v) local community engagements by dedicated CLOs. • All project employees and contracted workers will have equitable access to relevant on-the-job trainings, which will enable the dissemination of specialist and transferable skills within the Project's O&M phase. • Career development programs such as internships, mentorships and professional development plans will be provided for various tiers and sections of project employees and contracted workers, particularly skilled workers paired with expatriate experts not readily available in Uzbekistan. • The gender profile of the Project's direct and contracted workforce will be reviewed on a regular basis, with a view to ensuring a sufficient representation of women within construction labour to the extent feasible. • A dedicated Local Content Plan, Retrenchment Plan, and Sub-Contractor and Supplier Management Plan will be developed and implemented.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **<u>Occupational health and safety incidents</u>** • A Health Safety Security and Environmental (HSSE) Policy will be instituted for the project. The policy will highlight a commitment to preventive and protective measures to safeguard the health, safety and security of the Project's O&M workforce. • The Project's HSSE Policy will be contractually cascaded from the Project Company down to the O&M Contractor and any sub-contractors, to ensure that the policy provisions are applied to all contracted workers. • Construction workers will be provided with a safe and healthy work environment, taking into account inherent risks and specific classes of hazards associated with the project. • An operations-phase Occupational Health and Safety (OHS) management system taking into account specific risks associated with the project, legal requirements and duty of care will be developed and implemented. • Safeguard measures to ensure the health and safety of direct and contracted workers will include default efforts to eliminate workplace hazards that pose the risk significant Health and Safety (H&S) incidents (i.e., serious injury, chronic occupational disease and/or fatalities). • Where complete elimination of major workplace hazards is not feasible, subsequent consideration will be given to substituting high-risk facilities with safer technology or modifying the working environment and processes to lessen the hazards. • Provision of ladders, scaffolding, railing, and fall arrest equipment such as full-body harness (where necessary), as well as demarcation, timely covering and backfilling of fall hazard zones, will be implemented to prevent and mitigate against falls from a heights. • Measures for ensuring sufficient ventilation in areas with evaporative, fugitive, aerosol and exhaust emissions will be implemented. • Preventative and mitigating measures for the handling, storage and transportation of hazardous (i.e., toxic, flammable or explosive) materials will be implemented as part of relevant Standard Operating Procedures (SOPs), based on continual hazard assessment. • Material Safety Data Sheets (MSDSs) for any hazardous materials that will be stored, handled and transferred within the project sites will be communicated to relevant workers in a clear and understandable manner, as part of targeted trainings and SOPs. Copies of the MSDSs will also be made readily accessible in any on-site HAZMAT storage facilities, with efforts to ensure that precautionary signage and descriptions are provided in Uzbek, Russian, Chinese and English. • Fire detection and suppression systems as well as the establishment of emergency exits, assembly points and emergency medical response, will be implemented. • Periodic fire emergency response and spill emergency drills will be organized to ensure sufficient preparedness for incidents of fire outbreak and chemical/ waste spills.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-management Impact Significance	Residual Impact Significance
• Sufficient and specialized Personal Protection Equipment (PPE) including (but not limited to) safety boots, helmets, ear plugs/ mufflers, eye protection, overalls and gloves will be provided for O&M workers engaged in various risk-presenting activities, in conjunction with regular training on the proper use of the PPE. • Recruitment of project vehicle drivers and industrial/ heavy goods vehicles in particular will involve qualification criteria such as driving license status, adequate experience, familiarity with traffic H&S safety, visual tests and professional references. • All energized facilities and system components will be labelled accordingly to indicate the hazard of electrocution. • High-voltage equipment will be placed on hard-standings above ground level and housed with access controls and clear warning signage. • Routine maintenance checks will be carried out to ensure the integrity and insulation of power system components and electrical equipment. • Electrical systems, equipment and metallic enclosures for heavy electrical machinery will be grounded accordingly. • All workplace H&S incidents (i.e., accidents and near-misses) will be reported and documented for expert investigation and root-cause analysis, and subsequent remedial action to prevent re-occurrence. • Adequate and conveniently located sanitation and welfare facilities, including toilets, ablution, drenching, handwashing, and sanitizing facilities will be provided within the project sites. • An adequate number of waste bins will be placed for the collection of non-hazardous construction waste to minimize littering. • Dedicated bins will be placed around any on-site kitchen and office facilities to enable the collection and temporary storage of putrescible waste. On-site bins and skips dedicated to this waste stream will be covered and regularly emptied/ replaced to prevent the pest infestation. • The O&M Contractor's Health and Safety (H&S) team will include specially trained first aid providers and fire emergency responders. • Regular H&S monitoring will be carried out by relevant H&S staff underneath the Project Company and O&M Contractor. This line of monitoring will include (i) inspections to ensure the implementation of H&S safeguards in work procedures/ activities, and (ii) maintenance inspections and testing to ensure the structural integrity, mechanical integrity and overall operability of construction equipment and engineering controls for prevention of on-site and off-site H&S accidents. • Induction trainings for all direct and contracted O&M workers will include familiarization with a safety-oriented workplace culture, construction workplace H&S hazards and safeguards, essential PPE, hygienic requirements, emergency preparedness and response, H&S incident reporting requirements, as well as various obligations and prohibitions related to the prevention of significant H&S incidents. • Periodic refresher trainings and daily tool-box talks will be provided updated or reiterated information on (i) general workplace H&S hazards and safeguards, and (ii) targeted H&S instruction for specific O&M activities. • Induction trainings for all direct and contracted construction workers will cover hygiene, housekeeping and sanitation, the waste management hierarchy, operational waste streams, relevant categories of hazardous materials and waste, the impacts of hazardous materials and waste on human health and ecosystems, as well as requirements and safeguards for the handling, storage and transposition of various hazardous and non-hazardous construction materials and waste streams.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Operations-phase Occupational Health and Safety Plan and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Forced labour** • A Human Resources (HR) Policy and Supplier Code of Conduct will be instituted for the project. The policy will highlight zero tolerance for any forms of forced labour within the Project's direct, contracted and primary supply-chain workforce. • The Project's HR Policy and Supplier Code of Conduct will be contractually cascaded from the Project Company down to the O&M Contractor, sub-contractors, suppliers and any contracted recruitment agencies, to ensure that the policy provisions are applied to the to all workers associated with the Project's core business processes during operation. • The recruitment of all project workers will involve equal-opportunity eligibility criteria based around inherent job requirements (e.g., educational attainment, professional experience, fitness for work etc.), with priority consideration for Uzbekistan nationals. The recruitment process will be free of discrimination on the grounds of gender, ethnicity, religion, income status and other attributes of no bearing on inherent job requirements. • Employment terms and benefits with all direct and contracted workers will be stipulated in form of bilateral employment contracts, which will be documented in Uzbek, Russian, and English, as appropriate. • Bilateral employment contracts for all direct and contracted workers will expressly state the workers' legal rights and entitlements, which are to include (but not be limited to) the duration of employment, workstation(s), working hours, description of duties or general responsibilities, remuneration and overtime compensation, legally mandated health insurance, leave and pension entitlements, as well as the notice period for termination of the contract agreement. • Bilateral employment contracts for all direct and contracted workers will not infringe the workers' legal rights to collective bargaining through registered trade unions, and any negotiated agreements with relevant trade unions will be incorporated into the employment contracts of all affected workers. • Remuneration packages for direct and contracted workers will be provided on a fair and equitable basis, taking into account legally established minimum wage, benchmarks for similar jobs within the relevant sector and project location, the cost of living, provisions for health insurance and other fringe benefits, as well as level of experience. • Any changes to employment contract agreements for direct and contracted workers will be discussed and mutually agreed upon, prior to the contract changes being officially documented and effected. • Induction trainings for all direct and contracted O&M workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• The procurement process for the Project's O&M Contractor contractual stipulations for initiatory and annual supply chain due diligence for the full term of the EPC contract. Supply chain due diligence efforts will include (i) supply chain mapping and high-level labour risk screening, (ii) Self-Assessment (SA) audits, (iii) traceability audits for sourcing contracts for specific Bills of Materials (BoMs), and ad-hoc on-site audits for high-risk supply chain businesses. • The O&M Contractor will develop and implement a Corrective Action Plan (CAP) for any verified incidents of non-compliance with the Project's policy requirements and standards for forced labour, such that relevant performance gaps are remediated within the remedial timeframe specified in the CAP. • Operations-Phase Sub-Contractor and Supplier Management Plan, Supply Chain Management Plan (or Responsible Sourcing Procedure, as appropriate) including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Child labour** • A Human Resources (HR) Policy and Supplier Code of Conduct will be instituted for the project. The policy will highlight labour restrictions for workers under the age of 18 and prohibition of labour for workers under the age of 16 within the Project's direct, contracted, and primary supply-chain workforce. • The Project's HR Policy and Supplier Code of Conduct will be contractually cascaded from the Project Company down to the O&M Contractor, sub-contractors, suppliers and any contracted recruitment agencies, to ensure that the policy provisions are applied to the to all workers associated with the Project's core business processes during operation. • The recruitment process for the Project's direct and contracted workers will involve the screening of official personal identification documents (i.e., national ID, passport etc.) for the purposes of age verification. • Induction trainings for all direct and contracted O&M workers will include familiarization with the Project's HR Policy, the workers' legal rights and the Grievance Redress Mechanism (GRM) for project workers. • The procurement process for the Project's O&M Contractor contractual stipulations for initiatory and annual supply chain due diligence for the full term of the EPC contract. Supply chain due diligence efforts will include (i) supply chain mapping and high-level labour risk screening, (ii) Self-Assessment Questionnaire (SAQ) audits, and ad-hoc on-site audits for high-risk supply chain businesses. • The O&M Contractor will develop and implement a Corrective Action Plan (CAP) for any verified incidents of non-compliance with the Project's policy requirements and standards for child labour, such that relevant performance gaps are remediated within the remedial timeframe specified in the CAP.						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• Operations-phase Sub-Contractor and Supplier Management Plan, Supply Chain Management Plan (or Responsible Sourcing Procedure, as appropriate) including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented. • A worker GRM will be instituted for the Project and disclosed to the Project's direct and contracted workers to enable the collection of workplace grievances on platforms that are accessible to the workers and free of manipulation, intimidation, service charges and restrictions on arbitration, judicial recourse and choice of confidentiality. **Workplace harassment, violence and other security incidents involving project workers** • Public access to the project sites will be restricted using procedural and engineering controls including site fencing, issuance of administrative identification documents to all direct and contracted O&M workers, security checks at entry gates, as well as electronic access control systems and video surveillance for any high-risk and/or high-value facilities within project sites. • Professional security personnel will be hired to undertake on-site security monitoring including CCTV surveillance, site entry checks, and patrols for high-risk and/or high-value facilities within the project sites. • The recruitment of the project's security personnel will involve a vetting or screening procedure to ensure that candidates under consideration have no record of implication in unlawful use of force and other forms of human rights violations (including gender-based violence). • Reasonable efforts will be made to sensitize dedicated site security management teams to the standards set out in the National Guard to the UN Code of Conduct for Law Enforcement Officials and Voluntary Principles on Security and Human Rights (i.e., exceptional conditions for the application of force as a last resort, in a manner that is (i) cautious, (ii) proportionate to the extent of a given threat to project workers and assets and (iii) compliant with national laws on the use of lethal force). • The O&M Contractor's security department will regularly engage with the local police force and relevant Local Government Authority (LGA) units to obtain information on the incidence of crime within local communities based around the project sites and the wider host districts and develop the Project's security arrangements. • Emergency medical response and ambulatory hospital transfers will be provided for any injuries and casualties resulting from security incidents. • Local law enforcement authorities will be notified immediately, upon the occurrence of security incidents, to enable authoritative response, official investigation, apprehension, and prosecution. • Operations-phase Occupational Health and Safety Plan and Emergency Preparedness and Response Plan including (but not limited to) provisions for the avoidance and mitigation measures listed above will be developed and implemented, in coordination with relevant LGA departments and the local police force. **Gender Risk – Gender Based Violence and Harassment**						

E&S Impact	Area of Influence	Impact Magnitude	Potential Receptors (direct and indirect receptors)	Receptor Sensitivity	Pre-Management Impact Significance	Residual Impact Significance
• O&M workers will be provided with information regarding worker code of conduct in local languages as part of their employment contracts which will include provisions for reporting, investigation, disciplinary and legal action against those who perpetrate gender violence and harassment. • The O&M Contractor will implement the Project specific GBVH Policy. This policy will align with the Project Company's GBVH policy and define unacceptable behaviour among workers, provisions for reporting, sanctions for perpetrators and available resources & support systems for the victims in accordance with lenders and Uzbek requirements including the Project Company's Environmental & Social Management System Implementation Manual. • The O&M Contractor will conduct mandatory regular training and awareness raising for the workforce about gender-based violence and harassment towards local community members and their colleagues especially women and the availability of a grievance mechanism to report any GBVH/SEA/SH cases. • The workers will be made aware of the laws and regulations that make sexual harassment and gender-based violence a punishable offence which is prosecuted. • The O&M Contractor will work in close coordination with the local authorities in investigating any complaints relating to gender violence and harassment in the host communities where it relates to Project workers.						

16.4.3 Decommissioning phase

Project decommissioning will entail the deconstruction of project facilities, demobilization of related equipment and materials, as well as potential repurposing and/or rehabilitation works. At this stage, potential impacts relating to labour and working conditions will be similar to the above-described construction-phase impacts. Specifically, this set of impacts potentially includes:

- Unequal access to employment opportunities and benefits due to discriminatory and/or exploitative recruitment practices
- Occupational health and safety incidents
- Child labour
- Workplace harassment, violence and other security incidents involving project workers

For the avoidance and mitigation of these impacts, relevant impact management measures specified in Section 16.4.1 will be implemented. Accordingly, the same pre-management and residual significance ratings are provisionally assigned to mutually relevant impacts on sensitive receptors.

16.5 Monitoring Requirements

Table 16-6 below provides an overview of the key monitoring arrangements for evaluating performance against applicable standards relating to labour and working conditions in the Project's construction and operational phases. A more elaborate coverage of these requirements will be provided in the Construction- and Operations-phase Environmental and Social Management Plans (C-ESMP, O-ESMP) and Environmental and Social Monitoring Plans (ESMoPs).

Table 16-6 Monitoring arrangements for impacts and preventative and mitigation measures relating to labour and working conditions

E&S Impact	Key Performance Indicator/ Parameter	Target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
Construction phase					
Lacking access to employment opportunities and benefits due to discriminatory and repressive recruitment practices	Project-specific Human Resource Policies with equal-opportunity employment commitments and fair working conditions	- Project-specific Human Rights Policies with equal-opportunity employment commitments and fair working conditions are in place for the Project Company, the EPC Contractor and all primary sub-contractors	- Labour audits log	Upon onboarding of construction-related contractors, sub-contractors and suppliers	- Project Company HR Manager - EPC Contractor HR Manager
	Employment contracts	- Employment contracts in place for all direct and contracted workers, in appropriate languages	- Labour audits log	Quarterly	- Project Company HR Manager - EPC Contractor HR Manager
	Recruitment of local workers and retention of local workers	- Women account for at least 5% of the project labour	- Workforce profile	Quarterly	- Project Company HR Manager - EPC Contractor HR Manager
	Recruitment of local workers and retention of women	- Locals account for at least 20% of the project labour	- Workforce profile	Quarterly	- Project Company HR Manager - EPC Contractor HR Manager
Poor working and living conditions	Non-conformances (NCRs) related to	- 100% of non-conformances are	- Labour audits log	Quarterly	- Project Company HR Manager

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
	inadequate labour accommodation and welfare facilities	closed out in the shortest practicable duration			- EPC Contractor HR Officer, H&S Officer
	Grievances concerning poor working and living conditions	- All related grievances are closed out within the shortest practicable duration	- Worker Grievance Log	Ongoing	- EPC Contractor HR Officer
Occupational health and safety incidents	Number of significant H&S accidents involving project workers	- Zero significant H&S accidents involving project workers	- H&S Accidents Log	Ongoing	- EPC Contractor H&S Officer
	Percentage of H&S accidents involving project workers investigated and addressed through remedial and preventative actions within the shortest practicable duration	- 100% of accidents involving project workers have been investigated and addressed through remedial and preventative actions, within the shortest practicable duration	- H&S Accidents Log	Upon occurrence of accidents	- EPC Contractor H&S Officer
Forced labour	Project-specific Human Resource Policy and Human Rights Policy with prohibition of all forms of forced labour	- Project-specific Human Resource Policy and Human Rights Policy with prohibition of all forms of forced labour are in place for the Project Company, the EPC Contractor and all primary sub-contractors	- Labour audit log	- Upon onboarding of construction-related contractors, sub-contractors and suppliers. - Upon change in Sourcing Contract (supply chain).	- Project Company E&S Manager - Project Company HR Manager - Project Company Procurement Manager - EPC Contractor E&S Manager

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
					- EPC Contractor HR Manager - EPC Contractor Procurement Manager
	Percentage of labour audits completed in line with the schedules specified in the Sub-Contractor and Supplier Management Plan and Supply Chain Management Plan	- 100% of labour audits have been completed in line with the schedules specified in the Sub-Contractor and Supplier Management Plan and Supply Chain Management Plan	- Bill of Materials for solar panels - Traceability Audit Report - Labour Audit Reports	Upon onboarding of construction-related contractors, sub-contractors and suppliers; Annually thereafter	- Project Company E&S Manager - Project Company HR Manager - Project Company Procurement Manager - EPC Contractor E&S Manager - EPC Contractor HR Manager - EPC Contractor Procurement Manager
Child labour	Project-specific Human Resource Policy and Human Rights Policy with prohibition of illicit child labour	- Project-specific Human Resource Policy and Human Rights Policy with prohibition of illicit child labour are in place for the Project Company, the EPC Contractor and all primary sub-contractors	- Labour audit log	Upon onboarding of construction-related contractors, sub-contractors and suppliers	- Project Company E&S Manager - Project Company HR Manager - Project Company Procurement Manager - EPC Contractor E&S Manager - EPC Contractor HR Manager

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
					- EPC Contractor Procurement Manager
	Percentage of labour audits completed in line with the schedules specified in the Sub-Contractor and Supplier Management Plan and Supply Chain Management Plan	- 100% of labour audits have been completed in line with the schedules specified in the Sub-Contractor and Supplier Management Plan and Supply Chain Management Plan	- Traceability Audit Report - Labour Audit Reports	Upon onboarding of construction-related contractors, sub-contractors and suppliers; Annually thereafter	- Project Company HR Manager - Project Company Procurement Manager - EPC Contractor HR Manager - EPC Contractor Procurement Manager
Workplace harassment, violence and other security incidents involving project workers	Project-specific Human Rights Policy with a commitment to the protection of human rights and Code of Conduct	- Project-specific Human Rights Policy with a commitment to the protection of human rights, and a Code of Conduct, are in place for the Project Company, the EPC Contractor and all primary sub-contractors	- Labour audit log	Upon onboarding of construction-related contractors, sub-contractors and suppliers	- Project Company HR Manager - EPC Contractor HR Manager
	Grievances concerning workplace harassment, violence and other security incidents (from contracted workers)	- All related grievances are closed out within the shortest practicable duration	- Worker Grievance Log	Ongoing	- Project Company HR Manager - Manager - EPC Contractor E&S Manager - EPC Contractor HR Manager

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
					- EPC Contractor Security Manager/ Chief Security Officer
Operational phase					
Lacking access to employment opportunities and benefits due to discriminatory and repressive recruitment practices	Employment contracts	- Employment contracts in place for all direct and contracted workers, in appropriate languages	- Labour audits	- Annually	- Project Company HR Manager - Project Company Procurement Manager - O&M Contractor HR Manager - O&M Contractor Procurement Manager
Occupational health and safety incidents	Percentage of O&M workers who have received induction trainings in construction-related hazards, related safeguards, emergency response procedures, and reporting of health and safety incidents	- 100% of O&M workers have received induction trainings in construction-related hazards, related safeguards, emergency response procedures, and reporting of health and safety incidents	- HSSE Training Report	- Weekly	- O&M Contractor HSSE Trainer
Forced labour	Project-specific Human Resources Policy and Human Rights Policy with prohibition of all forms of forced labour	- Project-specific Human Resources Policy and Human Rights Policy with prohibition of all forms of forced labour are in	- Labour Audit - O&M Contractor/Supplier Sourcing Contract	- Upon onboarding of O&M Contractor, sub-contractors and suppliers	- Project Company E&S Manager - Project Company HR Manager

E&S Impact	Key Performance Indicator/ Parameter	target	Monitoring Location / Means of Verification	Monitoring Frequency	Responsible Entity
		place for the Project Company, the O&M Contractor and all primary sub-contractors, alongside the Project's Code of Conduct			- Project Company Procurement Manager - O&M Contractor E&S Manager - O&M Contractor HR Manager - O&M Contractor Procurement Manager

17 CLIMATE CHANGE RISK ASSESSMENT

17.1 Legal Requirements and Standards

17.1.1 National laws and regulations

The ratification of the Paris Climate Agreement committed Uzbekistan to transitioning to a green economy, and adoption of the following normative documents:

- Decree of the President of the Republic of Uzbekistan. № PD-4477, dated October 4, 2019 "On approval of the Strategy on transition of the Republic of Uzbekistan to the "green" economy for the period 2019-2030".,
- Decree of the President of the Republic of Uzbekistan, № PD-5863, dated October 30, 2019, "On approval of the Concept of environmental protection of the Republic of Uzbekistan until 2030".

Priority areas of "The Strategy on transition of the Republic of Uzbekistan to the "green" economy for the period 2019-2030" regarding to the electricity producing industry are:

- Reconstruction and modernization of generating capacities of existing power plants with implementation of highly efficient technologies based on combined cycle gas and gas turbine units.
- Improvement of configurations and modernization of main power networks to increase the stability of the power system.
- Implementation of organizational and technical measures, including optimization of modes.
- Increasing the level of automatization of technological processes; and
- Full equipment of power consumption systems with automatic control and metering devices.

17.1.2 Lender requirements

17.1.2.1 ADB

ADB Environment Safeguards state that the borrower/client is required to promote the reduction of project related GHG emissions in a manner appropriate to the nature and scale of the project operations and impacts. During the development or operation of projects that are expected to or currently emit significant quantitates of greenhouse gases, defined as amounting to 100,000 tCO2e per annum or more aggregate direct and indirect emissions, the borrower should quantify:

- Direct emissions from the facilities within the physical project boundary; and

- Indirect emissions associated with the off-site production of power used by the project.

The borrower should also evaluate technically and financially feasible and cost-effective options to reduce or offset project related GHG emissions during project design and operation.

In 2017, ADB instituted a Climate Change Operational Framework for the target period 2017 – 2030. The overall objective of the framework is to instrumentally align the Bank's operations in Developing Member Countries with collective and country-specific climate performance targets set out in the Paris Agreement. In furtherance of the Paris accord, the framework establishes principles and systems for mainstreaming climate action into the Bank's policy-, strategy- and project-level undertakings.

The CCOF places particular emphasis on proactive and collaborative incorporation of decarbonization and climate resilience foci into the broader appraisal and management framework for sustainability-related risks, across ADB's investment portfolio. The framework is therefore intended to ensure material progress towards Nationally Determined Contribution targets, through a systemic delivery of technical and financial assistance to this end.

17.1.2.2 IFC and EPFIs

The Equator Principles (EPIV) require ESIA studies for Category A projects to include a Climate Change Impact Assessment (CCIA), which includes an assessment of Scope 1, 2 and 3 emissions as well as physical and transition climate risks as appropriate.

17.2 Historical climate trends and extreme events

17.2.1 Temperature and precipitation

The climate of Uzbekistan is widely described as arid and continental, with large variations in temperature within days and between seasons. Most of the country (79% by area) features flat topography in the form of semi-desert steppes and desert zones, including desert areas in the far west that have formed due to the shrinking of the Aral Sea. The country's south-eastern reaches harbour the high mountains forming part of the Tien-Shan and Gissar-Alai Ranges and exhibit a continental climate. Uzbekistan experiences long, hot and dry summers with an average temperature of 26.1°C, along with cold winters with lowest temperatures averaging 0.91°C. Recent climatology indicates that overall temperature is highest in the country's south and lowest in the west. The spatial variation in annual precipitation levels varies considerably, with western parts of the country receiving less than 100 mm of yearly precipitation, and eastern reaches receiving 800–900 mm. The figures below illustrate the spatial variation in Uzbekistan's mean annual temperature and precipitation levels.

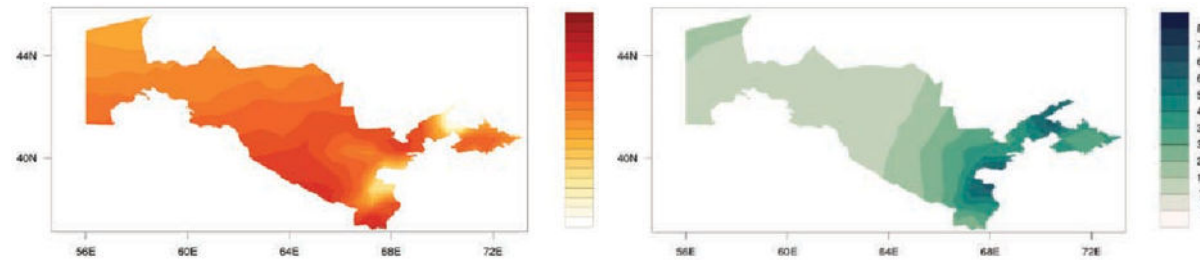


Figure 17-1 Visual representation of spatial variation in mean temperature and precipitation levels in Uzbekistan

17.2.1.1 Climate Related Natural Hazards – Historical Trends and Projections

Meteorological analyses have demonstrated a link between changes in the global climate system and the increased frequency and severity of climate-related disasters, such as droughts, floods, tropical storms and wild fires. These disasters have had a particularly severe impact on countries with both climatic and socioeconomic vulnerability. According to a risk index analysis published by INFORM for 2022, Uzbekistan currently holds a low risk score, and its humanitarian risk trend for the past three years has remained stable. The risk index report also indicates that drought and floods represent the country's main humanitarian risks.

Mean annual air temperatures have risen steadily and significantly in Uzbekistan over the past few decades, with varying rates of increase. Between 1990 and 2020, the country's mean annual temperature grew at a rate of 0.03°C per decade. Warming rates also differ geographically, with sharpest increases concentrated in the north and less warming in the southern highlands. Recent studies suggest that the changes in Uzbekistan's temperature are partly attributable to the drought of the Aral Sea (Asian Development Bank, 2021).

The most recent climatological analyses indicate that long-term changes in Uzbekistan's precipitation levels have not been statistically significant. The period 1990 to 2020, has seen an overall reduction in precipitation at a rate of 1.22 mm per decade. This general trend is nonetheless insignificant, with the greatest increases in precipitation recorded for the months of February, March and April, and sharpest declines recorded for the months of December, January and March. Climatological research focused on Uzbekistan and the wider central Europe asserts that the El Niño Southern Oscillation (ENSO) has exerted a substantial influence over multi-year dry and wet climate variability in the region.

17.2.2 Heat waves

A heat wave event can be defined as three or more days where the daily temperature exceeds the long-term 95th percentile of daily mean temperature. The frequency and severity of heat waves in Uzbekistan has increased in recent years, with the largest temperature rise observed in the north-western areas surrounding the Aral Sea and the lower Amu Darya.

According to CRU data, an average of 13 days per year have been reported to exceed 45°C in Uzbekistan.

In 2022, Uzhydromet issued a warning[13] for unprecedented heatwaves in several key regions within Uzbekistan. Extreme temperatures forecasted for Samarkand Region, in the same period ranged between 42°C and 45°C. Bukhara Region was one of the worst hit regions, with a temperature forecast of 44°C to 4 7°C. Heat wave alerts were also issue in the following year, with temperatures of ranging between 39°C and 49°C in various parts of the country.

17.2.3 Drought

The climate of Uzbekistan is increasingly characterized by arid climate and regular high temperatures that cyclically culminate in droughts with return periods of three to five years. Droughts in the country are classified as:

- Hydrological drought (water shortages from January to March due to low precipitation in the upper watershed of key rivers);
- Meteorological drought (usually associated with a precipitation deficit, and typically occurring in spring or summer), and;
- Agricultural drought (a lack of moisture in the soil that inhibits crop growth).

Over the past two decades, hydrological droughts have dominated the western reaches of Uzbekistan, whereas meteorological droughts have been most frequent in the country's central and southern provinces.

According to a country survey report published in connection with a National Action Program to Combat Drought and Land Degradation in the Republic of Uzbekistan, severe droughts have occurred in the lower reaches of Syr Darya and Amu Darya Rivers, with some of the most vulnerable areas located in the regions of Bukhara and Syr Darya (Tolipov and Sokolov, 2022). Samarkand Region has experienced a number of extreme drought events, which have intensified groundwater stress and necessitated water rationing within highly populated rural settlements.

The KIIs and FGDs conducted as part of the ESIA confirmed the average decline in rainfall levels in Samarkand and Bukhara Regions in particular, where these trends have adversely impacted rainfed agriculture and pastural regeneration in poorly irrigated areas.

[13] KUN UZ. 2022. Accessed via https://kun.uz/en/news/2022/07/18/extreme-heat-returning-to-uzbekistan

17.2.4 Extreme Precipitation and Floods

According to the Asian Disaster Reduction Center, certain areas within Uzbekistan remain vulnerable to alluvial and flash flooding. Flash floods and mudflows are most common in the southern and eastern parts of the country, where 3,300 incidents have been recorded between 1900 and 2013. Such floods typically follow heavy precipitation and snowmelt peaks between the months of March and July. The most severe inundation events reported over the past three decades include the floods of the Aksu, Shahimardan and Syrdarya rivers, which took place in 1998 and 2020.

In April of 2022, torrential downpours led to destructive flash floods and landslides in Samarkand and Jizzakh regions, and in the provinces of Mangystau, West Kazakhstan, Aktobe, Akmola, Karaganda and Pavlodar. Altogether, the floods have caused the casualties, infrastructural and agricultural damage, mass displacement of affected dwellers, and landslides. Uzbekistan's Ministry of Emergency Situations described the floods as the most intense of those witnessed over the last 80 years. Areas particularly prone to flooding in Samarkand and Jizzakh Regions include those surrounding rivers, creeks, and foothills.

17.3 Projected Temperature and Precipitation Trends

To understand possible temperature and precipitation extremes within the Project's operational phase, in the high-emissions scenario, climatological projections were performed for the period 2040-2059. Up-to-date Global Climate Models (GCM) for an integrated projection analysis were sourced from the Coupled Model Inter-Comparison Project Phase 6 (CIMP6). The analysis was premised on the Shared Socioeconomic Pathway (SSP) 5 (Fossil Fuel Development), paired with the Representative Concentration Pathway (RCP) 8.5. These climate change scenarios will be applied in consideration of the following:

- The high-emissions scenario is applied in keeping with the precautionary principle, to enable provisions for a plausible worst-case outcome.
- Greenhouse gas concentrations in the high-emissions scenario are the most consistent with the total cumulative GHG emissions between 2005 and 2020, and the SSP 5-8.5 is therefore regarded as particularly useful for near-term planning (up to 2050s).
- Greenhouse gas emissions to mid-century are in agreement with the current climate related policies (Schwalm et al, 2020).

The range of simulation outputs from the integrated model were limited to the 50th percentile, to obtain median values. The model results (generated at 100 km×100 km resolution) were assessed relative to historical observations reported by the Climatic Research Unit (CRU).

17.3.1 Temperature projections

Temperature projections for gauging the significance of related climatic impacts were performed using the MME accessed through the World Bank Climate Change Knowledge Portal. The model output for average maximum surface air temperature is presented in the chart below. The model outputs for average maximum surface air temperature simulations for Samarkand Region is presented in the following charts.

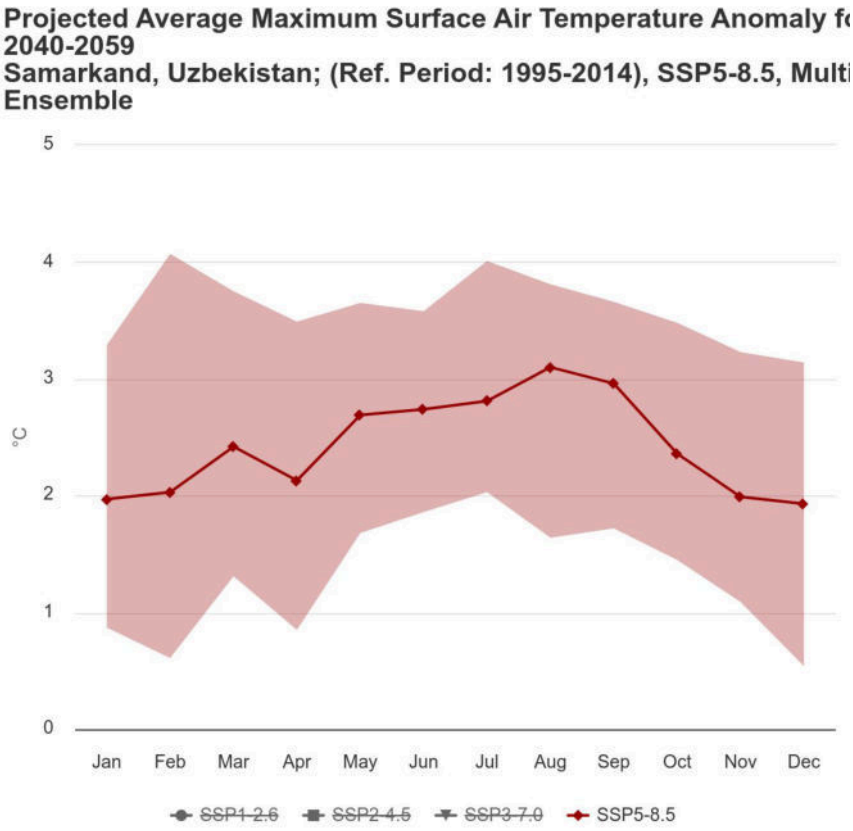


Figure 17-2 Range of projected anomalies for average maximum surface air temperature in Samarkand Region, for the period 2040-2059

As shown in Figure 17-2, in Samarkand Region, the projected rise in average maximum temperature will peak at a median magnitude of 36.2 °C in the month of July, by 2040, which represents a 3°C median jump from the baseline median.

17.3.2 Precipitation projections

Precipitation projections for gauging the significance of related climatic impacts were performed using the MME available on the World Bank Climate Change Knowledge Portal.

The model output for average largest 5-day cumulative precipitation is presented in the chart below.

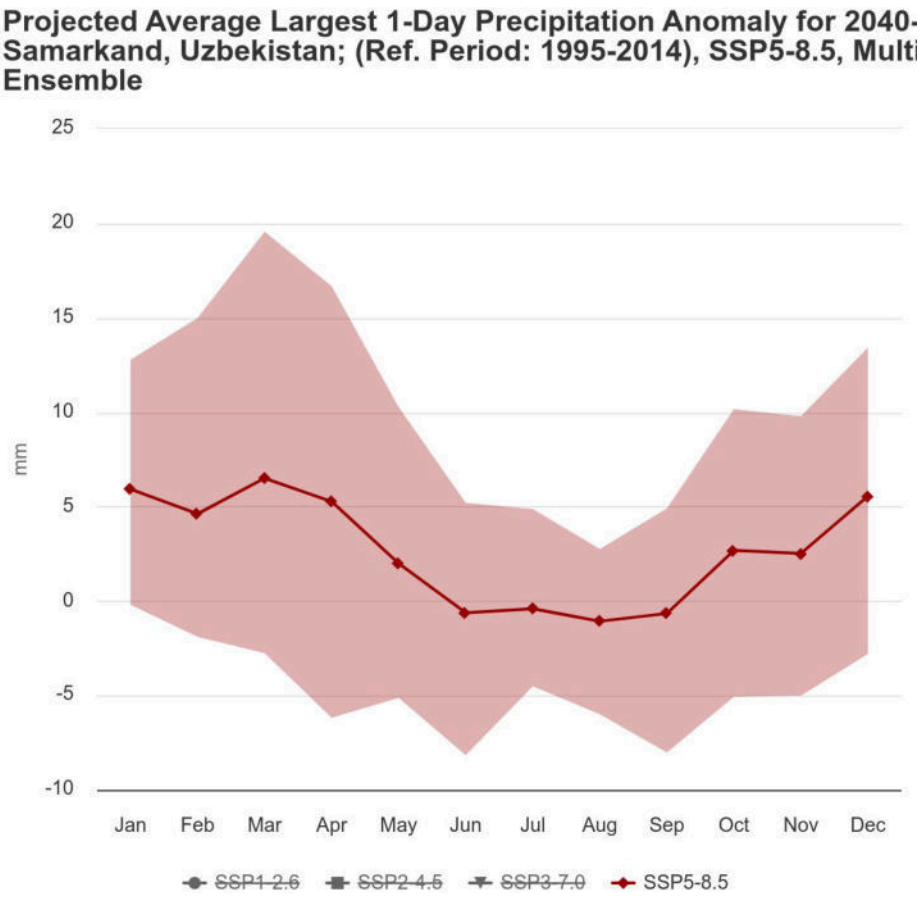


Figure 17-3 Range of projected anomalies for average largest 1-day precipitation in Samarkand Region, for the period 2040-2059

As shown in Figure 17-3 in Samarkand Region, the projected rise in the average largest 1-day precipitation will peak at a median magnitude of 34.1 mm, in the month of March, by 2040, which represents a 6.5 mm median jump from the baseline median.

17.4 Climate Change Vulnerabilities

Following table shows key E&S receptors with vulnerability to climate change related impacts, in the context of the Project.

Table 17-1 E&S receptors potentially vulnerable to climatic impacts on the Project

CLIMATE VULNERABILITY RECEPTORS	RELATION TO THE PROJECT
O&M Company/ Off-Taker	The Project Company (and subsequently, the Off-Taker) are charged with the operation and maintenance of the PV power plant and BESS

CLIMATE VULNERABILITY RECEPTORS	RELATION TO THE PROJECT
	facilities. These entities are therefore responsible for ensuring the full-time operation of power generation and storage systems, and addressing any climate-induced asset damages, and service interruptions.
Project (direct) O&M workers	O&M workers are potentially vulnerable to heat stress from prolonged exposure to elevated ambient air temperatures in the event of extreme heat waves within the PV power plant and BESS premises. Heat stress can cause heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also heighten the risk of injuries for workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Associated accidental contact with hot surfaces can result in burn injuries. In addition, potential electrical and structural failures from foreseeable climatic extremes poses a host of occupational safety risks to directly employed O&M personnel.
Establishments nearby PV power plant and BESS sites in Nurobod District	Residential and commercial/economic establishments situated within 500 metres of the PV power plant and BESS sites are potentially vulnerable to H&S incidents that may ensure from fire outbreak resulting from extreme ambient temperatures (among other contributing causes).
Local population and establishments within grid service area	The local population served by the national grid is potentially sensitive to grid congestion and power rationing, due to downtime associated with catastrophic physical impacts (i.e., climate-related damage) on the PV plant and BESS infrastructure. Power outages within residential, commercial, industrial, and institutional establishments can cripple productive activities and the hamper the delivery of essential social services, which could lead to considerable economic losses. Highly populated regions are particularly vulnerable.

17.5 Climate Risk Screening

In the context of the climate change risk assessment, the Project is subject to several physical climatic risks. Due to the Project's renewable status, and little to no GHG emissions over the Project's implementational period, transitional climate risks are scoped out of this assessment.

17.5.1 Reduction in solar module efficiency and yield

High temperature levels have a retarding effect on PV power production, as the efficiency of solar panels generally decreases by 0.5%, with every degree of temperature increase beyond

35°C. High temperatures in the event of heatwaves can reduce the output efficiency of solar panels by as much as 25%[14]. Temperature projections analysed in Section 17.3.1 above indicate that maximum temperatures will continue to rise in Samarkand Region to levels ranging between 31°C and 41°C. Protracted heatwaves will undermine the PV module efficiency on panels within the solar arrays and thereby impinge on the yield of the PV plant.

In the absence of mitigation, the impact significance is potentially moderate, given that baseline temperature levels in the region do not exceed the PV efficiency threshold of 35°C, on average. Nevertheless, yield constraints pose the cumulative risk of grid congestion and economic losses associated with inefficient power generation.

17.5.2 Reduction in transmission capacity

Conductor resistance to electrical current has an inherent heating effect on transmission cabling. The temperature of transmission cabling is also influenced by external factors such as solar radiation, ambient air temperature and wind conditions. Overheating of transmission lines causes several operational issues, such as cumulative cable wear from annealing, sagging of electrical cabling and, in extreme cases, severe damage to transmission cabling. Thermal expansion and consequent sagging of electrical cables beyond prescribed ground clearance limits poses a public safety hazard. Electric utilities therefore assign specific power ratings (power load maxima) to transmission lines with a view to preventing adverse overheating. In the event that external conditions interact to raise line temperatures above operational thresholds, power loads are reduced proportionally, which often leads to congestion within recipient distribution networks.

The frequency and intensity of extremely hot weather events is projected to rise. Instances of upward temperature extremes accompanied by low wind-speeds and/or precipitation will require de-rating for affected transmission line sections, which may in turn reduce the reach of subsequent power distribution. Concurrent surges in power demand for cooling facilities in the duration of any such hot weather extremes could therefore result Ingrid congestion and power outages and/or rationing.

17.5.3 BESS thermal runaway and associated fire hazards

Batteries and other sensitive electronic components constituting the BESS are required to operate at low, controlled temperatures. This requirement is especially critical for the battery storage containers, as high interior temperatures can cause battery overheating, thermal

[14] World Economic Forum. 2022. Why don't solar panels work as well in heatwaves? Accessed on 16 September, on https://www.weforum.org/agenda/2022/08/heatwaves-can-hamper-solar-panels/

runaway and potentially major fire hazards. Projected increases in ambient temperature, coupled with other factors for thermal runaway, can result in overheating and/or fire and extensive property damage (and occupational H&S incidents). To prevent such failure, a thermal management system will be installed for the BESS, in line with manufacturer-prescribed requirements for battery operating conditions.

In the absence of mitigation, the impact significance is potentially minor, as an adequate HVAC system, and other features are built into the thermal management system dedicated to the BESS facilities.

17.5.4 Damage to OTL infrastructure

The 70-km and LILO OTL corridors intersect Sazagansai River and several streams. Projected increases in the frequency and intensity of flash floods within any low-lying and steeply sloping sites along the OTL corridor presents the risk of damage to OTL footings. In addition, the risk of land-slides due to flood events along destabilized slopes cannot be ruled out, prior to geotechnical investigation. The occurrence of landslides in or around the transmission line corridor would lead to severe damage and loss of utility assets.

In the absence of mitigation, the impact significance is potentially moderate, considering the scale of on-site floods, associated O&M costs, and economic losses from service interruptions.

17.5.5 Plant downtime, grid congestion and associated power outage

Projected uptrends in the frequency and intensity of extreme weather events and associated disasters (e.g., floods, mudflows, and extreme heat) pose the risk of structural damage, plant downtime and power generation inefficiencies, which can lead to low yields or discharge, grid congestion and associated power outages. Damage to relevant utility assets and associated service interruptions will lead to economic losses, both for the operators of the utility assets, and power consumers within service areas alike.

In the absence of mitigation, the impact significance is potentially major, considering the existing power shortages in the country's most populated regions, and the typically high demand for power during periods of extreme climate events (i.e., extreme winters and heatwaves).

17.5.6 H&S incidents

The Project's physical climate risks further include health and safety incidents amongst direct O&M plant workers, during periods of extreme heat. Climate modelling for the Project's operational period indicates that the annual ambient air temperatures are likely to increase above with maxima exceeding 40°C. The incidence of inordinately high temperatures poses

a number of hazards for direct O&M workers, particularly those who will operate outdoors. Prolonged exposure to extreme heat presents the risk of dehydration, heat stress, heat stroke, heat exhaustion, heat cramps, heat rashes and burns from contact with overheated surfaces.

The following mitigation measures can be implemented to mitigate against natural heat hazards:

- Workers assigned to operations in the exterior of the Plant's buildings and shaded areas will be provided with appropriate PPE (e.g., sun hats and cooling vests).
- Shaded resting areas and adequate access to potable water will be provided for workers stationed outside of the Plant's buildings (e.g., guard houses).
- Work locations (and duration, to the extent possible) will be restricted during periods of extreme heat to lessen the risk of heat-related health effects. Maintenance work within high-temperature units will be avoided during days with inordinately high temperatures.
- Staff rooms on the plant's premises will be equipped with HVAC or fans to enable operations at workstations during periods of extreme heat.
- Induction and refresher health and safety (H&S) trainings will include trainings on prevention of and first response to extreme heat exposure. The trainings will cover risk factors, mitigating PPE, first aid measures and nearest health centre for treatment of hyperthermia.

17.6 Greenhouse Gas Emissions

17.6.1 Potential Impacts

In the context of the climate change risk assessment, the Project is subject to several physical climatic risks. Due to the Project's renewable status, and little to no GHG emissions over the Project's implementational period, transitional climate risks do not apply.

Table 17-2 Overview of physical climate risks

ENVIRONMENTAL ASPECT/ ACTIVITY	PHYSICAL CLIMATE RISK
PV power plants	
Operation and maintenance	Reduction in solar module efficiency and yield
Operation and maintenance	Plant downtime, grid congestion and associated power outage
BESS facilities	
Operation and maintenance	BESS thermal runaway and associated fire hazards
OTL facilities	

ENVIRONMENTAL ASPECT/ ACTIVITY	PHYSICAL CLIMATE RISK
Operation and maintenance	Damage to OTL infrastructure
Operation and maintenance	Reduction in transmission capacity

17.7 Greenhouse Gas (GHG) Emissions

The EP(IV) CCRA guidelines categorize the greenhouse gas emissions of various IFI investment projects as follows:

- **Scope 1 emissions** – Direct GHG emissions from owned or controlled sources, i.e. fuel combustion and fugitive emissions.
- **Scope 2 emissions** – Indirect GHG emissions from the use of purchased electricity, heat or steam.
- **Scope 3 emissions** – Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

The guidelines prescribe different CCRA requirements and protocols for projects based on their general E&S risk categorization (i.e., Category A and Category B).

For Category A projects with projected Scope 1 and Scope 2 GHG footprints exceeding 100 kilotons of CO_2 equivalent annually, the guidelines require (i) a GHG emissions assessment, (ii) physical CCRA, (iii) transition CCRA, and (iv) GHG alternatives analysis. For Category A projects with a lower annual GHG footprint, the guidelines mandate (i) a GHG emissions assessment, and (ii) physical CCRA, exclusively.

The project's operational facilities are not expected to generate greenhouse gas (GHG) emissions in excess of 100,000 tonnes per year. As such the Project is not required to monitor and publicly report on its annual GHG emissions inventory (from auxiliary O&M operations).

For the purposes of this assessment, GHG emission calculation tools designed by the Greenhouse Gas Protocol were used to estimate the carbon footprint of the Project's construction phase. The analysis is based on the best available estimates of fuel demand for various combustion sources to be employed during construction.

17.7.1 Construction-phase GHG footprint

The assessment of GHG emissions at the Project's construction stage includes both Scope 1 and Scope 2 emissions. Scope 1 emissions refer to direct greenhouse (GHG) emissions that occur from sources under the ownership of the Project organization (i.e., Project Company as

well as EPC and O&M contractors). Scope 2 and Scope 3 emissions are defined as indirect GHG emissions associated with the production of procured electricity and construction materials respectively.

17.7.1.1 Scope 1 emissions

The sole foreseeable source of Scope 1 emissions in the Project's construction phase is combustion from fuel-powered construction machinery, which includes vehicles and equipment for construction work (e.g., excavators, rollers, cranes etc.). For the purposes of this assessment, the Scope 1 emissions were quantified using the GHG Calculation Tool developed by the Greenhouse Gas Protocol (i.e., Mobile Combustion GHG Emissions Calculation Tool Version 2.6[15]), which offers specialized calculations for GHG emissions from mobile combustion sources. Emissions were computed as a product of estimated fuel quantities, and empirical factors accounting for mobile machinery types and corresponding fuel requirements.

The total estimated quantity of Scope 1 emissions during the Project's construction phase is presented in Table 17-3 below.

Table 17-3 Estimates for scope 1 GHG emission during construction

YEAR	ACTIVITY TYPE	FUEL SOURCE	VEHICLE TYPE	AMOUNT OF FUEL (L)	GHG EMISSION (TONNES CO2EQ)
2024 – 2026	Fuel use	Diesel	Diesel medium- and heavy-duty vehicles	22,500	1,458

17.7.1.2 Scope 2 emissions

Potential scope 2 emissions at the Project's construction stage derive from the procurement of (i) electricity from the local grid to power electrical construction equipment, and (ii) construction materials. Electricity-based scope 2 emissions were quantified using the GHG Calculation Tool developed by the Greenhouse Gas Protocol (i.e., Simplified GHG Emissions Calculator[16]), which offers specialized calculations for GHG emissions from purchased power. Emissions were computed as a product of estimated power demand, and empirical emission factors for thermal electricity generation.

[15] https://ghgprotocol.org/calculation-tools-and-guidance

[16] https://ghgprotocol.org/calculation-tools-and-guidance

Total estimated quantities of electricity-based and manufacturing-based GHG emissions across the Project's construction phase are presented in Table 17-4 below.

Table 17-4 Estimates for scope 2 GHG emissions pertaining to procurement of electricity[17] during construction

Total estimated demand for purchased electricity (MWh)	Scope 2 emissions				
	CO_2 (tonnes)	CH_4 (tonnes)	N_2O (tonnes)	CO_2E (tonnes)	EF ($kgCO_2E/kWh$)
1,650,000	778,091	61	8	781,991	0.47

17.7.1.3 Scope 3 emissions

Construction of the Plant will entail the use of materials, production of which will inevitably result in carbon emissions. Crude estimates of 'embodied carbon' associated with the production stage of primary construction materials (i.e., concrete and steel) are shown in following table[18]. Calculation for carbon emissions is based on initial estimate of construction materials and their 'Product Stage (PAS Modules A1-A3)[19]' emissions only. PAS (Publicly Available Specification) are specifications for the assessment of the life cycle GHG emissions of goods and services, developed by the British Standards Institution (BSI). Module [A1] to [A3] which includes raw material extraction and supply, transport to manufacturing plant, and manufacturing and fabrication.

Table 17-5 Estimate of ghg emissions from embodied carbon (primary materials)

Material	Estimated Quantity (tonnes) [1]	Emission Factor ($kg\ CO_2E/kg$ of material) [1]	GHG Emissions (CO_2E), Tonnes
Concrete	21,000	0.19	3,990
Steel	2,250	2.46	5,535
Total			**9,525**

Notes
[1] Emission factors and densities are taken from the Inventory of carbon and Energy (ICE) database v3, 2019.
Weight of concrete is calculated using estimated volume of 120,000 m^3 of concrete and concrete density of 2,300 kg/m^3.

[17] Estimate of power demand during construction was provided by the Project developer.

[18] Estimates of concrete and steel supplies for the Project's construction phase were provided by the project developer.

[19] PAS (Publicly Available Specification) are specifications for the assessment of the life cycle GHG emissions of goods and services, developed by the British Standards Institution (BSI). Module [A1] to [A3] which includes raw material extraction and supply, transport to manufacturing plant, and manufacturing and fabrication.

17.8 Mitigation Measures

The following measures can be implemented in subsequent stages of project planning and implementation to minimize GHG emissions over the course of the Project's operational lifetime:

- The Project Company and contractors will implement comprehensive resource efficiency measures to reduce scope 1 and scope 2 GHG emissions during the Project's construction and operational phases. These measures generally include, but are not limited to the following:
    - The procurement of equipment for the Project's construction and operational phases should give priority consideration to power efficiency and water conservation (based on operating technology and disrepair).
    - During construction and operation, energy conservation measures for electricity-powered equipment should be promoted (in the Project's E&S policy and HSES trainings) and power consumption should be monitored on a monthly basis. Economical use of fuel-powered equipment should be encouraged and monitored on the same basis.
    - During construction, resource efficiency in relation to construction materials should be promoted and monitored in the same manner.
    - During construction, use of electrically powered equipment, where possible.
- Use of high-performance monitoring and process control techniques, good design and maintenance of the PV plant and BESS systems so that the operational performance targets can prevail under projected climate trends.

17.9 Environmental additionality and creation of carbon credits

With regard to binding climate change conventions, including the Kyoto Protocol, the Clean Development Mechanism (CDM) is amongst the key avenues devised to achieve the GHG emission cutback targets. The mechanism provides a low-cost means for European Union (EU) economies to offset their emission target exceedances, through the acquisition of carbon credits based on the development of decarbonization projects in Early Transition Countries (ETCs). This trade is accredited by the carbon accounting unit of the UNFCCC on condition that the projects have a demonstrable environmental additionality (effective GHG reduction) and that the project delivers on broader sustainable development requirements in host countries.

To facilitate carbon trading based on CDM within the ETC region, certain DFIs have established facilities to ease the financial hurdles associated with the development of CDM projects by sponsors within ETC economies. As such, the Project is potentially accounted a CDM investment, with a prospective contribution to global GHG reductions and a carbon-market based economic incentive for the Project Developer.

In this connection, the CCRA further serves to quantify the Project's potential environmental additionality, to provide an indication of how this decarbonization scenario can further enhance the project's economic viability.

The calculation of carbon credits of potential relevance to the Project will be completed in the subsequent version of this Report, subject to the availability of outstanding O&M information.

18 CUMULATIVE IMPACT ASSESSMENT

Cumulative impacts are defined as those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future impacts. A Cumulative Impact Assessment (CIA) serves to identify resultant E&S impacts that can be compounded by similar impacts from proximate developments, and by natural stressors, such as climate change. As such, the CIA process seeks to:

- Identify and characterize potential impacts that can be expected to ensue from the Project activities, other developments and environmental drivers within the temporal and special boundaries of the Project
- Develop actionable measures for effective prevention, mitigation and alleviation of negative cumulative impacts and risks, and enhancement initiatives for any positive cumulative impacts

18.1 Objectives of the Cumulative Impact Assessment

The objectives and outcomes of the CIA study for the Project are as follows:

- Identification of project components, coincident developments, and natural/ unplanned dynamics that pose mutual Environmental and Social (E&S) impacts, which may arise and/or intensify within the Project's lifetime and influence areas.
- Identification of Vulnerable Environmental Components (VECs) or receptors that are subject to E&S impacts brought on by the Project in synergy with external drivers.
- Overview of the current state of the VECs identified, with a focus on baseline attributes of particular relevance to the Project.
- A description and assessment of cumulative E&S impacts foreseen to affect established VECs, relative to baseline conditions, legal requirements and internationally recognized benchmarks.
- Recommendation of effective mitigation measures to prevent, abate and/or alleviate negative E&S impacts, alongside enhancement actions to reinforce anticipated project benefits.
- Development of a management and monitoring plan with a specific focus on the Project's E&S impacts, which should set out the timing, monitoring indicators and responsible implementing parties, in order for consistent impact management and performance evaluation in relation to established indicators and targets.

18.2 Concurrent Developments and Environmental Drivers

A review of grey literature was carried out to identify ongoing and planned development projects which coincide with the Project in terms of implementation timeframe and location.

Development plans within the Project's Area of Influence (AoI) were also investigated over the course of the ESIA consultations and field surveys.

A summary description of major planned developments and relevant environmental drivers potentially impacting on areas in and around the sites designated for the Project is provided in the table below.

Table 18-1 List of existing and planned activities within the Project AoI

PROJECTS/ ENVIRONMENTAL STRESSORS	DESCRIPTION	SPATIAL EXTENT	TIMEFRAME	
Samarkand 1 PV and BESS Project	The Project will entail the construction of: • 500 MW PV power plants (2) • 500 MWh BESS (1) • Underground powerline (1) • 4.9-km OTL (1) • 70-km-km OTL (1) • 11-km OTLs (2) • 19-km OTLs (2) The Project will serve to augment the supply of renewable power to address existing power shortages and facilitate steady economic growth.	3 districts in Samarkand Region	Construction	June 2024 – March 2025
			Operation	March 2025 – March 2055
Samarkand 2 PV and BESS Project	The Project will entail the construction of: • 500 MW PV power plant (1) • 500 MWh BESS (1) • Underground powerline (1) • Sub-station (1) • 70-km-km OTL (1) • 350-km OTL (1) The Project will serve to augment the supply of renewable power to address existing power shortages and facilitate steady economic growth.	19 districts in the regions of Samarkand, Jizzakh, Syrdarya, Tashkent and Bukhara	Construction	June 2024 – March 2027
			Operation	March 2027 – March 2057

PROJECTS/ ENVIRONMENTAL STRESSORS	DESCRIPTION	SPATIAL EXTENT	TIMEFRAME
Climate Change	Rise in mean annual temperature levels, declines in rainfall levels and regularity, accompanied by more frequent and severe incidence of droughts, and flood events.	Global	Present to 2100 (IPCC current projections horizon)

18.3 Identification of Valued Environmental Components (VECs)

The E&S receptors factored into the ESIA are outlined in the following table, with site-specific summary descriptions.

Table 18-2 Summary description of VECs and respective sensitivity ratings

VULNERABLE ENVIRONMENTAL COMPONENTS/ RECEPTORS	EXISTING SENSITIVITY
Biodiversity	[TBC]
Geology and hydrology	In Samarkand Region, soils within the main project sites can be described as arid, sandy/silty, and moderately permeable. The water table lies 10 metres below ground level, and saline groundwater is prevalent across Nurobod District. The topography of the site is fairly even, and no surface water features are present within the sites. Soil erosion was not evident within the sites. The soil and groundwater are of moderate quality, due to elevated conductivity, however no contamination was detected.
Ambient noise and vibration	Noise baseline surveys undertaken for the main project sites in Samarkand Region indicate that ambient noise generally falls within regulatory and international thresholds. The main recorded noise influences are the major roads and highways near the main sites in Samarkand.
Air quality	Air quality surveys conducted at the locations of sensitive receptors in the vicinity of the main project sites in Samarkand Region confirmed that ambient air quality is generally within national and international guideline values. Nevertheless, dust conditions worsen in the dry seasons, as noted by local communities during the socioeconomic survey.
Landscape/ visual amenity	The examination of satellite imagery, field surveys and subsequent visual impact assessment indicated that the main project sites in Samarkand Region fall within vast, barren plains that are largely undeveloped and devoid of wooded vegetation. In Samarkand,

Vulnerable Environmental Components/ Receptors	Existing Sensitivity
	the landscape can be described as a mix of fallow land and scant and dry steppe grassland. No landscape characters of aesthetic/ scenic appeal are found within the sites, however the mountainous terrain in the northen and southern backdrop of the sites in Nurobod can be deemed aesthetically appealing.
Cultural heritage	Consultations with relevant authorities (including resident Cultural Heritage Agency offices) indicated the absence of any cultural heritage resources within the main project sites in Samarkand Region. Nevertheless, a mandatory pre-construction survey was commissioned to confirm the absence of any historical or archaeological heritage prior to land withdrawal and permanent disturbance and land transformation. The surveys did not uncover any archaeological finds or indication of potentially resident non-replicable and critical cultural heritage.
Traffic and transportation	Traffic counts nearby access road footprints indicated that existing traffic volumes along the A-378 and M-37 highways are quite high, however transit along inner feeder roads and communal footpaths is substantially lower.
Livelihoods	The vast majority of land-use impacted by the footprint of the Project's planned facilities is irrigated and rainfed cultivation. However, several livestock farms and pastural land parcels are potentially impacted within the PV plant and BESS sites in Samarkand Region.
Social infrastructure	Communities within the project-affected communities have access to basic social services and infrastructure. Nevertheless, unstable power supply and recurrent water shortages were cited in Nurobod District, Samarkand Region, and the lack of irrigation systems in the district is a major is a major challenge for all forms of local agriculture.
Community health, safety and security	All of the project-affected communities have access to basic healthcare facilities within a convenient distance, however larger medical centres are not as close to rural settlements. The most prevalent diseases cited in the majority of the communities are respiratory infections and Hepatitis A.
Labour and working conditions	Unemployment rates are invariably high in most of the project-affected communities, especially amongst women. Residents commute large distances to workplaces outside of their community for short-term labour (e.g., construction work) or factory jobs. No incidents of major labour rights violations on recent construction projects were cited during consultations with community representatives.

18.4 Cumulative Impacts

Based on the review of co-located developments nearby the Project's main footprint, and analysis of the current E&S context, the following cumulative impacts are likely to arise over the course of construction and operation.

Table 18-3 Assessment of cumulative impacts on VECs within the Project AoI

VALUED ENVIRONMENTAL COMPONENTS	IMPACT-GENERATING PROJECTS	CUMULATIVE IMPACTS	
		CONSTRUCTION PHASE	OPERATION PHASE
Biodiversity	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Please refer to Section 18.5 below.	Please refer to Section 18.5 below.
Geology and hydrology	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	In Samarkand Region, the Project will be developed alongside the Samarkand 2 PV and BESS project, as the projects include adjacent facilities (i.e., contiguous 400 MW and 500 MW PV plants and Nurobod BESS). The projects will have a cumulative impact in terms of minor land degradation during construction. The site clearing, excavation, backfilling and compaction can lead to soil erosion, soil compaction and displacement of fertile topsoil, which can render the land less productive.	Cumulative impacts are not envisaged for the operational stage, however the remote possibility of O&M related soil contamination on the adjacent sites cannot be ruled out.
Ambient noise and Vibration	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Noise and vibration will be generated concurrently during coincident construction timeframes, with increased disturbance to communities and residential establishments located nearby the project sites in Samarkand (and the 400 MW PV plant site in particular).	Cumulative impacts are not expected to extend into operation, as operational inverter noise from the adjacent PV plants in Samarkand will not be perceptible 200 metres away from the site and within on-site buildings/ offices.
Air quality	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	During periods of concurrent construction on adjacent sites, dust generation from earthworks and track out will exacerbate dust conditions and present a more serious nuisance to sensitive establishments. nearby the sites (e.g., herders, residential	Relevant cumulative impacts are not expected to occur in the O&M phase.

VALUED ENVIRONMENTAL COMPONENTS	IMPACT-GENERATING PROJECTS	CUMULATIVE IMPACTS	
		CONSTRUCTION PHASE	OPERATION PHASE
		buildings etc). Prolonged periods of extensive dust generation can also result in increased local morbidity from respiratory ailments.	
Landscape/ visual amenity	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Construction blight from simultaneous, extensive construction work on the contiguous PV plant sites, and concurrent construction on adjacent sub-station and BESS plots will have a bigger overall impact on the visual appeal of the existing landscapes.	The adjacent PV power plants, and contiguous sub-station and BESS facilities will result in a greater overall alteration of viewsheds and visual nuisance/ intrusion for communities and establishments based in the vicinity of the sites.
Traffic and transportation	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Project traffic along mutual feeder roads and/or shared access roads towards adjacent project sites in Samarkand Region may exacerbate traffic along public roadways within local communities.	Cumulative impacts are not expected to occur in the O&M phase.
Livelihoods	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Combined land-take from adjacent projects sites in Samarkand Region potentially may inconvenience pedestrian restricted access routes/ shortcuts and stock routes.	Combined land-take from adjacent projects sites in Samarkand Region potentially may inconvenience pedestrian restricted access routes/ shortcuts and stock routes.
Social infrastructure and local economy	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	The total scale of construction works on paired/ clustered project sites in Nurobod District will expose resident communities to a higher influx of construction workers, which can create increase the burden on limited social services and resources (e.g., housing, water, food), with the possibility	Cumulative impacts are not expected to occur in the O&M phase.

VALUED ENVIRONMENTAL COMPONENTS	IMPACT-GENERATING PROJECTS	CUMULATIVE IMPACTS	
		CONSTRUCTION PHASE	OPERATION PHASE
		added economic hardship from associated inflation.	
Community Health, Safety and Security	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Parallel construction works within common locations and affected communities will potentiate the risk of third-party H&S accidents (e.g., due to increased vehicle traffic, hazardous construction zones etc), and deterioration of living conditions and welfare due to strained provisioning of power, water and food within underdeveloped communities.	Cumulative impacts are not expected to extend into the O&M phase.
Labour and working conditions	1. Samarkand 1 PV and BESS 2. Samarkand 2 PV and BESS	Concurrent, labour-intensive construction programs within closely situated PV, BESS and sub-station sites in Nurobod District may create poor living conditions within centralized or external worker accommodation facilities in the event of limited housing options.	Cumulative impacts are not expected to occur in the O&M phase

18.5 Cumulative Impacts on Biodiversity

To ensure a comprehensive evaluation of cumulative impacts, it is essential to include all project alignments of both Samarkand 1 and Samarkand 2 in this analysis. The cumulative impact assessment (CIA) incorporates all facilities and alignments associated with these projects, ensuring a thorough understanding of their collective impacts on biodiversity.

The facilities under each project are outlined below to provide a detailed overview of the components involved:

Samarkand 1 Project Facilities:

- 100 MW PV Plant
- 400 MW PV Plant
- Nurobod BESS
- 70 km OTL
- 4.9 km OTL
- 11 km OTL
- 19 km OTL

Samarkand 2 Project Facilities:

- 500 MW PV Plant
- Nurobod Sub-Station
- 70 km OTL
- Karakul BESS
- 350 km OTL

The analysis integrates data from all proposed locations including current and planned sites, ensuring that potential future developments are considered. It also includes associated infrastructure such as transmission lines, access roads, and other supporting facilities to assess their additional impacts on the environment. Both short-term construction impacts and long-term operational impacts are analyzed across the entire spatial extent of the project areas. The assessment recognizes the interconnectedness of habitats and species across the project areas, ensuring that the cumulative impacts on biodiversity and ecological integrity are fully evaluated.

18.5.1 Assessing Ecological Cumulative Impacts

The assessment of cumulative impacts from an ESIA standpoint often focuses on considering impacts that a proposed project will have in the context of existing adjacent and regional development.

There are two issues with this approach when assessing ecological impacts on biodiversity receptors. Firstly, the knowledge on other projects is often limited without access to a greater regional level assessment (i.e. a Strategic Environmental Assessment). In order to assess cumulative impacts from multiple projects, there needs to be insight on the future planning of the region compared to the existing baseline. Such an assessment could be undertaken on a planning level considering government development plans, renewable energy targets, and any other relevant strategies.

However, the second issue with this approach for ecological receptors is that it ignores non-project or non-sector related threats. When considering impacts to habitats and species, a holistic approach is more appropriate; one that integrates existing pressures and threats in the region and assesses the culminating effect when adding specific project impacts.

The subsequent sections and sub-sections provide an assessment of cumulative effects to sensitive biodiversity receptors on a species by species approach, focusing on priority and critical species and habitats. This will provide a more comprehensive picture of cumulative impacts that could occur to the regional populations of specific species.

18.5.2 Selecting Biodiversity SRs to Assess

The CHAs for Samarkand 1 and Samarkand 2 identified one critical habitat trigger, the Great Bustard, as well as a number of Significant Biodiversity Values (SBVs). The SBVs are categorically grouped into the following:

- Breeding and passage migrant raptors
- Small, tree nesting birds
- Groundbirds
- Reptiles

The cumulative impact assessment will be narrated for each category and species-specific significance will be assessed where relevant.

Further, a Cumulative Impact Assessment has been completed for each habitat type as well a general cumulative assessment for ecological receptors including non-SBVs.

18.5.3 Cumulative Impacts on SBV Raptors

The SBV species confirmed to occur within project areas, included under the raptors category are:

- Saker Falcon
- Egyptian Vulture
- Eastern Imperial Eagle
- Greater Spotted Eagle

From the direct development of Samarkand 1 and 2 projects, the impacts of greatest significance include:

1. Construction disturbance (noise, anthropogenic movement, etc) which can cause displacement as well as lowered breeding activity;
2. Habitat loss in the form of direct vegetation clearing and removal causing secondary impacts caused by decline in prey species;
3. Installation of additional OTL which carries a high risk of electrocution for large perching raptors.

In addition, regional and global threats to these species are described in the subsequent sections.

18.5.3.1 Saker Falcon

Regional and global threats also impacting Saker Falcon and causing declining population trends include:

- In Europe, Loss and degradation of steppes and dry grasslands through agricultural intensification, plantation establishment and declines in sheep pastoralism.
- In Kazakhstan, the development of areas with taller vegetation where nomadic herders no longer graze resulted in declining availability of susliks and secondary impacts on reproductive success.
- In Kazakhstan and Mongolia, electrocution of birds hunting from pylons has been established as a major threat.
- "Mass mortality" reported in Mongolia after DDT-laced grain put out to combat high densities of voles.
- Highly sought after by falconers, particularly in Arabia; resultant excessive trade has caused local extinctions through capture of birds, particularly females, and theft of chicks. Trapping for falconers in Middle East has been estimated at 4000 in Saudi Arabia, 1000 in Qatar and 500-1000 in each of Bahrain, Kuwait and U.A.E.,

which, allowing for a 5% mortality in transit, suggests an annual off-take of 6825–8400 birds.

The culmination of these effects is leading to a decline in Saker Falcon populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative adverse effect would be:

- Habitat loss (breeding and foraging habitat)
- Electrocution risk from added OTL

Habitat loss can be mitigated by ensuring the post-construction phase ensures adequate levels of habitat restoration, with the ultimate goal of restoring ecosystem function to similar levels pre-construction. Restoration techniques that bring back native vegetation communities and biomass as well as ensure habitat connectivity will allow for re-population of the land by prey species, which in turn can minimize the loss of suitable habitat by providing modified habitat options for foraging birds.

As per current assessment and management/monitoring plan, the OTL will be designed to be raptor-safe to prevent electrocution; and also be monitored via surveys for carcasses of any birds. Should any Saker Falcon carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Ultimately, the additive cumulative effects of mitigated impact on Saker Falcon is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.3.2 Egyptian Vulture

Regional and global threats also impacting Egyptian Vulture and causing declining population trends include:

- Primary and secondary poisoning (ingesting from carcasses lead shot, diclofenac in livestock, toxins in targeted poisoning of animals)
- Electrocution on non-insulated powerlines
- Collision with wind turbines
- Reduction in availability of food (improved sanitation, declines in prey and habitat)

The culmination of these effects is leading to a decline in Egyptian Vulture populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative adverse effect would be:

- Habitat loss (breeding and foraging habitat)
- Electrocution risk from added OTL

Habitat loss can be mitigated by ensuring the post-construction phase ensures adequate levels of habitat restoration, with the ultimate goal of restoring ecosystem function to similar levels pre-construction. Restoration techniques that bring back native vegetation communities and biomass as well as ensure habitat connectivity will allow for re-population of the land by prey species, which in turn can minimize the loss of suitable habitat by providing modified habitat options for foraging birds.

As per current assessment and management/monitoring plan, the OTL will be designed to be raptor-safe to prevent electrocution; and also be monitored via surveys for carcasses of any birds. Should any Egyptian Vulture carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Ultimately, the additive cumulative effects of mitigated impact on Egyptian Vulture is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.3.3 Eastern Imperial Eagle

Regional and global threats also impacting Eastern Imperial Eagle and causing declining population trends include:

- Collision with wind turbines
- The species is sensitive to human disturbance - anthropogenic activity was the primary cause for the absence of the species at more than 30% of its potential habitats at the Hungarian Plain.
- Other threats are loss and alteration of feeding habitats, associated with agricultural expansion and forestry practices
- Shortages of small and medium-sized prey species (particularly ground-squirrels Spermophilus spp.),
- Electrocution from OTL
    - An average of c.450 Eastern Imperial Eagles were killed by powerlines during the 2009 breeding season in the Altai region – 25% of the total population of the region.

- Nest robbing and illegal trade,
- Shooting / Hunting / Poaching
- Primary and secondary poisoning (ingesting from carcasses lead shot, toxins in targeted poisoning of animals),
    - In Central Europe intentional predator poisoning became the first cause of mortality from 2006 onwards affecting more than 80 specimens in 10 years only in Hungary
- Collisions with vehicles.

The culmination of these effects is leading to a decline in Eastern Imperial Eagle populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative adverse effect would be:

- Habitat loss (especially foraging habitat from prey decline)
- Electrocution risk from added OTL

Habitat loss can be mitigated by ensuring the post-construction phase ensures adequate levels of habitat restoration, with the ultimate goal of restoring ecosystem function to similar levels pre-construction. Restoration techniques that bring back native vegetation communities and biomass as well as ensure habitat connectivity will allow for re-population of the land by prey species, which in turn can minimize the loss of suitable habitat by providing modified habitat options for foraging birds.

As per current assessment and management/monitoring plan, the OTL will be designed to be raptor-safe to prevent electrocution; and also be monitored via surveys for carcasses of any birds. Should any Imperial Eagle carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Ultimately, the additive cumulative effects of mitigated impact on Eastern Imperial Eagle is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.3.4 Greater Spotted Eagle

Regional and global threats also impacting Greater Spotted Eagle and causing declining population trends include:

- Poaching

- Accidental poisoning
- Electrocution on non-insulated powerlines
- Collision with wind turbines
- Reduction in availability of food (declines in prey and habitat)

The culmination of these effects is leading to a decline in Greater Spotted Eagle populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative adverse effect would be:

- Habitat loss (breeding and foraging habitat)
- Electrocution risk from added OTL

Habitat loss can be mitigated by ensuring the post-construction phase ensures adequate levels of habitat restoration, with the ultimate goal of restoring ecosystem function to similar levels pre-construction. Restoration techniques that bring back native vegetation communities and biomass as well as ensure habitat connectivity will allow for re-population of the land by prey species, which in turn can minimize the loss of suitable habitat by providing modified habitat options for foraging birds.

As per current assessment and management/monitoring plan, the OTL will be designed to be raptor-safe to prevent electrocution; and also be monitored via surveys for carcasses of any birds. Should any Greater Spotted Eagle carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Ultimately, the additive cumulative effects of mitigated impact on Greater Spotted Eagle is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.3.5 Pallas's Fish-eagle

Regional and global threats also impacting Pallas's Fish-eagle and causing declining population trends include:

- Direct take for hunting / poaching
- Electrocution on non-insulated powerlines
- Collision with wind turbines

- Reduction in availability of food (declines in prey and habitat)

The culmination of these effects is leading to a decline in Pallas's Fish-eagle populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative effect would be:

- Electrocution risk from added OTL

The greatest risk factor for the species is the cumulative effect of the project's potential OTL impact considering the existing regional pressures also caused by electrocution from OTL.

Thus it is of high importance to ensure proper mitigation of the electrocution risk from any OTL associated with the project(s), inclusive all OTL attached to Samarkand 1 and 2. As per current assessment and management/monitoring plan, the OTL will be designed to be raptor-safe to prevent electrocution; and also be monitored via surveys for carcasses of any birds. Should any Palla's Fish-eagle carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Ultimately, the additive cumulative effects of mitigated impact on Pallas's Fish-eagle is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.4 Cumulative Impacts on SBV Breeding Birds (small tree-nesting birds)

The SBV species included under the breeding treebirds category are:

- Yellow-eyed Pigeon
- European Turtle Dove

Both have been confirmed to breed in the area of impact of the Samarkand 1 and 2 Projects.

From the direct development of Samarkand 1 and 2 projects, the impacts of greatest significance include:

1. Construction disturbance (noise, anthropogenic movement, etc) which can cause displacement as well as lowered breeding activity;
2. Habitat loss in the form of direct vegetation clearing or landscape alteration

In addition, regional and global threats to these species are described in the subsequent sections.

18.5.4.1 European Turtle Dove

Regional and global threats also impacting European Turtle Dove and causing declining population trends include:

- Direct take for hunting / poaching
- Reduction in availability of food and habitat

The culmination of these effects is leading to a decline in European Turtle Dove populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative adverse effect would be:

- Habitat Loss from the PV panels and associated structures

Loss of habitat manifests in a loss of food availability, breeding locations, feeding locations as well as extirpation of species from areas that are no longer suitable to fulfil ecological needs. For these projects, the main magnitude of habitat loss will occur at the PV sites.

However, none of the habitat matrices found within the PV sites are considered as ideal habitat for European Turtle Dove, and none were observed during any of the bird surveys undertaken throughout the seasons to establish the baseline.

Ultimately, it is not considered that the project has additive cumulative effects on European Turtle Dove.

18.5.5 Cumulative Impacts on Passage Migrants & Seasonal Visitors (Groundbirds)

18.5.5.1 Great Bustard

Regional and global threats also impacting Great Bustard and causing declining population trends include:

- Illegal hunting both at breeding grounds as well as on migration and wintering populations
- Disturbance in breeding grounds causing disruption to nesting birds
- Habitat loss and deterioration as a result of development, agricultural land take
- Collision with OTL and wind turbines
- Naturally low reproduction rate
- Agrochemicals impacting birds as well as foraging success during chick-rearing

- Increased predation from invasive species

The culmination of these effects is leading to a decline in Great Bustard populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative effect would be:

- Collision risk from added OTL

Thus it is of high importance to ensure proper mitigation of the collision risk from any OTL associated with the project(s). As per current assessment and plans, dynamic visual bird flight diverters with UV coating will be added across all high risk HV OTL in appropriate increments.

For all lines, post-commissioning, they will also be monitored via surveys for carcasses of any birds. Should any Great Bustard carcass be found, calculation of adjusted fatality rates would be undertaken; estimated mortality would then be compared to the fatality thresholds established for the project and controlled within the adaptive management system that is in place.

Noting that Great Bustard has a critical wintering range within the project's AoI, monitoring at the OTL will be increased during the wintering period to ensure that the provided mitigation is sufficient to prevent significant mortality of Great Bustard.

Further as Great Bustard has triggered criticality for the Samarkand 2 project, it will be necessary to achieve Net Gain for the species' regional population. The exact mechanism of offset and/or compensation has not yet been determined, but the material commitment as such is in place. Therefore it can be considered that due to the project's commitment to ensure Net Gain for Great Bustard, there should not be significant additive cumulative effect from the project for the species.

18.5.6 Cumulative Impacts on Reptiles

18.5.6.1 Central Asian / Russian Tortoise

From the direct development of Samarkand 1 and 2 projects the impacts of greatest significance include:

- Direct mortality via vehicular collision, excavation and earthworks
- Construction disturbance (noise, anthropogenic movement, etc) which can cause displacement as well as lowered breeding activity
- Habitat loss in the form of direct vegetation clearing and removal causing secondary impacts caused by decline in forage.

Regional and global threats also impacting Central Asian Tortoise and causing declining population trends include:

- Habitat loss, particularly affecting foraging grounds
- "Take" poaching for the pet trade
- Collisions with vehicles

The culmination of these effects is leading to a decline in wild Central Asian Tortoise populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 projects, the elements of highest cumulative effect would be:

- Direct mortality

Recognizing the significance of direct mortality risk, the reptile relocation plan and programme has been implemented to capture and remove tortoises prior to earthworks throughout the construction footprint. A suitable release site was selected and a temporary fencing barrier it to be put in place to prevent direct return of tortoises to the cleared areas. Habitat restoration will take place post-construction and the tortoises are envisioned to be able to recolonize the project areas, resulting in minimal long-term impacts.

Ultimately, the additive cumulative effects of mitigated impact on Central Asian Tortoise is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.1 Cumulative Impacts on Habitats

18.5.1.1 (Natural Habitat) Dry Grasslands

Dry grasslands within the project area, including the 400 MW facility and the 70 km OTL corridor, are natural, unploughed areas characterized by rugged terrain and native temperate grassland vegetation. These lands fall under the IUCN habitat type 4 Native grassland, specifically subtype 4.4 Temperate grassland, and align with the EUNIS habitat type R Grasslands and lands dominated by forbs, mosses, or lichens.

The construction activities will result in significant impacts on these habitats. The clearing of vegetation for construction will lead to the direct loss and mortality of native plants and animals. Wildlife such as burrowing rodents and reptiles may be crushed during earthworks or suffer stress-

induced mortality. Construction vehicles and equipment pose a risk of vehicle collisions, particularly to small to medium-sized animals like rodents, lizards, tortoises, and snakes.

Additionally, the presence of site workers can lead to increased hunting, poaching, or gathering, resulting in the persecution of various wildlife species. Improper management of solid waste, such as plastic containers and bags, can lead to littering, which poses a danger to wildlife through entanglement or ingestion. The introduction of invasive species or pathogens through imported soil and previously used excavation equipment may result in the spread of invasive species that outcompete native flora.

Environmental degradation through dust, pollutants, noise, and lighting can further impact vegetation and soil quality. Dust can coat vegetation, reducing photosynthesis and respiration, while pollutants such as NOx, SOx, PM, and CO can lower survivorship and increase susceptibility to disease. Construction noise and vibration can cause acoustic masking, disturbance, displacement, and general reduction in survivorship and reproductive success in various fauna. Night-time lighting can impact nocturnal wildlife behavior, acting as either an attractant or repellent, interfering with the circadian cycle, and causing lower survivorship and reproductive success.

Finally, habitat fragmentation caused by construction activities disrupts biodiversity and ecosystem stability. The construction of the solar power plant and associated infrastructure may lead to significant soil degradation, habitat fragmentation, and loss of agricultural productivity. This can negatively affect local food security and agricultural economies.

Cumulative Impacts

The cumulative impacts on dry grasslands include habitat degradation, loss of ecological function, and reduced biodiversity due to construction activities, regional overgrazing, and climate change. The combined effects of these factors can lead to significant soil degradation, habitat fragmentation, and loss of biodiversity. Overgrazing and climate change exacerbate the impacts of construction activities, further degrading the habitat and reducing its ecological function.

Mitigation measures should focus on implementing sustainable grazing practices, restoring habitats post-construction, and monitoring climate impacts to preserve these important ecosystems. It is crucial to minimize land clearance, implement soil and water conservation practices, and restore habitats post-construction to mitigate these cumulative impacts. Monitoring and adaptive management strategies should be employed to ensure the long-term sustainability of these habitats, preserving their ecological function and biodiversity.

Given that cumulative habitat loss with the 500 MW PV power plant (under the Samarkand II project) and the 400 MW PV power plant (under the Samarkand I) project is of a potentially large scale, the Project Developer will consider off-site offsets to supplement on-site habitat restoration efforts within residual (unoccupied) sections. These safeguards will serve to ensure NNL for the original extent, quality and overall biodiversity value of the natural habitat.

18.5.1.2 (Natural Habitat) Dry Beds of Temporary Streams

The dry beds of temporary streams within the project area, particularly along the 70 km OTL, are characterized by intermittent water flow supporting specialized vegetation. These habitats fall under the IUCN habitat type 5 Wetlands (inland), specifically subtype 5.8 Seasonal/intermittent freshwater marshes/pools, and align with the EUNIS habitat type H Inland unvegetated or sparsely vegetated habitats.

Construction activities, including gravel extraction and earthworks, will significantly impact these habitats by altering their physical structure and hydrology. The operation of construction vehicles presents a risk to wildlife, and there is an increased likelihood of poaching or gathering of flora and fauna by site workers. Improper waste management can degrade these habitats, while the introduction of invasive species or pathogens from imported soil poses additional threats. Environmental degradation from dust, pollutants, noise, and lighting further impacts vegetation and soil stability. Dust can cover vegetation, reducing its ability to photosynthesize and respire, while pollutants such as NOx, SOx, PM, and CO can lower plant survivorship and increase susceptibility to disease. Construction noise and vibration can disturb wildlife, causing displacement and reducing reproductive success, especially for species that rely on acoustic communication. Night-time lighting can affect nocturnal wildlife behavior, either attracting or repelling species, and interfere with natural circadian rhythms, leading to lower survivorship and reproductive success.

Habitat fragmentation from construction activities disrupts natural hydrological patterns, affecting the ecological balance of these areas. This fragmentation can lead to altered water flow, impacting the specialized vegetation that relies on periodic flooding and drying cycles to thrive.

Cumulative Impacts

The cumulative impacts on the dry beds of temporary streams include hydrological disruption, loss of specialized vegetation, and reduced ecological function due to construction activities and regional hydrological changes. The combined effects of these factors can significantly degrade the habitat, leading to a loss of biodiversity and ecological function. Regional hydrological

changes, driven by factors such as climate change and upstream water management practices, exacerbate the impacts of construction activities, further disrupting the natural hydrological patterns and affecting the ecological integrity of these areas.

Mitigation measures should include careful management of gravel extraction to minimize disruption to the physical structure and hydrology of these habitats. Restoring natural vegetation post-construction can help stabilize soils, support biodiversity, and maintain ecological function. Controlling pollution sources is essential to prevent environmental degradation from dust, pollutants, noise, and lighting. Implementing these measures can help preserve the ecological integrity of the dry beds of temporary streams, ensuring they continue to support specialized vegetation and wildlife adapted to these unique environments.

18.5.1.3 (Modified Habitat) Arable Lands

Arable land within the SAM 1 project area, including the 70 km Overhead Transmission Line (OTL) corridor, is primarily used for rainfed and irrigated agriculture. This land supports the cultivation of crops such as wheat, barley, safflower, cotton, and peanuts. Classified under IUCN habitat type 14 Artificial – Terrestrial, specifically subtype 14.1 Arable Land, these areas align with the EUNIS habitat type V Vegetated man-made habitats, notably subtype V1 Arable land and market gardens.

The direct impacts of the SAM 1 and SAM 2 projects on arable land include vegetation clearing, which results in the immediate loss of agricultural land and the plants it supports. Construction activities also bring an increased risk of wildlife collisions, particularly affecting small to medium-sized animals due to the presence of construction vehicles. The potential for increased poaching or gathering of flora and fauna by site workers further disrupts the habitat, exacerbating the impact on local wildlife.

Improper waste management during construction can lead to littering, which negatively affects soil health and crop productivity. Additionally, the introduction of invasive species or pathogens through imported soil and equipment poses a significant threat to native vegetation and crops. Environmental quality degradation is another major concern, as construction activities generate dust, pollutants, noise, and lighting, all of which can reduce crop health and productivity. Dust can cover plant surfaces, inhibiting photosynthesis and respiration, while pollutants like NOx, SOx, PM, and CO can decrease plant vitality and increase disease susceptibility. Noise and vibration from construction can disturb local wildlife, and night-time lighting can affect nocturnal species' behavior, further stressing the ecosystem.

Moreover, habitat fragmentation caused by infrastructure development disrupts agricultural practices and local economies. The fragmentation impacts not only the physical landscape but also the socio-economic fabric of the region, making it harder for local farmers to maintain their agricultural activities and livelihoods.

Cumulative Impacts

The cumulative impact on arable land is significant, combining the direct habitat loss and disruption from construction activities with existing regional pressures such as soil degradation and water scarcity. These combined effects can have profound implications for local food security and agricultural economies. Soil degradation, often exacerbated by overuse and improper agricultural practices, reduces the land's productivity over time. Water scarcity, a growing concern in many regions, limits the availability of essential irrigation, further straining agricultural output.

The cumulative effects of these factors include a reduction in the availability of arable land for farming, decreased agricultural productivity, and a potential decline in local food security. These impacts also threaten the economic stability of communities that rely heavily on agriculture for their livelihoods.

Mitigation measures should focus on minimizing land clearance, implementing soil and water conservation practices, and restoring arable lands post-construction. Soil conservation practices, such as maintaining ground cover and using erosion control methods, can help preserve soil health. Water conservation techniques, including efficient irrigation systems and rainwater harvesting, are essential to manage water resources sustainably. Post-construction restoration should aim to return the land to a productive state, with efforts to re-establish native vegetation and improve soil structure.

By addressing both the direct and cumulative impacts on arable land, it is possible to mitigate the negative effects on local food security and agricultural economies, ensuring the long-term sustainability and resilience of these crucial habitats.

18.5.1.4 (Modified Habitat) Arable Lands with Agricultural Crops

Arable lands with agricultural crops within the 350 km OTL corridor are characterized by irrigated and rainfed land used for growing wheat, barley, safflower, cotton, and various other crops. These lands fall under the IUCN habitat type 14 Artificial – Terrestrial, specifically subtype 14.1 Arable Land, and align with the EUNIS habitat type V Vegetated man-made habitats.

The construction impacts include vegetation clearing, resulting in the immediate loss of agricultural land and the plants it supports. Wildlife is at risk from construction vehicles, and there is potential for increased poaching or gathering by site workers. Improper waste management can lead to littering, which affects soil health and crop productivity. The introduction of invasive species or pathogens from imported soil poses a significant threat to native vegetation and crops. Environmental degradation through dust, pollutants, noise, and lighting can reduce crop health and productivity. Habitat fragmentation caused by infrastructure development further disrupts agricultural practices and local economies.

The cumulative impacts on arable lands include significant soil degradation, habitat fragmentation, and loss of agricultural productivity due to construction activities, regional agricultural expansion, and climate change. These combined effects can negatively affect local food security and agricultural economies. Mitigation measures should include minimizing land clearance, implementing soil and water conservation practices, and restoring arable lands post-construction to mitigate these cumulative impacts.

18.5.1.5 (Modified Habitat) Fallow Land

Fallow lands within the project area, including those at the Nurobod BESS and the 400 MW PV power plant, are characterized by abandoned, non-irrigated arable land with sandy-clayey soil. These areas support a mix of ephemeral and perennial vegetation, primarily due to grazing and the presence of ground roads. Classified under the IUCN habitat type 14 Artificial – Terrestrial, incorporating subtypes 14.1 Arable Land and 14.2 Pasture Land, they align with the EUNIS habitat type V Vegetated man-made habitats (subtype V1 Arable land and market gardens). These lands, once used for agriculture, now feature natural succession vegetation communities such as bluegrass, camel thorn, harmel, and Cousinia resinosa. The vegetation is typically sparse, with plants scattered individually or in patches, indicating a poor species composition and a landscape in transition.

The construction impacts on these fallow lands include clearing and earthworks that disturb secondary vegetation communities. Small animals are at risk of being killed by construction vehicles, and there is an increased likelihood of poaching or gathering of flora and fauna by site workers, further disrupting the habitat. Improper waste management during construction can degrade soil and vegetation, while the introduction of invasive species or pathogens through imported soil can disrupt the existing ecological balance. Environmental degradation from dust, pollutants, noise, and lighting further impacts these habitats. Dust and pollutants can settle on vegetation, reducing their ability to photosynthesize and grow, while noise and lighting can disturb

wildlife and disrupt natural behaviors. Habitat fragmentation from construction activities hinders natural succession processes and disrupts the ecological continuity of the landscape.

Despite being abandoned for agricultural purposes, these plots are still actively utilized by local communities for grazing, highlighting their continued importance in the rural economy and livelihoods. The canopy cover ranges from nearly non-existent to 20%, suggesting potential opportunities for ecological restoration or managed rewilding to enhance biodiversity and soil health.

Cumulative Impacts

The cumulative impacts on fallow lands include potential soil degradation, habitat fragmentation, and loss of biodiversity due to construction activities and ongoing land use changes. Construction activities contribute to soil compaction, erosion, and the disruption of soil structure, making it difficult for vegetation to re-establish. Habitat fragmentation from infrastructure development further disrupts the ecological balance, making it challenging for wildlife to find continuous habitats and for natural succession to proceed unimpeded.

These combined effects of construction activities and regional agricultural pressures can lead to a significant loss of biodiversity and ecological function in fallow lands. The introduction of invasive species and pathogens can alter the native plant communities, reducing their resilience and capacity to support local wildlife. The ongoing use of these lands for grazing adds additional pressure, potentially leading to overgrazing and further degradation of the habitat.

Mitigation measures should focus on sustainable land management practices, promoting ecological restoration, and controlling invasive species to support the recovery of these habitats. Sustainable land management practices might include limiting the extent of land clearance, maintaining natural vegetation buffers, and using erosion control methods. Ecological restoration efforts should aim to re-establish native vegetation communities and improve soil health, while invasive species control can help maintain the ecological balance and resilience of fallow lands.

18.5.1.6 (Modified Habitat) Fruit Gardens & Vineyards

Fruit gardens and vineyards, dominated by woody and fruit tree species such as apple, apricot, and grapevines, are significant habitats within the SAM 1 project area and the 70 km OTL corridor. Classified under the IUCN habitat type 14 Artificial – Terrestrial, specifically subtypes 14.3 Plantations and 14.4 Rural Gardens, these areas align with the EUNIS habitat type V Vegetated

man-made habitats. These gardens and vineyards are vital for local agriculture, contributing to both the economy and biodiversity.

The direct impacts of the SAM 1 project on these fruit gardens and vineyards are considerable. The clearing of these areas for infrastructure development leads to the immediate loss of gardens and their associated biodiversity. Wildlife in these habitats is at significant risk from construction vehicles, which can result in direct mortality of small animals and birds. Furthermore, there is an increased likelihood of poaching or gathering of flora and fauna by site workers, which further disrupts the habitat.

Improper waste management during construction can exacerbate the degradation of these habitats, leading to soil contamination and littering that affect plant health and productivity. The introduction of invasive species or pathogens through imported soil poses additional risks, potentially outcompeting native plants and introducing diseases that can affect both the native flora and the cultivated crops.

Environmental degradation through dust, pollutants, noise, and lighting from construction activities can significantly reduce fruit production and negatively affect local flora and fauna. Dust and pollutants can settle on leaves, impairing photosynthesis and leading to decreased plant health and yield. Noise and lighting disturbances can affect the behavior and reproductive success of wildlife, further diminishing the ecological integrity of these gardens and vineyards.

Habitat fragmentation caused by infrastructure development disrupts the continuity of these agricultural landscapes, making it difficult for wildlife to move freely and for natural ecological processes to occur. This fragmentation can also impact agricultural productivity, as the isolation of garden patches can lead to reduced pollination and increased vulnerability to pests and diseases.

Cumulative Impacts

The cumulative impacts on fruit gardens and vineyards are profound, combining the direct habitat loss and disruption from construction activities with existing regional pressures such as agricultural expansion and climate change. The cumulative effect of these pressures can lead to significant loss of agricultural productivity, habitat fragmentation, and the potential introduction of invasive species, which together undermine the sustainability of these agricultural systems.

Regional agricultural expansion exacerbates these impacts by increasing competition for land and resources, leading to overuse and degradation of existing agricultural lands. Climate change

further intensifies these challenges by altering weather patterns, increasing the frequency and severity of droughts, and affecting the growing conditions for fruit trees and grapevines.

Mitigation measures should focus on preserving key agricultural zones by minimizing land clearance and implementing sustainable agricultural practices. This can include techniques such as crop rotation, organic farming, and integrated pest management to maintain soil health and productivity. Additionally, restoring habitats post-construction is crucial to re-establishing ecological balance and supporting biodiversity.

Efforts to control the introduction of invasive species and pathogens should include stringent biosecurity measures, such as cleaning construction equipment before entering the site and using locally sourced soil and plants. Effective waste management practices are also essential to prevent soil and water contamination.

Overall, mitigating the cumulative impacts on fruit gardens and vineyards requires a comprehensive approach that integrates sustainable agricultural practices with habitat restoration and biodiversity conservation. By adopting these measures, it is possible to support the resilience and productivity of these vital agricultural landscapes in the face of ongoing and future pressures.

18.5.1.7 (Modified Habitat) Young Fruit Gardens

Young fruit gardens, characterized by low canopy cover, face significant impacts from the SAM 1 project. Construction activities lead to the loss of young fruit gardens and associated biodiversity. Wildlife is at risk from construction vehicles, and there is an increased likelihood of poaching or gathering by site workers. Improper waste management can degrade these habitats, while the introduction of invasive species or pathogens from imported soil poses additional threats. Environmental degradation from dust, pollutants, noise, and lighting impacts young trees and soil quality. Habitat fragmentation from construction activities disrupts the growth and productivity of young fruit gardens.

The cumulative impacts on young fruit gardens include loss of agricultural productivity, habitat fragmentation, and reduced biodiversity due to construction activities and regional agricultural practices. Mitigation measures should include preserving young fruit gardens, implementing sustainable practices, and restoring habitats post-construction.

18.5.1.8 (Modified Habitat) Quarries

Quarries used for gravel and clay extraction, often associated with garbage dumps, face significant impacts from the SAM 1 project. Extraction activities lead to habitat destruction and

significant landscape alteration. Wildlife is at risk from construction vehicles, and there is an increased likelihood of poaching or gathering by site workers. Improper waste management can further degrade these habitats. The introduction of invasive species or pathogens from imported soil poses additional threats. Environmental degradation from dust, pollutants, noise, and lighting impacts vegetation and soil quality. Habitat fragmentation from extraction activities leads to extensive habitat degradation and loss of biodiversity.

The cumulative impacts on quarries include extensive habitat degradation, loss of biodiversity, and reduced ecological function due to extraction activities and regional resource extraction. Mitigation measures should include implementing restoration efforts post-extraction, managing waste properly, and promoting sustainable extraction practices to mitigate these cumulative impacts.

18.5.1.9 (Modified Habitat) Woodland Belts, Boundary Strips, Roadsides, Canals, and Drainage Channels

Woodland belts, boundary strips, roadsides, canals, and drainage channels within the project area, represent modified habitats supporting a diverse mix of native and introduced species. Classified under the IUCN habitat type 14 Artificial – Terrestrial and aligned with the EUNIS habitat type V Vegetated man-made habitats, these areas play a critical role in maintaining local biodiversity and ecological function.

The construction impacts on these habitats are significant. Disturbance and clearing for infrastructure development directly affect these narrow habitats and their associated species. Wildlife inhabiting these areas is at risk from construction vehicles, which can lead to direct mortality. Additionally, there is a potential for increased poaching or gathering of flora and fauna by site workers, further disrupting the habitat.

Improper waste management during construction activities can degrade these habitats, leading to soil contamination and littering that affects plant health and ecosystem function. The introduction of invasive species or pathogens through imported soil poses additional threats, potentially outcompeting native plants and altering the ecological balance.

Environmental degradation through dust, pollutants, noise, and lighting from construction activities can significantly impact vegetation and soil quality. Dust and pollutants can coat plant leaves, impairing photosynthesis and reducing plant health. Noise and lighting disturbances can disrupt the behavior and reproductive success of wildlife, further diminishing the ecological integrity of these habitats.

Habitat fragmentation caused by construction activities reduces the ecological function and connectivity of woodland belts, boundary strips, roadsides, canals, and drainage channels. This fragmentation disrupts the movement of wildlife and the flow of ecological processes, making it challenging for species to thrive and for natural regeneration to occur.

Cumulative Impacts

The cumulative impacts on woodland belts, boundary strips, roadsides, canals, and drainage channels are profound. Habitat fragmentation, reduced connectivity, and loss of biodiversity due to construction activities are exacerbated by regional urbanization and infrastructure development. The cumulative effect of these pressures leads to significant ecological degradation and the loss of valuable green corridors that support biodiversity and ecological resilience.

Regional urbanization compounds these impacts by increasing habitat fragmentation and reducing the availability of natural habitats. This urban expansion places additional stress on woodland belts, boundary strips, roadsides, canals, and drainage channels, making it difficult for these areas to maintain their ecological functions and biodiversity.

To mitigate these cumulative impacts, it is essential to focus on maintaining and enhancing green corridors. This can be achieved by preserving and restoring woodland belts, boundary strips, roadsides, canals, and drainage channels, ensuring they remain connected and functional. Implementing pollution control measures, such as reducing dust and pollutant emissions during construction, is crucial to protecting soil and vegetation quality.

Restoring habitats post-construction is vital to supporting their ecological role and biodiversity. This involves replanting native species, controlling invasive species, and ensuring that these areas are managed sustainably to support wildlife and ecological processes. By adopting these mitigation measures, it is possible to preserve the ecological integrity of woodland belts, boundary strips, roadsides, canals, and drainage channels, ensuring they continue to provide essential ecosystem services and support biodiversity in the face of ongoing development pressures.

18.5.1 Non-Priority Flora and Fauna Species

In summary, the non-priority flora and fauna species within the SAM 1 and SAM 2 project areas are integral to the overall ecological health of the region. While they may not have the same conservation status as priority species, their protection and conservation are crucial for maintaining biodiversity and ecosystem functionality. Implementing comprehensive mitigation

and monitoring strategies will help safeguard these species and support sustainable development in the project areas.

18.5.1.1 Mammals

The mammalian fauna within the project areas of SAM 1 and SAM 2 encompasses a variety of non-priority species that play crucial roles in maintaining ecological balance. Common species include small to medium-sized mammals such as rodents, hares, and foxes. These mammals are integral to the food web, serving as both predators and prey. Construction activities pose significant risks to these species, primarily through habitat loss, vehicular collisions, and increased human presence leading to potential poaching. Effective mitigation measures, such as creating wildlife corridors and implementing strict anti-poaching regulations, are essential to minimize impacts on mammal populations and ensure their continued ecological functions.

18.5.1.2 Reptiles

Reptilian species in the project areas include a range of lizards, snakes, and the notable Central Asian Tortoise (*Testudo horsfieldii*). While the tortoise is a priority species, other reptiles are also impacted by habitat disruption and fragmentation due to construction activities. Reptiles are particularly vulnerable to soil compaction, changes in microhabitats, and direct mortality from vehicles. Measures such as establishing buffer zones, translocating vulnerable individuals before construction, and maintaining undisturbed habitat patches can help protect these reptiles. Additionally, educating construction workers about the importance of these species can reduce intentional harm.

18.5.1.3 Avifauna

The avifauna within the project areas is diverse, including both resident and migratory bird species. Birds are highly sensitive to changes in their environment, with potential impacts including habitat loss, disturbance from noise and light pollution, and collisions with infrastructure such as power lines. These impacts can lead to reduced breeding success and population declines. To mitigate these effects, it is important to design bird-safe power lines, minimize nighttime construction activities, and preserve key breeding and feeding habitats. Monitoring bird populations before, during, and after construction can also provide valuable data to guide conservation efforts.

18.5.1.4 Flora

The flora of the project areas consists of a mix of native and non-native plant species, with many adapted to the arid and semi-arid conditions typical of the region. While some priority plant

species have been identified, the broader vegetation community faces threats from habitat clearing, soil compaction, and the introduction of invasive species. Maintaining the integrity of these plant communities is vital for soil stability, water regulation, and providing habitat for wildlife. Restoration efforts post-construction, such as replanting native species and controlling invasive plants, are crucial to ensure the resilience and recovery of these ecosystems.

18.5.1.5 Bats

Bats represent an essential group within the project's ecosystems, contributing to insect control and pollination. The acoustic surveys have identified several bat species within the project areas, highlighting their presence and activity. Construction impacts on bats include habitat disturbance, roost destruction, and increased mortality from collisions with vehicles and infrastructure.

From the direct development of the Samarkand 1 and 2 projects, the impacts of greatest significance include:

- Construction disturbance (noise, anthropogenic movement, etc) which can cause displacement as well as lowered breeding activity;
- Habitat loss in the form of direct vegetation clearing and removal causing secondary impacts caused by decline in prey species.

Regional and global threats also impacting bats and causing declining population trends include:

- Decline in prey due to pesticide use
- Habitat loss – both roosting habitats as well as foraging habitats
- Fragmentation
- Collision with wind turbines

The culmination of these effects is leading to a decline in bat populations regionally and globally.

In the context of additive pressures from the Samarkand 1 and 2 Projects, the elements of highest cumulative effect would be:

- Habitat Loss from the PV panels and associated structures

Loss of habitat manifests in a loss of food availability, breeding locations, feeding locations as well as extirpation of species from areas that are no longer suitable to fulfil ecological needs.

Habitat loss can be mitigated by ensuring the post-construction phase ensures adequate levels of habitat restoration, with the ultimate goal of restoring ecosystem function to similar levels pre-construction. Restoration techniques that bring back native vegetation communities and biomass

as well as ensure habitat connectivity will allow for re-population of the land by prey species, which in turn can minimize the loss of suitable habitat by providing modified habitat options for foraging bats.

Ultimately, the additive cumulative effects of mitigated impact on bats is considered to adequately managed and the residual cumulative impact is not considered to be of significance.

18.5.2 Concluding Remarks

Each species considered as a Priority Biodiversity Feature (aka Significant Biodiversity Value) or Critical Species has been assessed in preceding sections considering existing regional and global threats and pressures and projected population trends. The impacts of most significance and mitigation of most importance have been highlighted. It is considered that given the application of sufficient mitigation, cumulative impacts on each species have been adequately managed to the best of the project's ability to ensure that the project does not have additive significant impacts on the species in question.