

Initial Environmental Examination

April 2021

Uzbekistan: Partial Credit Guarantee Facility for Uzbekistan Solar PPP Program

Main Report

Prepared by the Ministry of Energy of the Republic of Uzbekistan for the Asian Development Bank.

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Initial Environmental Examination Report

for Uzbekistan: Sherabad Solar IPP Project

Project no.: 54056-001

Client: Ministry of Energy, Uzbekistan & ADB – Asian Development Bank

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MINISTRY OF ENERGY
OF THE REPUBLIC OF UZBEKISTAN



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Uzbekistan: Sherabad Solar IPP Project

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GLOSSARY

Khokimiyat	The local government authority that interfaces between local communities and the government at the regional and national level. It has ultimate administrative and legal power over local populations residing within its jurisdiction.
Makhalla	A local level community-based organization recognized officially by the Government of Uzbekistan serving as the interface between the Government and community. It is responsible for facilitating a range of social support facilities and ensuring the internal social and cultural cohesiveness of its members. Makhalla leaders are elected by their local communities.

Term / Abbreviation	Explanation
ADB	Asian Development Bank
AP	Affected Person
BAP	Biodiversity Action Plan
BMEP	Biodiversity Management and Evaluation Plan
CHA	Critical Habitat Assessment
EA	Executing Agency
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
ERP	Emergency Response Plan
FGD	Focused Group Discussion
GHG	Greenhouse Gas
GRC	Grievance Redressal Committee
GRM	Grievance Redress Mechanism
IFC	International Finance Corporation
IPP	Independent Power Producer
IUCN	International Union for Conservation of Nature
JSC	Joint-stock company
KBA	Key Biodiversity Area
LARP	Land Acquisition and Resettlement Plan
MOE	Ministry of Energy
MOH	Ministry of Health
MOF	Ministry of Finance
MIFT	Ministry of Investments and Foreign Trade
NEGU	National Electric Grids of Uzbekistan
PIB	Project Information Booklet
PCR	Physical Cultural Resources
PIC	Project Implementation Consultancy Services
PMU	Project Management Unit
PPP	Public-Private Partnership
PPPDA	Public-Private Partnership Development Agency
QPR	Quarterly Progress Report
SCADA	Supervisory Control and Data Acquisition
SEMP	Site Environmental Management Plan
SOMP	Standard Operation and Maintenance Plan
SSDDR	Social Safeguards Due Diligence Report
SPS	Safeguard Policy Statement
SPV	Special Purpose Vehicle
SPZ	Sanitary Protection Zone
UNEP	United Nations Environment Program
WHO	World Health Organization

Currency Equivalents

(as of July 2020)

Currency Unit	UZS (Uzbekistan so'm)
\$1.00	10, 173 so'm

NOTE: In this report, "\$" refers to United States dollars.

Weights and Measures

Abbreviation	Explanation
dBA	A-weighted decibel
km	kilometer
km ²	square kilometer
Ha	Hectare (10,000 square kilometer or 2.47105 Acre)
LAeq	Equivalent Continuous Level 'A weighting' - 'A'-weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies
m	Meter
°C	Degree Celsius
PM10	Particulate Matter 10 micrometers or less
PM2.5	Particulate Matter 2.5 micrometers or less
NO ₂	Nitrogen Dioxide
SO ₂	Sulphur Dioxide
VOC	Volatile Organic Compounds
µg/m ³	Microgram per cubic meter
kV	Kilovolt (1,000 volts)
kW	Kilowatt (1,000 watt)
MW	Megawatt (1000 kilowatt)
GWh	Gigawatt-hour
MVA	Megavolt Amperes

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EXECUTIVE SUMMARY

INTRODUCTION

1. In accordance with Presidential Resolution PP-4300, the Ministry of Energy (MOE) jointly with the Ministry of Investments and Foreign Trade (MIFT), the Public-Private Partnership Development Agency (PPDA) under the Ministry of Finance (MOF) of the Republic of Uzbekistan (or “the promoters”), have proposed the development of a program of solar power projects in Uzbekistan procured under a Public-Private Partnership (PPP) modality. Joint-Stock Company National Electric Grids of Uzbekistan (NEGU) and MIFT are the “Public Partners” of the solar program¹. The Asian Development Bank (ADB) has been mandated on 16 August 2019 by the MOE and MIFT to act as a Transaction Advisor.

2. The Uzbekistan Solar Program includes the proposed development, construction, financing, operations and maintenance of up to 1 GW of capacity through a number of solar PV power plant projects to be tendered in suitable locations in Uzbekistan.

3. The Sherabad Solar IPP will support the promoters to design and conduct a competitive tender for constructing up to 500-megawatt (MW) capacity solar photovoltaic (PV) plants in phases and a transmission interconnection system to supply power to the national grid. The solar PV plants and transmission interconnection system will be tendered to a “Private Partner” i.e. Independent Power Producer (IPP) through a Special Purpose Vehicle (SPV) ².

PROJECT ORGANIZATIONAL STRUCTURE

4. The MOE is the executive agency (EA) responsible for the overall supervision and monitoring of project implementation (i.e. the Sherabad Solar IPP project, implementation of the Public Private Partnership (PPP) agreement and subsequent projects under the solar program). The MOE will be assisted by the MIFT and PPDA of the MOF and ADB in developing and approving the relevant PPP agreements and monitor project implementation.

5. A qualified Private Partner (private developer-investor) for the project will be the implementing agency (IA) through a SPV. The SPV will be supported by the current Project Management Unit of NEGU (PMU NEGU)³ and Project Implementation Consultancy Services (PIC)⁴ that will be engaged under this project by the SPV. The SPV will set up a Project

¹ JSC NEGU as sole off-taker of electricity and signatory of the Power Purchase Agreement (PPA); and MIFT, as signatory of the Government Support Agreement (GSA).

² The private partner can be single entity, group of companies, or consortium to be prequalified according to financial resources and experience of developing similar solar projects; the private partner will need to incorporate an Uzbek entity and to assign the PPA agreement to such an Uzbek entity.

³ The NEGU functions through the NENs office Main Power Network (MPN) in the Surkhandarya Region.

⁴ The Terms of Reference (TOR) has been prepared for Project Implementation Consultant(s) - International and National Environment Specialists and enclosed as Appendix 5 of the IEE. The PIC services will be engaged by SPV to assist PMU and SPV with the implementation of the project and for safeguards in particular, to: (a) update, as necessary, the Initial Environmental Examination (IEE), Environment Management Plan (EMP), Biodiversity Action Plan (BAP), Biodiversity Management and Evaluation Plan (BMEP) and Social Safeguards Due Diligence Report or preparation of Land Acquisition and Resettlement Plan (LARP), and, after obtaining ADB’s approval, oversee their implementation; (b) work and coordinate with PMU to complete Environmental, Health and Safety Audit (EHS) for existing Surkhan substation that will undergo upgrade / extension work; (c) work and coordinate with SPV contractors to develop and finalize site EMPs (SEMPs), and after obtaining PMU’s approval, oversee SEMP implementation; and (d) supervise the integration of safeguard measures into the design, installation, and commissioning of the solar PV plant and transmission interconnection infrastructure works by the SPV contractor. The PIC will be responsible

Implementation Unit (PIU) that be responsible for day to day activity and compliance with safeguards during project implementation.

6. The qualified Private Partner through the SPV will design, build, finance, own, operate, maintain (and potentially decommission) the solar PV plant(s). It will also design, build and finance the transmission interconnection infrastructure and transfer to NEGU at commercial operations date (COD) of the project against a capped lumpsum payment. The project will be implemented in two phases - Phase I will tender a minimum of 200 MWac solar PV plant (this project) while Phase II will procure the capacity depending on the PV plant size set up by the bidder in phase I. The ownership and the responsibility for operating and managing the solar PV plant(s) will be with the Private Partner while the responsibility for operation and managing the transmission interconnection infrastructure will be with NEGU. It should be noted that Phase II will be tendered separately.

PROJECT LOCATION

7. The solar project site is located in the Sherabad district of Surkhandarya province. The new transmission line will run across Sherabad, Kizirik and Jarkurgan districts of Surkhandarya province while the existing Surkhan substation is located in the Jarkurgan district (refer to Figure 1).

PROJECT IMPACTS, OUTCOME AND OUTPUTS

8. The impact of the project is in line with the Government's inclusive economic growth achieved through increased clean and sustainable energy supply. The outcome of the project is aligned with the Government's strategy to increase renewable energy generation led by the private sector to deploy up to 5 GW in the upcoming 10 years. Further, it is in line with Uzbekistan's power sector development plan to develop solar energy at a large scale to diversify the fuel resources and reduce dependency on the fossil fuel, primarily natural gas.

9. The project's expected outputs will be:
- i. The generation of minimum 200 MWac of renewable energy, which is expected to provide clean energy to approx. 300,000 households in the Surkhandarya region.
 - ii. The development of 220/110/10kV substation and 52 km 220 kV overhead transmission line to evacuate the power generated from solar power plants
 - iii. The improvement of the region's energy security by delivering renewably generated power at affordable costs.
 - iv. Government's capacity strengthened to attract private investments

INTEGRATION OF SAFEGUARDS IN PROJECT DESIGN

10. Project design is detailed in the feasibility study and summarized below in context of integrating safeguards in to project design.

for building PMU and SPV capacity in safeguards monitoring and reporting. The PIC will also assist the PMU and SPV contractors in conducting project level COVID-19 risk assessment. The PIC will ensure that the SPV contractor's Occupational Health & Safety plans integrate measures to mitigate COVID-19 health risks that are aligned with Government guidelines and measures listed in the EMP. The PIC will consist of one international and two national specialists recruited for a total of 4 person-months and 14 person-months total over 18 months project implementation period, respectively.

11. **Climate resilience.** A preliminary climate risk screening classifies the project as *moderate* to *low risk* from future climate change impacts. While climate change impacts are not anticipated to be significant over the design life of the solar project (+25 years), the preliminary design integrates measures for potential climate risks (and extreme weather events) in project detailed engineering design such as consideration of wind speed, dust, and increase in temperature and snowfall in project siting and structural design. The key climate vulnerable project components will be subject to further analysis during the project detailed engineering design to ensure they take account of projected climate risks; climate proofing measures that will permanently become part of the project infrastructure will be included within the main civil work contract costs (indicative estimate will be prepared during detailed engineering).

12. **Biodiversity conservation measures.** A habitat assessment was carried out for the project. The project is located in modified habitat and has low ecological sensitivity. However, the project area is classified as a critical habitat as per International Finance Corporation Performance Standard 6 or IFC PS6 under Criterion 1, presence of Critically Endangered (CR) or Endangered (EN) species. The qualifying species is the *Alsophylax laevis* (smooth even-fingered gecko).⁵ The preliminary design integrates biodiversity risk mitigation measures and will be subject to further analysis during detailed engineering design; biodiversity measures that will permanently become part of the project infrastructure will be included within the main civil work costs; Pre-construction surveys and additional bird surveys will be conducted as per recommendations included in the Critical Habitat Assessment (CHA), Appendix 3.1.

13. **Land requirements.** The proposed Phase I – minimum 200 MWac will involve permanent land take for the solar site. The current land available to the bidder for solar PV plant and new substation is approximately 600 ha. There is no land acquisition since the land belongs to the Government; this will be leased to the Private Partner through the SPV. The development of the access branch road within the project site is included in the land requirement for the solar PV plant with a Right of Way (ROW) width 5.5 m, length 2-3 km. The 220 kV transmission line from new substation to existing facility - Surkhan substation will affect approximately 52 km Right of Way (ROW) of width 35 m or total of 182 ha out of which the transmission tower footings will require permanent acquisition of 12.69 ha as per Uzbekistan Electric Rules and Regulations. Land acquisition and compensation process is detailed in the project Social Safeguards Due Diligence Report (SSDDR) ⁶. There is no new land requirement for the planned upgrade/extension works at existing facility - Surkhan substation. Facilities such as construction and erection staging (unloading, site storage, workshop) areas, construction (workers) camps, spoil disposal sites and access tracks established for the new transmission line alignment will take up land temporarily during the construction stage. The temporary land take areas will be estimated during detailed engineering design. There is no temporary land-take associated with the solar site since all civil works will be undertaken within the site boundary.

⁵ This gecko is listed as CR on the IUCN Red List and listed as VU within the Uzbekistan Red Data Book (URDB, 2019). The critical habitat status has been established as a precautionary approach following a discussion with ADB safeguards team on July 3 and 5, 2020.

⁶ In case some permanent land acquisition and resettlement impacts occur during the physical works on the solar project site and due to the new transmission line, the MOE/NEGU will prepare a land acquisition and resettlement plan (LARP) which will be submitted to ADB for approval and fully implemented prior to award of a civil works contract. The LARP will be implemented in accordance with the national laws and regulations and ADB SPS 2009. Any unanticipated adverse impacts identified during project implementation, will be compensated in full at the replacement cost of assets affected.

Infrastructure type	Land requirements
Min. 200 MW capacity solar PV	400–500 ha permanent land take (depending on the PV system configuration)
New substation (220/110/10kV)	15–20 ha – permanent land take (included in site)
220 kV Transmission line of 52 km length with ROW of 35 m between new substation up to and existing grid Surkhan substation	169 ha of land – temporary land take and disturbance during construction and maintenance for length 52 km
Transmission line tower footings	12.96 ha of land – permanent land acquisition
Access branch road within the solar park (north to south)	2 km road length and 5.5 m width (land requirement included in solar site, numbers are indicative and will be confirmed during detailed engineering design)

*Total 52 km length transmission line x 35 m width ROW = 182 ha.

ADB AND DOMESTIC ENVIRONMENTAL REQUIREMENTS

14. The due diligence has confirmed the project environment classification is B requiring an initial environmental examination (IEE) and Environmental Management Plan (EMP) in accordance with ADB Safeguard Policy Statement (SPS 2009). The IEE and EMP cover environmental impacts and risks in the project area of influence for the project output⁷ i.e. the solar PV plant and transmission interconnection infrastructure and the Surkhan substation (which is an existing facility⁸). The works will be limited to the sites, with exception of haulage of materials from resource areas to the sites, and potential impacts will be site-specific and largely created during the construction stage. The IEE and EMP, refer to Part 2 of the Main IEE Report, have been prepared based on the preliminary engineering designs and will be updated where necessary to meet the final detailed engineering designs. This project gives special consideration to the ecological area of analysis in order to align with the IFC Performance Standards⁹, in particular with the PS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources and the updated Guidance Note (GN6, June 2009)¹⁰. The preliminary design integrates conservation measures as detailed in the project Biodiversity Action Plan (BAP) and Biodiversity Management and Evaluation Plan (BMEP), refer to **Annexure 1** and **2**. These will be further integrated in the final detailed engineering designs.

⁷ Project area of influence has been established for assessing potential adverse impacts and is defined by a 50 m buffer around the solar project site including the solar PV plant, new substation, common facilities and a 200 m buffer around the transmission line ROW center line. The project area of influence covers an area of 2,688 ha.

⁸ ADB SPS 2009 requires for projects involving *existing facilities* that the borrower will undertake an environment and/or social compliance audit, including on-site assessment to identify past or present concerns related to impacts on the environment, involuntary assessment and indigenous peoples. The objective of the audit is to determine if actions were in accordance with SPS and to identify and address outstanding compliance issues.

⁹ IFC Performance Standards: [Online Link](#)

¹⁰ Project ecological area of analysis has been established for compiling the environmental baseline and critical habitat assessment and is defined by a 50 km radius buffer around the proposed solar project site including the solar PV plant, new substation, common facilities and new transmission line for 52 km length. The ecological area of analysis covers an area of 1.26 million ha.

15. The project will also comply with the national environmental due diligence procedures in Uzbekistan called the State Environmental Expertise (SEE) and regulated by the Law on the Environmental Expertise and the Regulation on State Environmental Expertise (SEE) approved by the Cabinet of Ministry Decree No. 949, dated 22 November 2018. The Private Partner through the SPV will be responsible for applying and obtaining the required domestic environmental clearances, other permits and approvals.

PROJECT ENVIRONMENTAL BENEFITS

16. This project is expected to have significant environmental benefits. Phase I of minimum 200 MWac capacity will avoid approximately 272,000 tons of carbon dioxide-equivalent (tCO₂e) annually¹¹ and approximately 6.8 million tCO₂e over a 25-year project lifetime.

ANTICIPATED ADVERSE ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

17. Environmental impacts were assessed for all project activities in the project area of influence across all stages of the project implementation cycle, i.e. (i) design and pre-construction stage, (ii) construction stage, (iii) operation stage, and (iv) decommissioning stage. Impact assessment methodology consists of: (a) **Identification of Valued Environmental (and social) Receptors (VERs)**: to identify potential interactions between the proposed project and valued receptors (sensitive natural and human receptors) in the defined Area of Influence; (b) **Impact prediction**: to determine what could potentially happen to identified valued environmental receptors (VERs) as a consequence of the project activities. (c) **Impact evaluation**: to evaluate the significance of the predicted impacts by considering their magnitude and the sensitivity of the affected resource/receptor; (d) **Mitigation measures**: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts; and (e) **Residual impact evaluation**: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

18. **Impacts during design and pre-construction.** The potential adverse environment impacts associated with the project have been avoided or minimized through careful site and route selection of the solar project site and the transmission line alignment. During detailed design, further surveys will be conducted to finalize the transmission line alignment, which will be adjusted as needed to avoid VERs (sensitive natural and human receptors) and minimize the cutting of trees, orchards for the ROW. Any changes in scope or location of project during implementation would be subject to appropriate due diligence as per ADB SPS requirements. Some houses or structures are anticipated to be affected / displaced.

19. A number of environmental measures will be implemented in the design and pre-construction stage to ensure the project's readiness for implementation. Some of these measures will permanently become part of the infrastructure design, such as: (i) ensuring transmission line route selection avoids sensitive receptors including protected areas, forests, habitats and species of conservation value, hospitals/clinics/schools and physical cultural resources (PCRs) as well as minimizing impacts on human health, households and crops and trees of economic value, and (ii) integration of design features for climate resilience, biodiversity conservation and effective environmental management.

¹¹ Assuming 493,438 MWh (P50) energy generated by PV plant (Suntrace) and calculating the baseline emission using the grid emission factor for Uzbekistan
(source: <https://www.adb.org/sites/default/files/institutional-document/296466/guidelines-estimating-ghg.pdf>)

20. Other environmental measures during pre-construction stage include: (i) obtaining permits, approvals and clearances in a timely manner; (ii) conducting baseline surveys and meaningful consultations; and (iii) timely land acquisition and compensation, if required, as per project SSDDR. The PMU and grievances redress mechanism (GRM) for the current ADB funded energy projects will also manage this project. The safeguards requirements will be integrated in contracts, tenders and bidding documents for the SPV/SPV appointed key contractors/sub-contractors.

21. **Impacts during construction stage:** There will be temporary, localized impacts of moderate significance during peak construction such as increased noise and dust levels, vibration, traffic congestion, potential interruption to existing utilities (e.g. power outages), waste generation, disrupted access to properties and agricultural land, presence of workers at construction (workers) camps and work sites as well as loss of vegetation, trees, plantations, orchards and/or crop damage. Upgrade works at Surkhan substation will take place within the fenced perimeter of the existing grid substation and the construction impacts will be of minor significance. An on-site physical Environmental, Health and Safety (EHS) audit of Surkhan substation will be conducted by PIC and findings integrated in the updated IEE and EMP.

22. **Impacts during operation & maintenance stage:** There will be impacts of minor significance during operation such as use of transformer oil at the new substation, risks to occupational and community health and safety (working at height, electrocution), water usage for PV panel cleaning and permanent sanitation facilities at the solar PV plant, waste generation and maintenance activities for project components, site and ROW vegetation management. There will be impacts of moderate significance due to change in landscape features and visual impacts (industrial solar site in rural setting) during project lifetime (25 years) while the remaining residual impacts are of low significance (refer to details in Section 5 of IEE).

23. **Mitigation measures.** The identified potential adverse environmental impacts can be managed through effective implementation of the EMP, BAP and BMEP and appropriate measures agreed in the project SSDDR. There are no significant residual impacts anticipated due to implementation of the proposed project. The main project risk is the low institutional capacity of the PMU, SPV PIU and SPV appointed key contractors/ sub-contractors and their failure to implement the EMP, BAP and BMEP effectively during all stages of project implementation. These risks will be mitigated by: (i) hiring PIC services - Environment, (ii) providing training and capacity building on environment and social safeguards to the PMU, SPV PIU and SPV appointed key contractors/sub-contractors¹², (iii) developing and implementing an Environmental and Social Management System (ESMS); (iv) developing and implementing site specific/topic specific EMPs (SEMPs) and Standard Operation & Maintenance Plans (SOMPs), (v) following appropriate project implementation, mitigation, monitoring and reporting arrangements, and (vi) adequate site supervision including audits of contractor/sub-contractor's EHS performance. Monitoring and evaluation parameters have been identified in the EMP and BMEP to check the effectiveness of safeguard measures and to ensure any unidentified impacts can be readily addressed. Additionally, the project risks will also be mitigated through inclusion of safeguard specifications (project EMP, Annexure 1 and 2) in contracts, bids and tenders for the SPV and SPV appointed key contractors / sub-contractors.

INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

¹² Contractors imply = SPV appointed Engineering, Procurement and Construction (EPC) contractors, any key sub-contractors and facility operators. Note: Safeguards implementation for solar PV plant(s) during operation stage will continue through the SPV and for transmission interconnection infrastructure directly through NEGU.

24. Public participation in the course of preparing this IEE included informal discussions with villagers residing nearby the solar project site and along the length of the transmission line. Consultations revealed support for the project since the villagers have the electricity connection but experience power outages and low voltage when they need it most, in harsh winters and very hot summers. Main environmental concerns expressed by the participants were related to increases in dust in the dry season, waste dumping and damage to existing roads during construction and safety concerns due to presence of transmission towers during the operation stage. Measures to address these concerns have been integrated in the project design. Consultations will continue through the project cycle. A project information booklet (PIB) will be prepared with project information and key contact details of local entry points (focal point persons); the PIBs will be distributed in the project area of influence.

GRIEVANCE REDRESS MECHANISM

25. The PMU will use the project GRM in accordance with the time frame and requirements specified in the EMP (and SSDDR). The GRM will provide multiple entry points for affected persons (APs) / households. The GRM will be coordinated by the PMU with active participation of SPV PIU and supported by PIC. Project GRM will address concerns and complaints promptly via a transparent process. Complaints and their resolution will be documented and reported in project Quarterly Progress Reports (QPRs) and semi-annual safeguard reports to ADB.

KEY SAFEGUARDS IMPLEMENTATION RESPONSIBILITIES

26. The key institutions involved in the safeguard implementation will be the PMU and SPV PIU, assisted by PIC. To ensure effective implementation of environmental safeguards procedures, the PMU and SPV PIU will include designated and trained staff and contractor focal point persons. The PMU and SVP PIU be responsible for the overall supervision and compliance with (i) environmental safeguards requirements, (ii) coordinate the project GRM, (iii) coordinate with line ministries to ensure smooth implementation of the project¹³, (iv) engage PIC, (v) supervise the procurement process, and (vi) report to the ADB. In particular, the PMU will ensure consistency of safeguards documents with government policy, legal and administrative framework across all jurisdictions – national, state and local level. The SPV PIU and contractor/sub-contractor focal point persons will be responsible for day to day activity and compliance with safeguards during project implementation in the field including engaging in project GRM and meaningful consultations and information disclosure. PIC will assist the PMU and SPV PIU with the implementation of the project, EMP, BAP, BMEP and oversight of the contractors/sub-contractors or any third-party consultants.

27. The PMU will be responsible for safeguards reporting. The SPV PIU and contractor focal point persons, assisted by PIC, will conduct monitoring for the project and provide the environment input based on site visits, compliance checks and prepare the project Quarterly Progress Reports (QPRs) for submission to PMU; the PMU will further verify the information and submit the project QPRs to ADB.¹⁴ The PIC will support the PMU to use the information from the project QPRs and prepare a safeguards monitoring report for submission to ADB semi-annually during construction stage and annually during operation stage. The safeguards monitoring reports

¹³ The PMU will ensure that project activities are synchronized between the SSDDR/LARP and EMP, BAP and BMEP implementation. The PMU will also ensure that no physical or economic displacement of affected persons/APs will occur until: (i) compensation at full replacement cost has been paid to each affected person/APs for project or sections of project that are ready to be constructed; and (ii) other entitlements listed in the SSDDR/LARP are provided to the affected persons/APs.

¹⁴ Initially the safeguards reporting will be via the project QPRs.

will be publicly disclosed on the ADB website. Reporting to ADB will continue until project completion report is issued.

28. The SPV PIU will be responsible for safeguards monitoring. The SPV PIU and contractor focal point persons, assisted by PIC, will coordinate and interact with the PMU on compliance to ADB safeguards requirements and with relevant government agencies and local authorities on permits and clearances and national environmental requirements, update and finalize the IEE and EMP as well as BAP and BMEP as needed. PIC will assist PMU, SPV PIU and contractors/sub-contractors in handling complaints and/or grievances filed through the project GRM, if any.

29. During construction, the SPV PIU will coordinate with contractors/sub-contractors to submit monthly progress reports to PMU on SEMP/EMP and BAP/BMEP implementation, which will inform the project QPR and semiannual safeguard monitoring reports. After completion of the construction stage, the SPV PIU/facility operator will continue to submit monthly progress reports to PMU for the first year of the operation and quarterly progress reports thereafter; these will inform the annual safeguards monitoring reports.

CONCLUSION

30. This IEE shows potential adverse environmental impacts can be reduced to acceptable levels with effective implementation of mitigation and monitoring/evaluation measures. There are no significant residual impacts anticipated due to implementation of the proposed project; there will be impacts of moderate significance due to change in landscape/visual features (industrial solar site in rural setting) during project lifetime (25 years) while the remaining residual impacts are of low significance (refer to details are provided in Section 5 of the IEE). The EMP, BAP and BMEP has specified mitigation measures to address identified impacts, responsible parties, and monitoring and evaluation across all stages of project implementation including measures to achieve No Net Loss (NNL) for the Smooth even-fingered gecko. The project is expected to improve electricity supply and increase access to clean and reliable energy that will encourage additional investment and economic growth. This project is expected to have significant environmental benefits. Phase I of minimum 200 MWac capacity will avoid approximately 272000 tons of carbon dioxide-equivalent (tCO₂e) annually and approximately 6.8 million tCO₂e over a 25-year project lifetime.

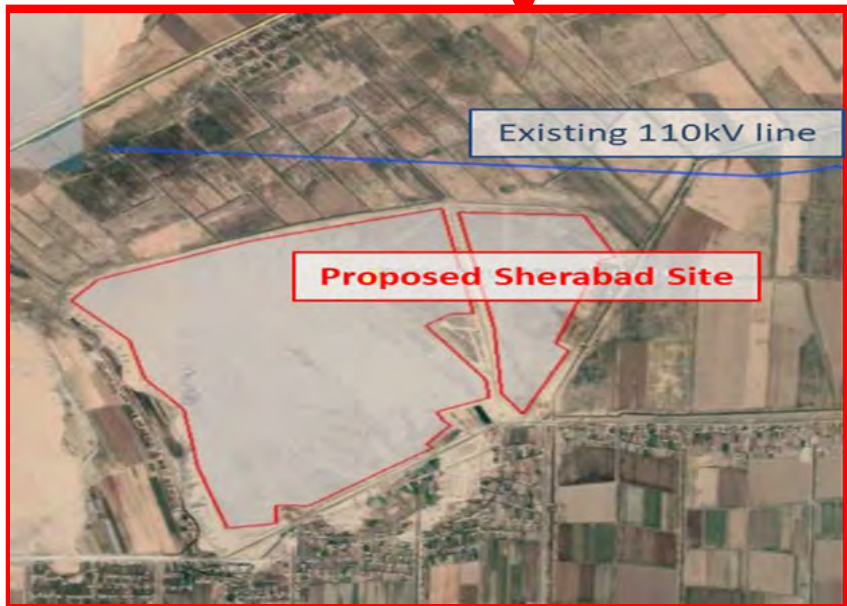


Figure 1 Project Location

1 INTRODUCTION

1.1 Project Scope and Location

1. In accordance with Presidential Resolution PP-4300, the Ministry of Energy (MOE), the Ministry of Investments and Foreign Trade (MIFT) and the Public-Private Partnership Development Agency (PPDA) under the Ministry of Finance (MOF) of the Republic of Uzbekistan – or the “promoters” have proposed the deployment of a solar program consisting of solar PV projects in Uzbekistan procured under a Public-Private Partnership (PPP) modality. The Asian Development Bank (ADB) has been mandated on 16 August 2019 by MOE and MIFT to act as a Transaction Advisor.

2. One of the projects under deployment of the solar program is the Sherabad IPP Solar project that will involve the construction of a solar photovoltaic (PV) plant with a capacity of minimum 200MWac including construction of a new 220/110/10kV substation and new 220 kV double circuit transmission line of length 52 km to connect to the existing Surkhan 220kV substation. The project will be implemented by a Private Partner through a Special Purpose Vehicle (SPV) in Sherabad district of Surkhandarya region.

1.2 ADB and Domestic Environmental Due Diligence

3. **ADB SPS 2009 and domestic requirements.** ADB SPS 2009 sets out the environmental safeguard requirements that apply to all ADB-financed, co-financed, technical assistance/managed projects¹⁵. The due diligence carried out during project preparation confirms the project environment classification as Category B requiring an Initial Environmental Examination (IEE) and Environmental Management Plan (EMP). The project also requires a Biodiversity Action Plan (BAP) and corresponding Biodiversity Management and Evaluation Plan (BMEP) that are enclosed as part of the safeguards documentation for this project.

4. Additionally, the SPV supported by PIC, will approach the State Committee on Ecology and Environment (SCEEP) or the “Goskomekologiya” to establish the project classification for environment as per the national environmental due diligence procedures, also referred to as the State Environmental Expertise (SEE). The environmental requirements as per ADB SPS 2009 and national environmental regulations are set out in detail in **Section 2** of this IEE.

5. **Site visits.** As part of the environmental due diligence, a total of three proposed sites in Surkhandarya region were visited and assessed in November 2019. The walk over survey for the proposed 52 km transmission line was conducted in February 2020. The site selection report and transmission line walk-over survey report are enclosed as **Appendix 1** and **2**. The socio-economic profile for the project area is presented in the project Social Safeguards Due Diligence report (SSDR), and summarized in **Section 4** of the IEE. The objective of the site visits and surveys was to collect primary and secondary data relevant to the project area of influence to establish the environment and socio-economic baseline conditions, identify potential adverse impacts and to inform the project design.

6. **Habitat assessment.** An ecological survey was conducted in March – April 2020. The objective of the assessment was to collect primary and secondary data relevant to the project specific ecological area of analysis to establish the presence of any critical habitats, identify

¹⁵ ADB is providing a partial credit guarantee for the development of this project.

adverse impacts and to inform the project design. Details are included in **Section 4** of this IEE. The findings are enclosed as **Appendix 3**.

7. **Public consultations and focus group discussions.** Meaningful consultations with relevant stakeholders were conducted in November 2019. Records of consultations and findings are discussed in **Section 7** of the IEE. Further consultations will be carried out during detailed design and will continue throughout project implementation.

1.3 Structure of this Report

8. This IEE report follows the format prescribed in ADB SPS 2009. For the purposes of this project, this IEE contains the following:

Part 1

- Section 2 - Policy, Legal and Administrative Framework
- Section 3 - Description of the Project
- Section 4 - Description of the Baseline Environment
- Section 5 - Anticipated Environmental Impacts and Mitigation Measures
- Section 6 - Analysis of Alternatives
- Section 7 - Information Disclosure, Consultation and Participation
- Section 8 - Grievance Redress Mechanism
- Section 9 - Environmental Management Plan
- Section 10 - Conclusion

9. Part 2 to this IEE contains the Environmental Management Plan (EMP) tables with mitigation and monitoring measures that are designed to aid the Project Management Unit (PMU), SPV Project Implementation Unit (SPV PIU) and SPV appointed key contractors / sub-contractors in management of potential adverse environmental impacts. When the final project detailed engineering designs are available, the EMP will be updated and will also include detailed site location maps to support PMU and contractors with preparation of package specific site EMPs (SEMPs) and in environmental monitoring

10. **Annexure 1 and 2** to this IEE contains the Biodiversity Action Plan (BAP) and Biodiversity Management and Evaluation Plan (BMEP) with proposed mitigation and evaluation measures that are designed to aid the PMU, SPV PIU and SPV appointed key contractors in management of potential adverse biodiversity impacts.

11. The BAP includes:

- Baseline and critical habitat status
- Overview of impacts relevant to reptiles
- Framework to achieve no net loss
- Proposed mitigation measures

12. The BMEP includes:

- Monitoring and evaluation procedures for no net loss
 - Field surveys
 - Monitoring and reporting
 - Summary of monitoring and evaluation procedures
 - Indicative annual monitoring budget

2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Environmental Assessment Requirements

2.1.1 Environmental Requirements ADB Safeguard Policy Statement (SPS 2009)

13. Safeguard requirements for all projects funded by ADB are defined in SPS 2009 which establishes an environmental review process to ensure that projects undertaken as part of programs funded through ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements and are not likely to cause significant environment, health, or safety hazards. The SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/BP, October 2013). The policy (principle 9) also promotes adoption of International Good Practices as reflected in the International Finance Corporation's (World Bank Group) Environment, Health and Safety Guidelines - IFC (WBG) EHS Guidelines. This IEE and EMP are intended to meet ADB SPS 2009 requirements.

14. ADB SPS 2009 environmental assessment requirements specify that:

- At an early stage of project preparation, the borrower/client will identify potential direct, indirect, cumulative, and induced environmental impacts on and risks to physical, biological, socioeconomic and cultural resources and determine their significance and scope, in consultation with stakeholders, including affected persons and concerned non-government organizations (NGOs). If potentially adverse environmental impacts and risks are identified, the borrower/client will undertake an environmental assessment as early as possible in the project cycle.
- The assessment process will be based on current information, including an accurate project description and appropriate environmental and social baseline data.
- Impacts and risks will be analyzed in the context of the project's area of influence.
- Environmental impacts and risks will be analyzed for all relevant stages of the project cycle, including preconstruction, construction, operations, decommissioning, and post-closure activities such as rehabilitation or restoration.
- The assessment will identify potential transboundary effects as well as global impacts.
- Assessment encompasses **associated facilities** that are not funded as part of the project (funding may be provided separately by the borrower or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project.
- Assessment encompasses **existing facilities** and/or business activities that already exist (for which) the borrower will undertake an environment and/or social compliance audit, including **on-site assessment** to identify past or present concerns related to impacts on the environment, involuntary assessment and indigenous peoples. The objective of the audit is to determine if actions were in accordance with SPS and to identify and address outstanding compliance issues.

15. Other requirements of ADB SPS 2009 included in the IEE include:

- ▶ Analysis of Alternatives. There is a requirement to examine alternatives to the project's location, design, technology, components and their potential environmental and social impacts and consider the no project alternative. SPS 2009 states that this is only for projects which have "significant adverse environmental impacts that are irreversible, diverse, or unprecedented" i.e., category A projects. This does not apply to this category B projects but is included for completion.

- ▶ Consultation and participation. The borrower/client will carry out meaningful consultation with affected persons and other concerned stakeholders, including civil society and facilitate their informed participation. This IEE includes a Consultation Plan to ensure that the project affected persons, other concerned stakeholders and the civil society can provide meaningful consultations into the project detailed design and implementation.
- ▶ Information disclosure. Environmental information on the project will be translated into Uzbek and Russian language(s) and made available in accessible locations (e.g. project construction field offices, local government offices (“Khokimiyat”), local level community organization recognized official by the Government (“Makhalla”), etc. in accordance with ADB’s Access to Information Policy (September, 2018)¹⁶ and ADB SPS (2009). The draft IEE will be disclosed on ADB’s project website (www.adb.org) prior to Board approval, the final IEE after detailed engineering design and safeguards monitoring reports during implementation.
- ▶ Grievance redress mechanism. The borrower/client will establish a mechanism to receive and facilitate resolution of project affected persons’ concerns, complaints, and grievances about the project’s environmental (and social) performance.
- ▶ Monitoring and Reporting. The Borrower/Client will monitor, measure the progress of implementation of the EMP and safeguards tender requirements for the contractors and report as mandated by the ADB SPS 2009.

16. The IEE covers an area of influence that encompasses: the solar PV plant and transmission interconnection system and the Surkhan substation. The IEE and EMP has been prepared based on the preliminary engineering designs and will be updated where necessary to meet the final project detailed engineering designs. The IEE also considers the effects from cumulative impacts from further planned development of the project and other sources of similar impacts as well as effects from unplanned but predictable developments caused by the project that may occur later or at a different location. Cumulative impacts in this regard are anticipated as a result of this or similar projects in the area; a discussion is included in **Section 5** of this IEE. As a result of this project, it is anticipated that the development of the solar PV plant will lead to further socio-economic developments around the project area.

17. This project gives special consideration to the ecological area of analysis in order to align with the IFC Performance Standards¹⁷, in particular with the Performance Standard 6 or PS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources and the updated Guidance Note (GN6, June 2009).¹⁸ The preliminary design integrates biodiversity conservation measures that are include in the project BAP and BMEP (**Annexure 1 and 2**). These will be further integrated in the final detailed engineering design.

18. This project was also screened and assessed for climate risks and vulnerability following the ADB Guidelines for Climate Proofing Investments in the Energy Sector, May 2013. The preliminary design integrates climate resilience measures such as consideration of wind speed and increases in temperature in project siting and structural design. These will be further assessed and integrated in the final detailed engineering design.

¹⁶ The above has superseded ADB’s Public Communications Policy (2011).

¹⁷ IFC Performance Standards: [Online Link](#).

¹⁸ The ecological area of analysis for the project is based on a 50 km radius around the proposed solar project site including the solar PV plant, new substation, common facilities and proposed transmission line (for approx. 52 km length).

2.1.2 National Environmental Requirements

19. The national environmental due diligence procedures in Uzbekistan is called the State Environmental Expertise (SEE) and regulated by the Law on the Environmental Expertise and the Regulation on State Environmental Expertise (SEE) approved by the Cabinet of Ministry Decree No. 949, dated 22 November 2018. The SEE is a review process conducted by the Center under the State Committee on Ecology and Environmental Protection or SCEEP (“Goskomekologiya”).¹⁹ Figure 3 illustrates the SEE procedures. The Law stipulates four categories of projects as follows:

- Category I — “high risk of environmental impact” (SEE is conducted by the national SCEEP within 20 days, all EIA materials are required)
- Category II — “medium risk of environmental impact” (SEE is conducted by the national SCEEP within 15 days, all EIA materials are required)
- Category III — “low risk of impact” (SEE is conducted by regional branches of SCEEP within 10 days, all EIA materials are required)
- Category IV – “local impact” (SEE is conducted by regional branches of SCEEP within five days, only a draft EIA is required).

20. Category I and Category II projects are approved by the Main Directorate of Center for State Environmental Expertise (SEE) at the national level whereas Category III and Category IV projects are approved by the Regional Directorate of Center for State Environmental Expertise, (“Gosekoexpertiza”).

21. Pursuant to Section 18 of the Regulation on SEE, the project proponent must conduct the EIA assessment process in a staged approach, providing the Main Directorate of Center for State Environmental Expertise / Regional Directorate of Center for State Environmental Expertise with EIA documents for review at three distinct stages of the project.²⁰ Section 14 of the Regulation on SEE outlines the information that should be within the documentation at each of these stages as summarized below.

22. Stage 1. The ‘Draft Statement of the Environmental Impacts (“PZVOS”)’, to be conducted at the planning stage of the proposed project prior to allocation of funds for development. The PZVOS shall include:

- The state of the environment prior to the implementation of the planned activities, the population of the territory, land development, analysis of environmental features
- Situational plan with an indication of the geographical coordinates of the object in question,

¹⁹ SCEEP was formerly called the State Committee on Nature Protection; it was renamed and restructured to SCEEP by the President Resolution No. 5024 'On Improving the System of State Management in the sphere of Ecology and Environmental Protection' of 21th April 2017. State Committee on Ecology and Environmental Protection. SCEEP, formerly called State Committee on Nature Protection, is responsible for environmental protection. The main tasks of the SCEEP are ensuring the implementation of a unified state policy in the field of environmental safety, environmental protection, use and reproduction of natural resources; the implementation of state control over the observance by ministries, state committees, departments, enterprises, institutions and organizations, as well as individuals, in the area of the use and protection of land, mineral resources, water, forests, flora and fauna, atmospheric air; interdisciplinary integrated environmental management; and organization and coordination of work to ensure a favourable state of the environment and improve the environmental situation.

²⁰ The activities of the Center for State Environmental Expertise are directly related to the consideration of materials for EIA and the issuance document on determination of compliance of the planned or carried out business and other activities with environmental requirements and determination of the admissibility of the implementation of the object of environmental expertise.

available recreational areas, settlements, irrigation, land-improvement facilities, farmland, power lines, transport, water, gas pipelines and other information about the area

- The envisaged (planned) main and auxiliary objects, used equipment, technologies, natural resources, materials, raw materials, fuel, analysis of their impact on the environment;
- Expected emissions, discharges, wastes, their negative impact on the environment and ways to minimize them
- Storage, storage and disposal of waste
- Analysis of alternatives to the planned or ongoing activities and technological solutions from the standpoint of nature conservation, taking into account the achievements of science, technology and best practices
- Organizational, technical, technological solutions and measures that exclude negative environmental consequences and reduce the impact of the object of examination on the environment
- Analysis of emergency situations (with an assessment of the likelihood and scenario of preventing their negative consequences)
- Forecast of environmental changes and environmental consequences as a result of the implementation of the object of examination

23. The PZVOS shall be reviewed and approved at the national level (for projects relating to category I and II) or at the regional level (for projects relating to category III and IV) under the SCNP. The SEE confirms the category of the project and identifies the main issues that the project beneficiary shall focus on in the next stages of the environmental assessment process and during the project implementation (construction or rehabilitation works).

24. Stage 2. The 'Concept Statement on Environmental Impacts ("ZVOS") shall be prepared based on conclusions of the SEE on the PZVOS. The Statement must be submitted to the Center for State Environmental Expertise/Regional Center for State Environmental Expertise before approval of the project's feasibility study, and therefore before construction. The SEI shall include:

- Assessment of environmental problems of the selected site based on the results of engineering and geological surveys, model and other necessary studies
- Environmental analysis of technology in relation to identified problems of the site
- Results of public hearings
- Reasoned studies of environmental measures to prevent the negative effects of the implementation of the object of examination

25. Stage 3. The 'Statement of Environmental Consequences ("ZEP") is the final stage in the SEE process shall be conducted before the project is commissioned. The report details the modifications to the project or project design that have been made from the Center for State Environmental Expertise/Regional Center for State Environmental Expertise review during the first two stages of the EIA process, the comments received during public consultations, the environmental norms applicable to the project and environmental monitoring requirements associated with the project and principal conclusions.

26. The Conclusion of SEE shall be valid for three years from the date of its issuance. If the object is not implemented within three years from the date of issue of the Conclusion of the SEE needs to be revised and re-submitted to the SCEEP for revision and approval. The Conclusion of the SEE shall be sent to the relevant Regional (city) control inspections in the field of ecology and environmental protection for control. Such inspections under the SCEEP supervise the compliance with the requirements and conditions specified in the Conclusion of the SEE.

27. The SPV supported by PIC, will approach the State Committee on Ecology and Environment (SCEEP) or the “Goskomekologiya” to establish the project classification for environment as per the national environmental due diligence procedures, also referred to as the State Environmental Expertise (SEE). The SPV will prepare the environmental due diligence documentation at detailed engineering design stage pursuant to Section 18 of the Regulation on SEE for clearance and approval.

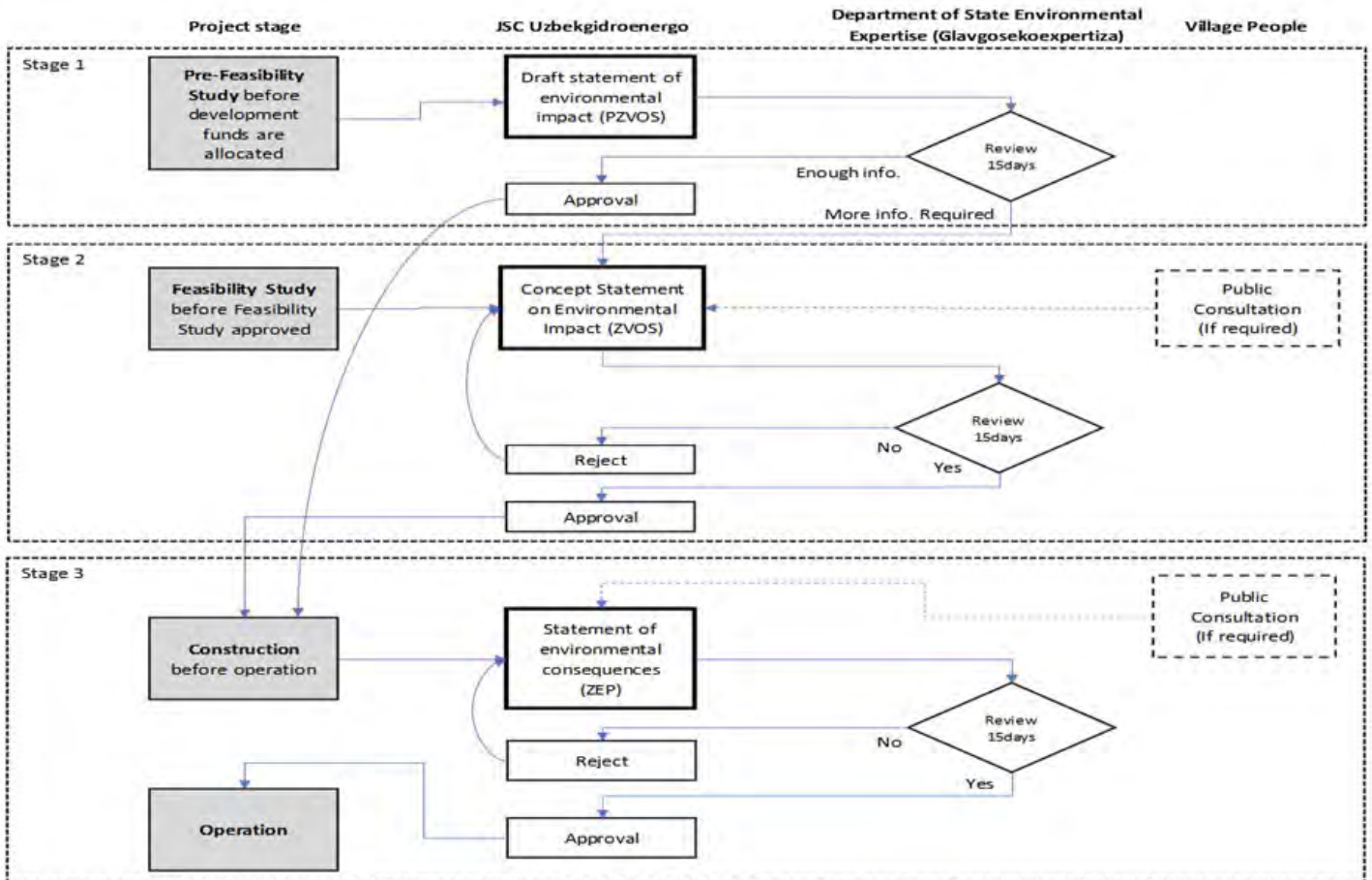


Figure 2 State Environmental Expertise Procedures²¹

²¹ Source: ADB Initial Environmental Examination Guzar-Regar 500 kV Power Transmission Line Rehabilitation Project (Draft, April 2020).

2.2 National Environmental Policy and Legislation

2.2.1 Legislation for Environmental Management

28. Uzbekistan has created a legal framework in the field of environmental protection and environmental management, which is designed to ensure the rights and obligations of citizens enshrined in Articles 50 and 55 of the Constitution of Uzbekistan. These are more than 100 laws, about 50 Decrees of the President and Decrees of the Cabinet of Ministers of the Republic of Uzbekistan and other by-laws and regulatory documents. A list of Uzbekistan's environmental legislation relevant to the project is shown in Table 1 and a brief summary provided below.

Table 1 List of Environmental Laws Relevant to the Project

Year	Law / Regulation	Last revision
08.12.1992	Constitution of Uzbekistan	16.04.2014
09.12.1992	Law "On nature protection"	18.04.2018
06.05.1993	Law "On water and water use"	23.07.2018
25.05.2000	Law "On Environmental Expertise";	14.09.2017
03.12.2004	Law "On Specially Protected Areas"	14.09.2017
26.12.1997	Law "On protection and use of flora"	21.09.2016
26.12.1997	Law "On protection and use of fauna"	19.09.2016
27.12.1996	Law "On air safety"	14.09.2017
05.04.2002	Law "On wastes"	10.10.2018

29. **Constitution of Uzbekistan.** In accordance with the Constitution of the Republic of Uzbekistan, land, subsoil, water, flora and fauna and other natural resources are national wealth, subject to rational use and protected by the State.

30. **Law on environmental expertise.** Environmental impact assessment in Uzbekistan is called State Environmental Expertise (SEE). SEE is regulated by this law approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 491 dated December 31, 2001 and No.949, dated November 22, 2018.

31. **Law on nature protection.** This law regulates the legal relationship between the bodies of the State authority and the physical persons or legal entities (without distinction-legal form) in the field of environmental protection and in the use of nature on all Uzbekistan's territory including its territorial waters, airspace, continental shelf and special economic zone. The law defines the principles and norms of legal relations, rights and obligations and responsibilities, awareness raising, education and scientific research in the field of environment, key players and principles of environmental management; describes economical mechanisms and levers; ecological insurance; basics of environmental audit; environmental requirements during privatization; justifies needs of environmental standards and limits (air, water, soil, noise, vibration, fields, radiation) and ecological requirements for production, transportation and storage of goods and food products; ecological requirements applicable to waste; states necessity of environmental impact assessment and related issues (strategic environmental protection and transboundary environment assessment) referring to Environmental Assessment Code; defines general principles of environmental protection; considers different aspects on protection of ecosystems, protected areas, issues of global and regional management, protection of ozone layer, biodiversity and international cooperation aspects. As stated in the law, in order to protect the climate against the global changes, the subject of the business activity is obliged to observe the limits to greenhouse gas emissions as well as to take measures for mitigating this emission.

32. **Law on water and water use.** This law regulates water use, defines rights and obligations of water users, sets out the types of licenses for the use of water, the rules and conditions of their issuance, considers conditions of suspension, withdrawal and deprivation of license, regulates water flows. The law states liability of all natural and legal persons to prevent pollution of catchment basins, water reservoirs, snow and ice covers, glaciers, permanent snow cover with industrial, household and other wastes and emissions which may cause deterioration of the underground water quality; prohibits piling of industrial and household wastes near the public water headwork's and in their sanitation protection zones, bans construction of facilities and implementation of any other activity which may cause water pollution; sets requirements for forest use within water protection zones. The state management of water protection and use is exercised through accounting, monitoring, licensing, control and supervision.

33. **Law on air safety.** The law regulates protection of atmospheric air from man-caused impact. Pollution of atmospheric air is emission of hazardous substances originating from activities which are able to have negative impact on human health and environment. Maximum permitted limits for concentration of hazardous substances into the atmospheric air are defined for each contaminant and represent maximum concentration of hazardous pollutants, in averaged time span, recurring action of which has not have negative impact on human health and environment.

34. **Law on State Sanitary Supervision – No. 657-XII of March 7, 1992 (as amended on September 3, 2010).** It regulates social relations in the field of sanitary-epidemiological well-being and radiation safety, the right of people to a healthy environment and other related rights, guarantees and guarantees for their realization.

35. **Law on waste.** This law provides the legal conditions for implementation of measures aiming at prevention of generation of waste and increased re-use, environmentally sound treatment of waste (including recycling and extraction of secondary raw materials, as well as safe disposal). Law on Waste No.362-II of April 5, 2002 (modified January 4, 2011). This law states that citizens have the right to a safe and healthy environment, to participate in the discussion of projects, and compensation for damage to their life, health or property.

36. **Law on specially protected areas.** This law forms a legal basis for planning, establishment and maintenance and assignment of categories of protected areas, described funding issues for each category. It specifies ownership forms of land and other natural resources in protected areas, allowed and prohibited activities.

37. **Law on protection and use of flora.** This law regulates protection and usage of flora growing in natural condition, as well as in cultivation and its reproduction and conservation of gene pool of wild plants. The Cabinet of Ministries, local government bodies and special authorized agencies implement the law. State Committee of Nature Protection (SCNP) and Head Department of Forestry under the Ministry of Agricultural and Water Resources are the special authorized agencies in flora protection and its usage. The Cabinet of Ministries, SCNP, local government bodies and Head Department of Forestry are responsible for implementing on the national level the administration of the law.

38. **Law on protection and use of fauna.** This Law regulates relations in the field of protection and use of wild animals living in a state of natural freedom on land, water, atmosphere and soil, constantly or temporarily inhabiting the territory of the Republic of Uzbekistan, as well as contained in semi-free conditions or artificially created habitat for scientific or nature protection goals.

39. A list of Uzbekistan's social legislation relevant to the project is shown in Table 2 and a brief summary provided below.

Table 2 List of Social and Land Ownership Related Laws Relevant to the Project

Year	Law / Regulation	Last Revision
29.08.1996	Civil code of Uzbekistan	18.04.2018
21.12.1995	Labor code	16.10.2018
30.04.1998	Land Code	24.07.2018
13.01.1992	Law on Employment	03.01.2018
30.08.2001	Law on cultural heritage	18.04.2018
29.08.1996	Law on Public Health	13.06.2017
01.08.2018	Decree of the President of the Republic of Uzbekistan №5495 on measures on cardinal improvement of investment climate in the republic of Uzbekistan.	01.08.2018
29.05.2006	Resolution of Cabinet of Ministers № 97 on compensation for losses to individuals and legal entities due to seizure of land plots for state and public needs	29.05.2006
25.05.2011	Resolution of Cabinet of Ministers № 146 on improve the procedure of granting land plots, protect the rights of legal entities and individuals on land and improve the architecture of settlements and the efficient use of their settlements land for construction.	25.05.2011
16.06.2018	Resolution of Cabinet Ministers №3857 on measures to improve the effectiveness of training and realizing projects with participation of international financial institutions and foreign government financial organizations.	16.06.2018

40. Civil Code defines the legal status of participants of civil relations, the grounds and procedure of implementation of property rights and other proprietary rights, rights on intellectual property, regulates the contractual and other obligations, as well as other property and related personal non-property relations. The Civil Code defines general rules of property seizure, determination of property cost and rights for compensation, terms of rights termination.

41. **Labor code and law on employment.** These two documents are main legislations regulating labor relations of individuals employed with labor contract by enterprises, institutions, organizations of all type ownership form, including contracted by individuals. These legislations are considering interests of employees and employers provide efficient function of labor market, just and secure labor conditions, protection of labor rights and employees health, promote to growth of labor productivity, increase of work quality, raising on this matter welfare and social livelihood level of the population.

42. **Land Code.** The Land Code is the main regulatory framework for land related matters in Uzbekistan. The land code regulates allocation, transfer and sale of land plots, defines ownership and rights on land. It describes responsibilities of different state authorities (Cabinet of Ministers, region, district and city Khokimiyats) in land management; rights and obligations of land possessor, user, tenant and owner; land category types, land acquisition and compensation issues, resolution of land disputes and land protection. The land code also defines the terms of rights termination on land plot, seizure and land acquisition of land plot for state and public needs, and terms of seizure of land plot in violation of land legislation.

43. **Law on Public Health.** The main objectives of legislation on the protection of public health are: guaranteeing the rights of citizens to health care from the state; the formation of a healthy lifestyle of citizens; legal regulation of the activities of state bodies, enterprises, institutions, organizations, public associations in the field of public health.

44. **Resolution of Cabinet of Ministers № 97.** This resolution regulates compensation for losses to individuals and legal entities due to seizure of land plots for state and public needs. This regulation is mainly dealing with land plots, houses, building and structures of individuals and legal entities. The resolution determines the procedure for seizure of land or part thereof, as well as the procedure for calculating the amount of compensation to individuals and legal entities for the demolished residential, industrial and other buildings, structures and plantings in due to seizure of land for state and public needs.

45. **Resolution of Cabinet of Ministers No. 146.** This Resolution is aimed to improve the procedure of granting land plots, protect the rights of legal entities and individuals on land and improve the architecture of settlements and the efficient use of their (settlements) land for construction in accordance with the Land Code and the Town Planning Code. This resolution has approved two Regulations: (i) Regulation on the procedure for granting land for urban development and other non-agricultural purposes, (ii) Regulation on the procedure of compensation for land possessors, users, tenants and owners, as well as losses of agriculture and forestry.

46. **Resolution of Cabinet Ministers No. 3857.** The resolution “On measures to improve the effectiveness of training and realizing projects with participation of international financial institutions and foreign government financial organizations” partly provides that payment of compensation for the land acquisition, demolition of houses, other structures, plantings within the framework of projects with the participation of International Financial Institutions (IFIs), if it is agreed and stated in agreements, then will be carried out by authorized bodies in accordance with the requirements of IFIs or Foreign Governmental Finance Organizations.

47. **Decree of the President of the Republic of Uzbekistan No. 5495.** Decree “On measures on cardinal improvement of investment climate in the republic of Uzbekistan” partly provides that the adoption of decisions on the seizure of land for state and public needs is allowed only after an open discussion with interested parties whose land plots are planned to be seized, as well as assessing the benefits and costs; demolition of residential, industrial premises, other structures and structures belonging to individuals and legal entities, with the withdrawal of land plots is allowed after the full compensation of the market value of immovable property and losses caused to owners in connection with such withdrawal.

48. Law on Cultural Heritage sets out procedures for protection of cultural heritage and permitting arrangements for archaeological investigations. The purpose of this Law is to regulate relations in the field of protection and use of cultural heritage objects, which are the national property of the people of Uzbekistan.

2.2.2 Environmental Regulations and Standards

49. Ambient Air Quality Standards, or Maximum Permissible Emissions (MPCs), established by SanPiN 0293-11 (May 16, 2011) is shown in Table 3. According to the United Nations

Environment Program (UNEP), these standards are aligned with World Health Organization (WHO) standards.²² The most stringent standards apply.

Table 3 National Air Quality Maximum Permissible Concentrations (MPCs)

Parameter	UZB Air Quality ²³ MPC (µg/m ³)	WHO Air Quality Guidelines (µg/m ³)	Applicable Standards as per ADB SPS ²⁴ (µg/m ³)
Particulate Matter PM10	150 - 500 (30 min) 100 (24-hr) 80 (monthly) 50 (annual)	20 (annual) 50 (24-hr)	20 (annual) 50 (24-hr)
Particulate Matter PM2.5	150 - 500 (30 min) 100 (24-hr) 80 (monthly) 50 (annual)	10 (annual) 25 (24-hr)	10 (annual) 25 (24-hr)
Nitrogen Dioxide (NO ₂)	85 (30 min) 60 (24-hr) 50 (monthly) 50 (annual)	40 (annual) 200 (1-hr)	40 (annual) 200 (1-hr)
Nitrogen Oxide (NO)	60 (30 min) 250 (24-hr) 120 (monthly) 60 (annual)		
Sulphur Dioxide	500 (30 min) 200 (24-hr) 100 (monthly) 50 (annual)	500 (10 min) 20 (24-hr)	50 (annual) 20 (24-hr) 500 (10 min)
Carbon Monoxide (CO)	4000 (24-hr) 3500 (monthly) 3000 (annual)		3000 (annual) 4000 (24-hr)

50. Noise Standards established by SanPiN No. 0267-09, is used for residential/commercial areas in Uzbekistan. Evaluation of the sound level at the calculation point is performed for the day and night period of the select day (from 7 to 23 hours and from 23 to 7 hours) and takes into account the maximum intensity of the sound (source) level during the half-hour period. Noise standards established by SanPiN No. 0120-01 (“Sanitary norms and rules to ensure acceptable noise levels in the workplace”), is used for health of staff in the workplace. The standards are shown in Table 4.

²² These rules and regulations establish permissible noise parameters in residential, public buildings and residential buildings of populated areas created by external and internal sources, as well as general requirements for measurements, measurement methods and hygienic noise assessment at research sites.

²³ Note: Uzbekistan labels particulate emissions as dust.

²⁴ As per ADB SPS, the borrower / project proponent shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the implementing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 4 Noise limits from SanPiN No. 0267-09 and SanPiN No. 0120-01

Receptor/ Source	UZB Noise Level Standards		WHO Guidelines Value For Noise Levels		Applicable Per ADB SPS ²⁵	
	(30 min LAeq in dBA)		(One Hour LAeq in dBA)		(dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	80 ²⁶	80	70	70	70	70
Commercial area	55	45	-	-	55	55
Residential Area	55	45	55	45	55	45
Silent Zone	-	-	-	-	-	-

* LAeq- equivalent average sound pressure level

51. The German Standard DIN 4150-3 – Vibration in Buildings – Part 3. Effects on structures provides short term and long-term limits²⁷ for vibration at the foundation for various structures. These standards are considered international best practice and will be followed as part of the project as shown in Table 5.

Table 5 Guideline Values for Vibration Velocity to be Used When Evaluating the Effects of Short-term and Long-term Vibration on Structures²⁸

S. No	Type of structure	Guideline Values for Velocity (mm/s)				
		Short-term			Long-term	
		At foundation			Uppermost Floor	Uppermost Floor
		Less than 10 Hz	10 Hz to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	10

²⁵ As per ADB SPS, the borrower / project proponent shall achieve whichever of the noise standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the implementing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

²⁶ Performance of all types of work at permanent workplaces in industrial premises and at enterprises operated since March 12, 1985.

²⁷ Short-term vibrations are defined as those that do not occur often enough to cause structural fatigue and do not produce resonance in the structure being evaluated and long-term vibrations are all the other types of vibration. DIN 4150-3 notes that “experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible. Exceeding the value in the table does not necessarily lead to damage”.

²⁸ DIN 4150-3, Structural Vibration, Part 3: Effect of vibration on structures.

S. No	Type of structure	Guideline Values for Velocity (mm/s)				
		Short-term			Long-term	
		At foundation			Uppermost Floor	Uppermost Floor
		Less than 10 Hz	10 Hz to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
2	Residential dwellings and buildings of similar design and/or use	5 (105 dB)	5 to 15	15 to 20	15	5 (105 dB)
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3 (100.5 dB)	2 to 8	8 to 10	8	2.5 (99.0 dB)

52. Water quality standards given as Maximum Permissible Concentrations (MPC), is established by SanPiN No. 0172-06 and has two categories: a) first category is for centralized or non-centralized drinking water supply; b) second category is for cultural and everyday purposes of the population, recreation, and sports. There are no water quality standards for treated sanitary sewage discharges (from construction), therefore, the following standards in Table 6 shall apply:

Table 6 WBG Indicative Values for Treated Sanitary Sewage Discharges

Pollutant	Unit	National MPC	WBG Guideline Value for sanitary sewage discharge	Applicable Standards as per ADB SPS 2009
pH	pH	6.5–8.5	6–9	6–9
Biological Oxygen Demand (BOD)	MgO/l	Fisheries water bodies – 3 Cultural Household – 3-6 Household Drinking – 3-7 Irrigation – 10	30	30
Chemical Oxygen Demand (COD)	Mg/l	Fisheries water bodies – 15 Cultural Household – 40 Household Drinking – 30 Irrigation – 40	125	125
Total Nitrogen	Mg/l	Fisheries water bodies – 9.1 Cultural Household – 25 Household Drinking – 45 Irrigation – 25	10	10

Pollutant	Unit	National MPC	WBG Guideline Value for sanitary sewage discharge	Applicable Standards as per ADB SPS 2009
Total Phosphorus	Mg/l	Fisheries water bodies – 15 Cultural Household – 40 Household Drinking – 30 Irrigation – 40	2	2
Oil and Grease	Mg/l	Fisheries water bodies – 0.05 Cultural Household – 0.3 Household Drinking – 0.1 Irrigation – 0.3	10	
Total Suspended Solids	Mg/l	Fisheries water bodies – 15 Cultural Household – 30 Household Drinking – 30 Irrigation – 50	50	
Total Coliform Bacteria	MPN ^A / 100 ml	-	400	

53. Other key regulations relating to water quality and use for the Project include: Hygiene requirements for the protection of surface waters in Ruz SanR&N No 0172-04 Main criteria for hygienic assessment of the level water bodies contamination for health risks population in Uzbekistan (SanR&N No 0255-08).

54. **Solid waste.** The project will comply with the Law on Waste No.362-II (dated, April 5, 2002 and modified January 4, 2011) that regulates solid waste treatment procedures and defines the authority of various institutions involved in solid waste management. The law also provides rules for the transport of solid waste. Regulation Document on Order of endorsement and approval of projects of wastes disposal and limits for its disposal (RH 84.3.22:2006) shall also apply.

55. **Hazardous waste.** The project will comply with the provisions approved by the SCEEP, the Ministry of Health No. 2438 dated March 20, 2013, for hazardous waste specifically for placement of hazardous chemicals and hazardous materials in special landfills, their protection, transport and disposal.

56. Hazardous wastes that are transported must undergo environmental certification and be transported by special vehicles for disposal. The SCEEP and the Ministry of Health also provide approvals i.e. ‘proper performance of work’ for hazardous materials generated. The transportation and disposal of hazardous waste is under the purview of the State organization “Qishloqxujalikkimyo” (Agricultural Chemicals). Transportation of such materials should be carried out in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 35 (dated February 16, 2011) “On rules of transportation of hazardous materials in the territory of Uzbekistan”.

2.3 Uzbekistan Electrical Rules and Regulations

57. **Sanitary protection zone.** In order to protect the population from the effects of the electric field created by overhead power lines, sanitary protection zones (SPZ) are established as per

SanPiN No. 0236. The SPZ is defined as the territory along the high-voltage line in which the electric field exceeds 1 kV / m.

58. For newly designed overhead lines as well as buildings and structures, the SPZ is established along the horizontal arrangement of high voltage wires and without means of reducing the electric field strength on both sides of the ROW center-line. The distances corresponding to the projection onto the ground of the outer phase wires in a direction perpendicular to the overhead line are as follows. Vertical height:

- 15 m – for overhead lines with a voltage of 220 kV
- 20 m – for overhead lines with a voltage of 330 kV
- 30 m – for overhead lines with a voltage of 500 kV
- 40 m – for overhead lines with a voltage of 750 kV
- 55 m – for overhead lines with a voltage of 1150 kV

59. The typical values for ROW are as follows.

- 22 m – for overhead lines with voltage 110 kV
- 27 m – for overhead lines with a voltage of 132 kV
- 35 m – for overhead lines with a voltage of 220 kV

60. Design clearances and height for the transmission line are as regulated by the State Technical Design Standards (GOST) and the Electrical Installation Code (EIC) Rules, which are mandatory for all transmission line projects in Uzbekistan²⁹.

2.4 Permits and Licences

61. The required permits and licenses are listed in Table 7.

Table 7: Required Permits and License

Permit Required Activity	Permit Title	Issuing Authority	Implementing Law	Responsible Party for Obtaining License
Design and Pre-construction				

²⁹ The characteristics of supports, foundations of supports, wires, cables, earthing, insulators and even connection fittings are standardized by the GOST.

Permit Required Activity	Permit Title	Issuing Authority	Implementing Law	Responsible Party for Obtaining License
For Construction activities	Construction Permit	Local Khokimiyat	Resolution of the Oliy Majlis of the Republic of Uzbekistan "On the list of activities for which a license is required" No. 222-II of May 12, 2001. Resolution of the Cabinet of the Republic of Uzbekistan No. 54 of February 25, 2013. Appendix 1 "Regulations on the procedure for granting land plots in populated areas for the implementation of urban planning activities of design and registration of construction objects, as well as the acceptance into operation of objects"	SPV
For construction activities	Environment Decision	Goskomekologiya	Law On Nature Protection (1992) PKM RUz No. 949 of November 22, 2018. "On Approval of the Regulation on State Environmental Expertise"	SPV
For Construction activities	Cultural Heritage Clearance	Ministry of Culture of Uzbekistan	Law on the Protection and Use of Cultural Heritage Objects (2001) The Law "On Protected Natural Territories" with amendments and additions, December 3, 2004.	SPV
For Construction activities	Visual geological-engineering conclusion	O' zGASHKLITI	Decree of the Cabinet of Ministers (DCM) Ruz No. 222 "On Improving the System of Permitting Procedures and State Supervision in the Sphere of Urban Planning" - Urban Development Code of the Republic of Uzbekistan	SPV
Hazardous materials transport and storage	Hazardous materials permission	"Qishloqxujalikki myo" (Agricultural Chemicals)	The Order No. 2438 of March 20, 2013.	SPV
For Construction activities	SPZ permits	Relevant Regional Khokimiyats SES	DCM (Decree of the Cabinet of Ministers) No. 981 dated December 11, 2019 "On	SPV

Permit Required Activity	Permit Title	Issuing Authority	Implementing Law	Responsible Party for Obtaining License
		(sanitary and epideological service), and relevant Regional Department of Ecology and Environmental Protection	approval of the Regulation on the procedure for establishing water protection zones and zones of sanitary protection of water bodies on the territory of the Republic of Uzbekistan”	
Construction Phase				
Underground water abstraction	Mineral extraction license	State Committee on Geology and Mineral Resources	DCM number 546 of July 1, 2019. Regulations On measures to further improve the procedure for issuing licenses for the right to use subsoil areas containing non-metallic minerals	SPV / Contractor
Construction or upgrade of access roads, if any	Approval of construction or upgrade activities	State Inspectorate for quality control of roads and construction works under the Cabinet of Ministers of the Republic of Uzbekistan	Law of the Republic of Uzbekistan “On Automobile Roads”	SPV / Contractor
Transportation of oversized and overweight cargo	Transportati on permit	State Committee of the Republic of Uzbekistan on highways	DCM RUz No 11 of January 11, 1995. On the procedure for the entry, stay, transit and departure of foreign road carriers from the territory of Uzbekistan ”	SPV / Contractor
Spoil disposal, if required	Spoil disposal approval	Goskomekologiya Waste department	Law "On Subsoil" of May 8, 2012	SPV / Contractor

2.5 Comparison of ADB SPS 2009 and National Environmental Regulatory Requirements

62. The Government of Uzbekistan national environmental review and clearance procedures generally conforms to the intent of ADB SPS 2009. Comparison of environment requirements as undertaken by ADB and the national regulatory authority are shown in Table 8. While ADB SPS 2009 environmental assessment requirements and Uzbekistan national legal requirements address the same topics, ADB SPS 2009 requirements are more detailed.

Table 8 Comparison of ADB SPS 2009 and National Environmental Regulatory Requirements

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
Screening and Categorization				
	<ul style="list-style-type: none"> • Assigns categories based on potential adverse impacts: <ul style="list-style-type: none"> - Category A – Environmental Impact Assessment (EIA) required (irreversible, diverse or unprecedented adverse environmental impacts) - Category B – Initial Environmental Examination (IEE) required - Category C - no environmental assessment required but a review of environmental implications is required - Category FI – Environment and Social Management System (ESMS) is required • Checklists prepared and completed by the project proponent to be submitted 	<ul style="list-style-type: none"> • The national environmental impact assessment procedures in Uzbekistan is called the State Environmental Expertise (SEE)³⁰ • The law stipulates four categories of projects as follows: <ul style="list-style-type: none"> ➤ Category I – “high risk of environmental impact” (SEE is conducted by the national SCEEP within 20 days, all EIA materials are required) ➤ Category II – “medium risk of environmental impact” (SEE is conducted by the national SCEEP within 15 days, all EIA materials are required) ➤ Category III – “low risk of impact” (SEE is conducted by regional branches of (SCEEP) 	<ul style="list-style-type: none"> • no gaps. 	<ul style="list-style-type: none"> • Sector-specific REA checklist for screening and categorization of project conducted at the earliest stage of project cycle to establish categorization. • Assessment process (SEE) for categorization of project conducted at the earliest stage of the project cycle as per a staged approach

³⁰ SEE is a review process conducted by the Center under the State Committee on Ecology and Environmental Protection or SCEEP (“Goskomekologiya”).

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	to ADB for concurrence or approval.	<p>within 10 days, all EIA materials are required)</p> <ul style="list-style-type: none"> ➤ Category IV – “local impact” (SEE is conducted by regional branches of SCEEP within five days, only a draft EIA is required). 		
Assessment of Potential Impacts				
	<p>For Category A or Category B projects:</p> <ul style="list-style-type: none"> • Identify potential impacts on physical, biological, ecological and human environment in the context of project's area of influence (i.e., primary subproject site and supporting services, associated facilities) and audit of existing facilities 	<ul style="list-style-type: none"> • Undertake assessment of potential impacts (SEE) as per recommendations of SCEEP 	<ul style="list-style-type: none"> • For the purposes of the EIA / IEE, an assessment of potential impacts needs to be carried out. However, Government framework does not prescribe detailed due diligence or environmental audit to check project Associated Facilities or Existing Facilities to determine whether they could cause, or is causing, environmental risks and impacts. 	<ul style="list-style-type: none"> • For Category A or Category B type project, as per ADB SPS 2009: <ul style="list-style-type: none"> – Define project area of influence – Conduct assessment of potential impacts – Due diligence or environmental audit will be undertaken for any project Associated Facilities and/ or Existing Facilities • Undertake appropriate studies (SEE) for assigned category as per recommendations of SCEEP.
Preparation of Safeguard Plans and Documents and Obtaining Permits and Licenses				

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	<ul style="list-style-type: none"> • For Category A or Category B project <ul style="list-style-type: none"> - Draft and final EIA / IEE for project in line with ADB SPS 2009 and National environmental regulatory requirements • Submit to ADB for approval and clearance, prepare EIA 	<ul style="list-style-type: none"> • Category I and Category II projects are approved by the Main Directorate of Center for State Environmental Expertise at the national level, whereas Category III and Category IV projects are approved by the Regional Directorate of Centres for State Environmental Expertise, (“Gosekoexpertiza”). 	<ul style="list-style-type: none"> • No gap 	<ul style="list-style-type: none"> • For Category A project as per ADB SPS 2009, draft EIA will be prepared taking detailed design considerations such as site layout, site geo-tech investigations outcomes, site water quality analysis, site topo-survey details / contour gradients, and KMZ/KML files that will be cleared by the NEGU technical committee. • For Category B project, as per ADB SPS 2009, draft IEE will be prepared based on preliminary design and then submitted to ADB for review and approval. Following the detailed design, a final IEE should be prepared and submitted for ADB review and approval prior to any contract award. In both cases, recommendations from the IEE such as key environmental considerations in site layout, design or technical specifications can be integrated into the detailed design. • Obtain environmental clearance for assigned Category type project from the Center for State Environmental Expertise.
Analysis of Alternatives				

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	<ul style="list-style-type: none"> • For projects with potential significant adverse impacts (i.e., Category A) • Also considered for Category B projects • Examine alternatives to the project's location, design, and technology 	<ul style="list-style-type: none"> • Alternative assessments may be carried out as per request of the Center for State Environmental Expertise. 	<ul style="list-style-type: none"> • This is not mandatory as per the national environmental regulatory requirements but may be asked for by SCEEP 	<ul style="list-style-type: none"> • Analysis of alternatives including the “no project” scenario will be carried out.
Meaningful Consultation				
	<ul style="list-style-type: none"> • Starts early and continues during implementation • Undertaken in an atmosphere free of intimidation • Gender inclusive and responsive • Tailored to the needs of vulnerable groups • Allows for the incorporation of all relevant views of stakeholders 	<ul style="list-style-type: none"> • Public consultations are not required during Stage 1 - Draft of Concept Statement (PZVOS). • Public consultations may be required if deemed necessary during Stage 2 - Concept Statement on Environmental Impacts (ZVOS) and Stage 3 – Statement of Environmental Consequences (ZEP) 	<ul style="list-style-type: none"> • The public consultation as per Government mandate starts at a later stage in the project cycle and only conducted if deemed necessary while under ADB SPS it starts early in the project cycle and continues throughout project implementation. 	<ul style="list-style-type: none"> • Initiate meaningful consultations at the earliest stage of the project cycle and continue during implementation. • Integrate findings from consultations into subproject detailed design.
Information Disclosure				

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	<p>ADB will post in its website the following:</p> <ul style="list-style-type: none"> - Draft EIA / IEE prior to loan appraisal - Final or updated EIA / IEE upon receipt (due to change in scope or project detailed design) - Corrective action plan prepared during subproject implementation, if any - Environmental monitoring reports (quarterly progress / semi-annual / annual monitoring reports submitted by the PMU upon receipt) 	<ul style="list-style-type: none"> - Conducting of public consultation is not mandatory. It may be conducted, if required at the time of the EIA (second stage of EA). Advertisement on conduction of public consultation have to be announced in the media. 	<ul style="list-style-type: none"> • Public consultations will be carried out with the stakeholders, affected people, NGOs for all Category A, B and C subprojects, in line with the ADB requirements. Questions and concerns raised during public consultations will be reflected in EMP documents. The feedback received from the Public Consultations will be used to finalize and disclose the E&S instruments. 	<ul style="list-style-type: none"> • Follow information disclosure requirements as per ADB SPS 2009
Grievance Redress Mechanism				
	<p>Establish a mechanism to receive and facilitate resolution of grievances or complaints</p>	<p>Grievance Procedures. Each state agency/ministry must follow to detail instructions (approved by the government) on registering and reviewing the concerns and claims from citizens. New opportunities for claims are provided by virtual Government websites platforms.</p>	<p>No reconciliation is needed. However, the existing grievance mechanism may be further strengthened with further supplementary measures</p>	<p>To comply with ADB SPS 2009, a project specific mechanism for redressal will be set as described in Section X of this IEE.</p>
Use of Environmental Standards				

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	<ul style="list-style-type: none"> Refers to IFC (WBG) EHS 2007 If national regulations differ from the above, more stringent standards will be followed If less stringent levels are appropriate in view of specific project circumstances, provide full and detailed justification 	<ul style="list-style-type: none"> The national environmental regulatory standards are followed as per law for all projects 	<ul style="list-style-type: none"> The limiting value of some pollutants specified in the Government national environmental regulatory standards maybe different than those specified in IFC (WBG) EHS 2007 guidelines and hence some gaps in certain situations. 	<ul style="list-style-type: none"> For purpose of applicability of environmental standards, the most stringent environmental standards to be followed. The environmental standards that will apply to the project has been set out in Section 2 of this IEE.
Procurement and Contract Award				
	<p>No contract award until:</p> <ul style="list-style-type: none"> Environmental clearances by the SEIAA have been obtained IEE and EMP has been finalized, cleared by ADB, and disclosed to public IEE and EMP, other safeguard requirements are included in bidding documents and civil works contracts EMP implementation is reflected in the Project Administration Manual. 	-	-	Follow steps for procurement and contract award as per ADB SPS 2009.
Monitoring and Reporting				
	<ul style="list-style-type: none"> Prepare monitoring reports on the progress of 	There are no requirements on environmental monitoring with	• gap	<ul style="list-style-type: none"> Follow steps for monitoring and reporting as per ADB SPS 2009

S. No	ADB	Government of Uzbekistan	Gap	Tasks to bridge gaps to meet ADB SPS and the requirements of this IEE (By PMU)
	<p>EIA/ IEE and EMP implementation</p> <ul style="list-style-type: none"> • Prepare and implement corrective action plan if non-compliance is identified • Submit quarterly, semi-annual, and annual monitoring reports to ADB for review and approval. • ADB supervision mission to review safeguards implementation 	<p>specification of monitoring parameters and location.</p>		<p>and Government mandated rules.</p> <ul style="list-style-type: none"> • Monitoring and reporting requirements are set out in the project EMP (Section 9 of the IEE).

2.6 International Agreements, Best Practices and Standards

2.6.1 International Finance Corporation (World Bank Group) Environment, Health and Safety Guidelines

63. **Best practices.** ADB SPS 2009 (Principle 9) requires that during the design, construction, and operation of the project, the Borrower/ Client will apply pollution prevention and control technologies and practices consistent with International Best Practice, as reflected in internationally recognized standards of the International Finance Corporation's (World Bank Group) Environmental, Health and Safety Guidelines ("EHS Guidelines") and World Health Organization (WHO) and IFC Performance Standards³¹. The relevant IFC (WBG) EHS Guidelines are referenced in the project EMP such as IFC (WBG) Industry Sector EHS Guidelines for Electric Power Transmission and Distribution (2007)³²; and Environmental Guidelines on Air Emissions and Ambient Air Quality, Noise Management, Wastewater and Ambient Water Quality, Hazardous Material Management and Waste Management as well as Occupational Health and Safety and Community Health and Safety (2007) and Guidance Note on Workers Accommodation: Processes and Standards, August 2006³³. The relevant IFC PS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources and the updated Guidance Note (GN6, June 2009) are referenced in the project BAP and BMEP.

64. **Labor standards.** ADB is committed to due consideration of Core Labor Standards (CLS) in the design and implementation of investment projects. A CLS handbook has been developed by ADB with cooperation of International Labor Organization (ILO). The project proponent will also ensure compliance to applicable CLS of ADB-ILO and guidance note on managing risks from COVID-19 on construction sites and in construction (workers) camps/accommodation (included in Part III of the project EMP) during project implementation including:³⁴

- ▶ Freedom of association and the effective recognition of the right to collective bargaining
- ▶ Elimination of all forms of forced or compulsory labor
- ▶ Effective abolition of child labor
- ▶ Elimination of discrimination in respect of employment and occupation

65. The project does not fall within ADB Prohibited Investment Activities List (PIAL) in Appendix 5 of ADB SPS 2009.

2.6.2 International Agreements

66. **International agreements.** Uzbekistan is signatory to international agreements and protocols on environment, social, safety and occupational issues that are relevant for the project. The list of the international agreements is provided Table 9.

³¹ IFC Performance Standards: [Online Link](#).

³² [IFC \(WBG\) Industry Sector Guidelines for Electric Power Transmission and Distribution](#).

³³ [IFC Guidance Note: Workers Accommodation](#).

³⁴ Asian Development Bank and International Labor Organization. Core Labor Standards, October 2006.

Table 9: International Agreements

S. No	International Conventions and Treaties	Date of ratification	Date of coming into force for Uzbekistan
1	UN Framework Convention on Climate Change	20 June 1993 (acceptance)	21 March 1994
2	Kyoto Protocol	20 October 1999	16 February 2005
3	Montreal Protocol on Substances that Deplete the Ozone Layer (with London, Copenhagen, Montreal amendments)	18 May 1994 (succession) London - 01.05.1998; Copenhagen - 01.05.1998; Montreal - 07.09.2006.	18 May 1993 London - 08.09.1998; Copenhagen - 08.09.1998; Montreal -
4	Vienna Convention on the Protection of Ozone Layer	18 May 1993 (succession)	18 May 1993
5	Ramsar Convention on Wetlands of International Importance Especially as Wildlife Habitat	30 August 2001 (accession)	8 February 2002
6	United Nations (Rio) Convention on Biological Diversity	6 May 1995 (accession)	17 October 1995
7	Convention on International Trade in Endangered Species of Wild Fauna and Flora	25 April 1997 (accession)	8 October 1997
8	Bonn Convention on Conservation of Migratory Species of Wild Animals	1 May 1998 (accession)	1 September 1998
9	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	22 December 1995 (accession)	7 May 1996
10	United Nations Convention to Combat Desertification	31 August 1995	29 January 1996
11	UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water	9 August 2007 (accession)	3 December 2007
12	Convention on the Law of the Non-Navigational Uses of International Watercourses	9 August 2007 (accession)	Has not entered into force yet
13	Paris Convention on Protection of the World Cultural and Natural	22 December 1995	15 June 1996
14	Paris Agreement	9 November 2018	-

67. **Regional agreements.** As a member of the Commonwealth of Independent States (CIS), Uzbekistan is a member of the Interstate Environmental Council on the harmonization of environmental legislation and the development of economic instruments for environmental protection as well as a member of the Interstate Environmental Fund for financing environmental protection in interstate and regional programs.

68. **Uzbekistan climate change commitments.** The First, Second and Third National Communication was submitted to the UNFCCC on October, 1999, December 2008 and February 2017, respectively.³⁵ The Third National Communication contained information on the country's greenhouse gas inventory including general information on GHG emissions and sinks, vulnerability assessment and adaptation measures that Uzbekistan has implemented or intends to implement to further contribute to global efforts to reduce GHG emissions. It also lays emphasis on use of alternative renewable energy sources (RES) as one of the country's priority in the energy generation sector. More than 90 % of the total RES potential is from solar energy. Furthermore, Uzbekistan's Nationally Determined Contribution (NDC) enshrined in the 2016 Paris Agreement³⁶, commits to its intention to curb growth rates of GHS, decreasing their specific emission per unit GDP by 10% by 2030 from level 2010 and plan to bring up the share of solar energy in the total energy balance of the country to 6% by 2030.³⁷

2.6.3 ADB Climate Change Commitments

69. In 2015, ADB committed itself to increasing climate financing from its own resources to \$6 billion yearly by 2020—\$4 billion for mitigation in sectors such as renewable energy, energy efficiency, sustainable transport, and urban development, and \$2 billion for adaptation in areas such as urban resilience and agriculture and land use. The \$6 billion target corresponds to around 30% of ADB's projected corporate pipeline by 2020. In 2017, ADB reached a record high of \$4.5 billion in climate investments, a 21% increase from the \$3.7 billion reached in 2016. From 2011 to 2017, ADB approved more than \$25 billion for climate financing—\$21.7 billion from ADB's own resources while leveraging over \$3.4 billion from external resources.

70. With a view to deliver stronger, better, and faster support to its Developing Member Countries (DMCs), ADB has established its Climate Change Operational Framework, 2017–2030 (CCOF 2030), which positions ADB to facilitate, collaboratively and proactively, a regional shift toward a low GHG emissions and climate-resilient development path. It further provides a framework for supporting DMCs in translating their NDC aspirations into climate change action investment plans and implementing those plans.

³⁵ <https://unfccc.int/non-annex-I-NCs>.

³⁶ The Paris Agreement entered into force on December 12, 2015.

³⁷ [https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uzbekistan First/INDC Uzbekistan 18-04-2017_Eng.pdf](https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uzbekistan%20First/INDC%20Uzbekistan%2018-04-2017_Eng.pdf).

3 DESCRIPTION OF THE PROJECT

3.1 Rationale

71. **Country background**³⁸. The Government of Uzbekistan has expressed its commitment to develop solar energy on a large scale and to become the regional knowledge hub for solar technologies. Republic of Uzbekistan (Uzbekistan) currently produces c. 89% of power by means of conventional thermal power plants, mostly by natural gas (c. 85% of power generated conventionally) but also coal and fuel oil. Over 50% of power is generated in old steam turbine plants built before 1982. Fossil fuel availability issues in Uzbekistan are also expected to occur from around 2025 for fuel oil and 2045 for natural gas while the forecast for annual growth in electricity consumption in the country is about 6%–7%.

72. To accommodate expected growth of demand, manage the availability of fuel and to replace inefficient old steam turbine plants, the introduction of variable renewable energy, in particular solar energy, is expected to be a major part of Uzbekistan's power expansion plan. A key component of the planned deployment is the first project of a 1GW solar photovoltaic program developed with the support of a partial credit guarantee by the ADB which will also function as the Transaction Advisor. The program is promoted by the MOE, MIFT and PPPDA or “promoters”.

73. The program presents an opportunity both for the development of renewable resources and for procurement through public-private partnership modality due to the following reasons:

- Cost of developing solar power projects has been reduced substantially over the past 5–10 years due to decrease in costs of solar panels which are the main cost item for any solar project and because of fierce competition among developers. Tariffs from electricity generated from solar projects are much lower compared to thermal sources like coal and gas and generate lower overall tariffs.
- Solar is an indigenous and renewable resource for Uzbekistan and reduces reliance on fossil fuels and improves energy security of the country. Developing the project under a PPP modality results in the most robust and sustainable way to harness this potential.
- The private sector has considerable expertise in design, construction, operations and maintenance of solar power projects in a cost-effective manner and will be incentivized to complete and operate the project in an efficient manner in order to deliver the lowest tariff for the government and end-users.

74. **The project.** In 2014, ADB carried out an evaluation of several sites and a site close to the city of Sherabad in Surkhandarya region, was selected as a prime site for a solar IPP (“project”). The implementation of the Solar IPP will increase the clean energy generating capacity of Uzbekistan by not less than 200 MW in line with the national GHG emissions reduction targets³⁹, especially in Surkhandarya region, which currently has no power generation assets and imports ca. 600MW from other regions.⁴⁰ The project will provide electricity to approximately 300,000 households in the region. The project will also assist the “promoters” to design and conduct a competitive tender for procuring the first solar PV plant and a transmission

³⁸ CONCEPT Public-Private Partnership Project in the Republic of Uzbekistan on a Public Initiative, ADB.

³⁹ Weblink: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uzbekistan_First/INDC_Uzbekistan_18-04-2017_Eng.pdf.

⁴⁰ The project site was approved in the Decision (as per the Letter of Khokimiyat of Sherabad District of Surkhandarya Region dated February 29, 2020).

interconnection system to the Surkhan substation to supply power to the national grid. The Phase I 200 MW solar PV plant will be tendered to a SPV to supply power for 25 years to NEGU. Phase II will procure the remaining 300 MW.

75. The project builds on lessons learnt from the first solar IPP project in Uzbekistan i.e. the 100 MW Navoi solar project funded by the IFC⁴¹. The project aims to demonstrate the ability of large-scale solar parks to produce solar energy at a competitive price while also providing technical benefits to the national grid⁴² and substitute for imported energy in the future. This project will build appreciation for the costs, operational requirements and actual performance of solar PV plants. It will also inform further policy development and give NEGU knowledge and experience in structuring a transparent, competitive procurement for private sector-led power projects and negotiating with private developers. These early projects will also build experience among grid operators on management of the variable power produced by solar PV plants.

76. Figure 3 presents the Uzbekistan power transmission map and Figure 4 presents the Uzbekistan solar radiation map.

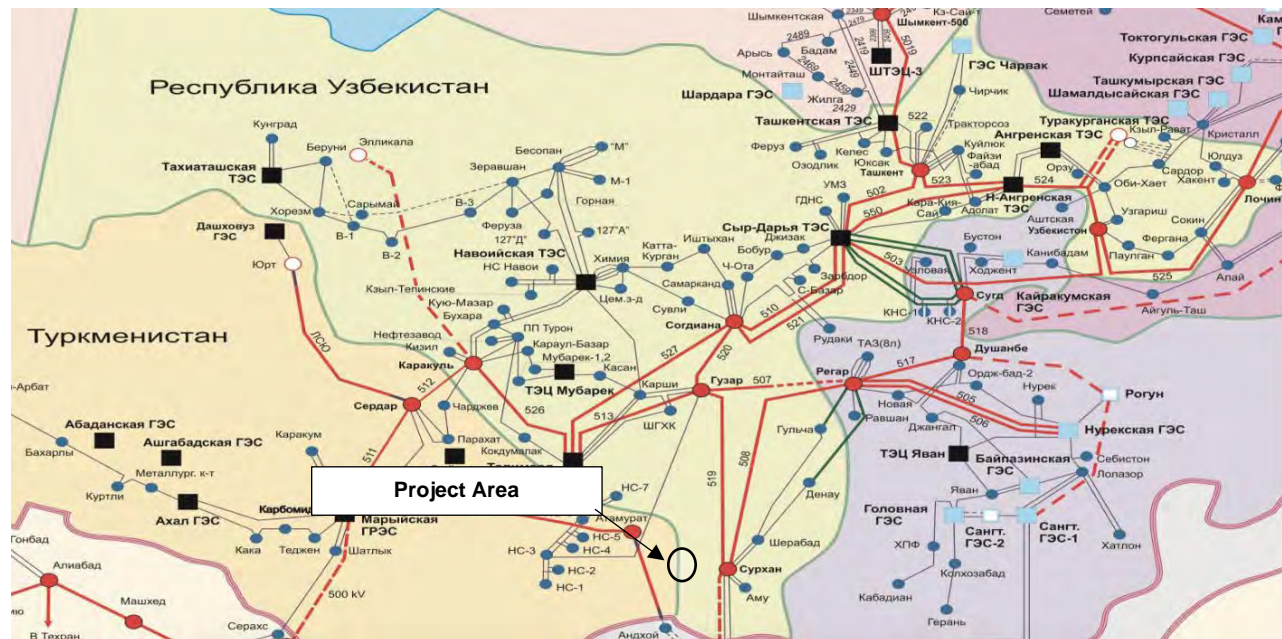


Figure 3 Uzbekistan Power Transmission Map

⁴¹ Weblink: <https://masdar.ae/en/masdar-clean-energy/projects/100mw-nur-navoi-solar-project>.

⁴² Technical or ancillary benefits include: (i) voltage support during peak loading periods, (ii) reduction of loading levels on transformers, (iii) and reduction of the amount of power that needs to be generated from distant sources (fossil fuels, in particular), and therefore reduction of losses in the transmission system.

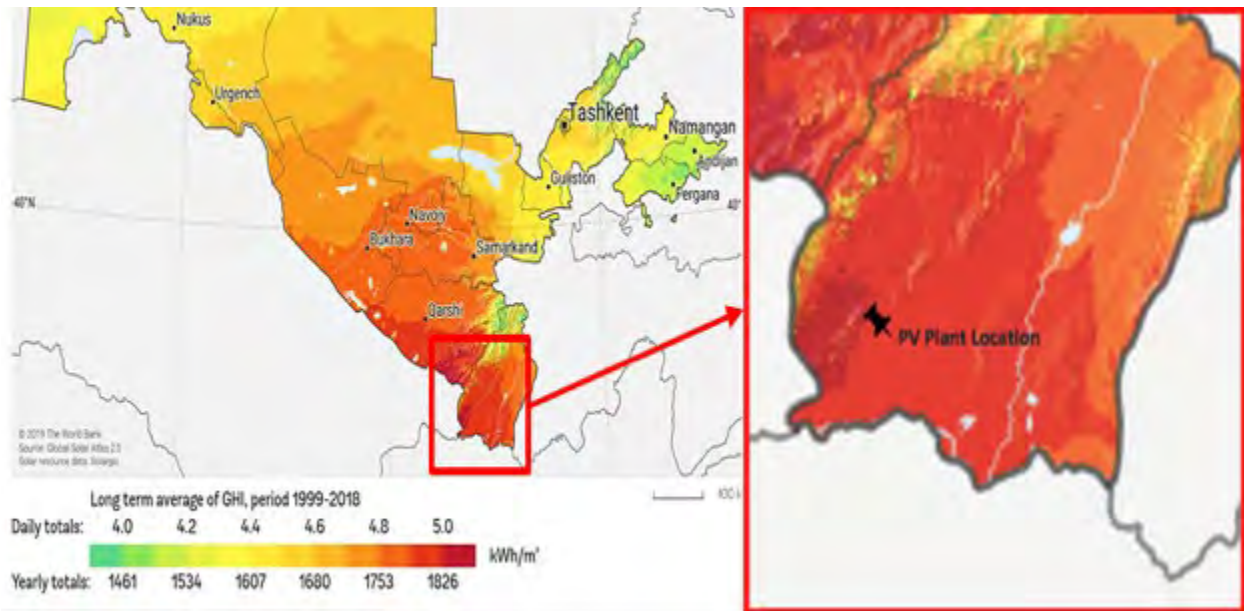


Figure 4 Uzbekistan Solar Radiation Map

3.2 Project Location

77. A project site is situated in the Sherabad district (18 km south-west of Sherabad town). The proposed land area covers 600 ha to allow construction of a Phase I solar PV plant of minimum capacity of 200 MWac and will also include a new 220kV solar substation adjacent to the solar PV plant. A new 220 kV overhead high voltage transmission line with length 52 km will connect the new solar substation to the grid at the existing 220kV Surkhan substation. The starting point of the new transmission line will be at the solar IPP site and will run across Sherabad, Kizirik and Jarkurgan districts; the existing 220kV Surkhan substation is located in Jarkurgan district. The project location is enclosed as Figure 1.

3.3 Project Impact, Outcomes and Outputs

78. The impact of the project is in line with the Government's inclusive economic growth achieved through increased clean and sustainable energy supply. The outcome of the project is aligned with the Government's strategy to increase renewable energy generation led by the private sector to deploy up to 5 GW in the upcoming 10 years. Further, it is in line with Uzbekistan's power sector development plan to develop solar energy at a large scale to diversify the fuel resources and reduce dependency on the fossil fuel, primarily natural gas.

79. The project's expected outputs will be:
- i. The generation of minimum 200 MWac of renewable energy, which is expected to provide clean energy to approx. 300,000 households in the Surkhandarya region.
 - ii. The development of 220/110/10kV substation and 52 km 220 kV overhead transmission line to evacuate the power generated from solar power plants
 - iii. The improvement of the region's energy security by delivering renewably generated power at affordable costs.
 - iv. Government's capacity strengthened to attract private investments.

3.4 Project Activities

80. The project is scheduled for completion within 18 months and activities can be divided into: (a) pre-construction and project design stage; (b) construction stage; (c) operation and maintenance stage; and (d) decommissioning stage. The typical process flow chart for construction of solar PV and transmission line is enclosed as Figure 5 and Figure 6⁴³.

⁴³ Reference: Handbook of Construction Techniques - A practical field review of environmental impacts in power transmission/distribution, run-of-river hydropower and solar PV power generation projects, ADB Sept 2015.

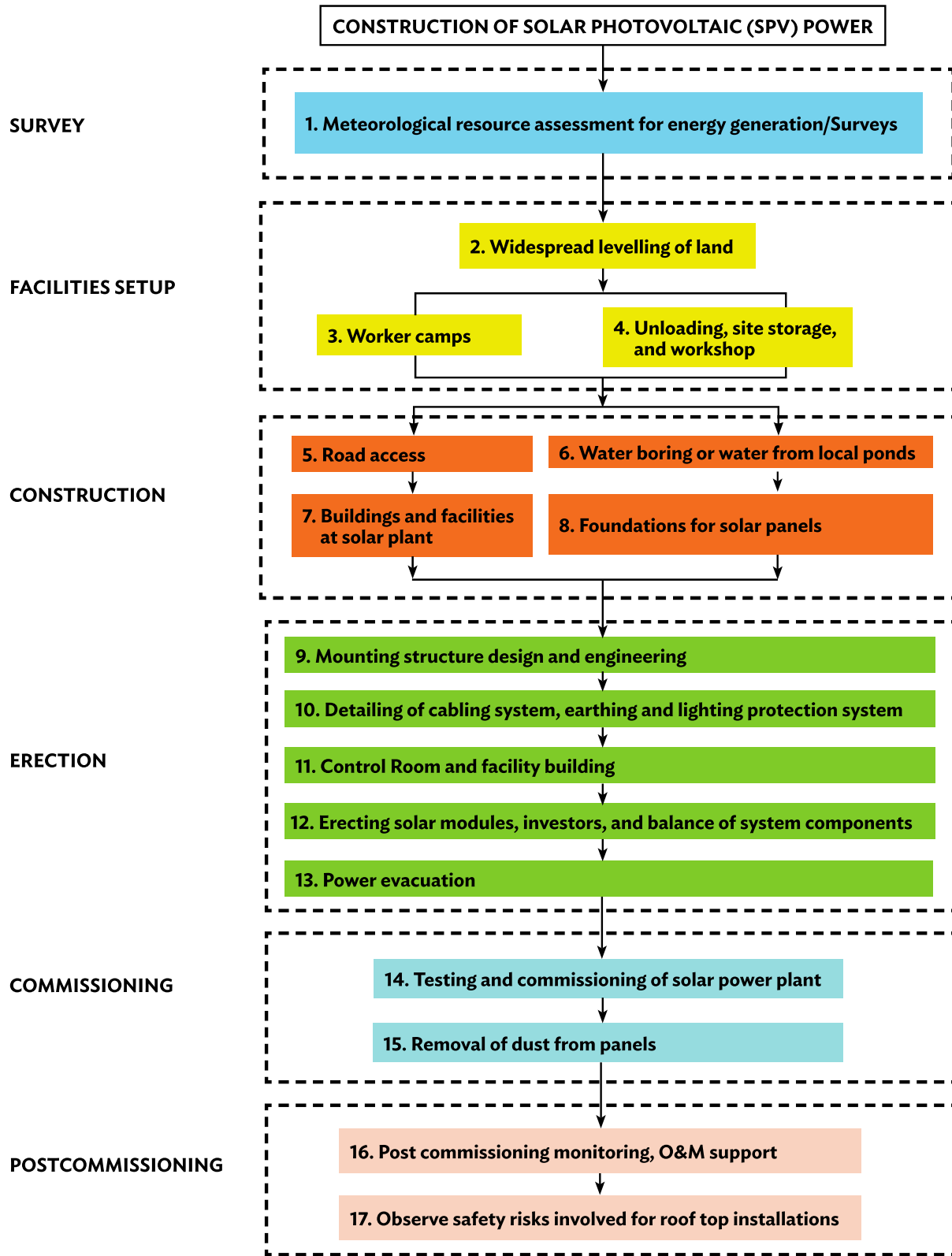


Figure 5: Process Flow Diagram for Construction and Commissioning / Operation of Solar PV Plants

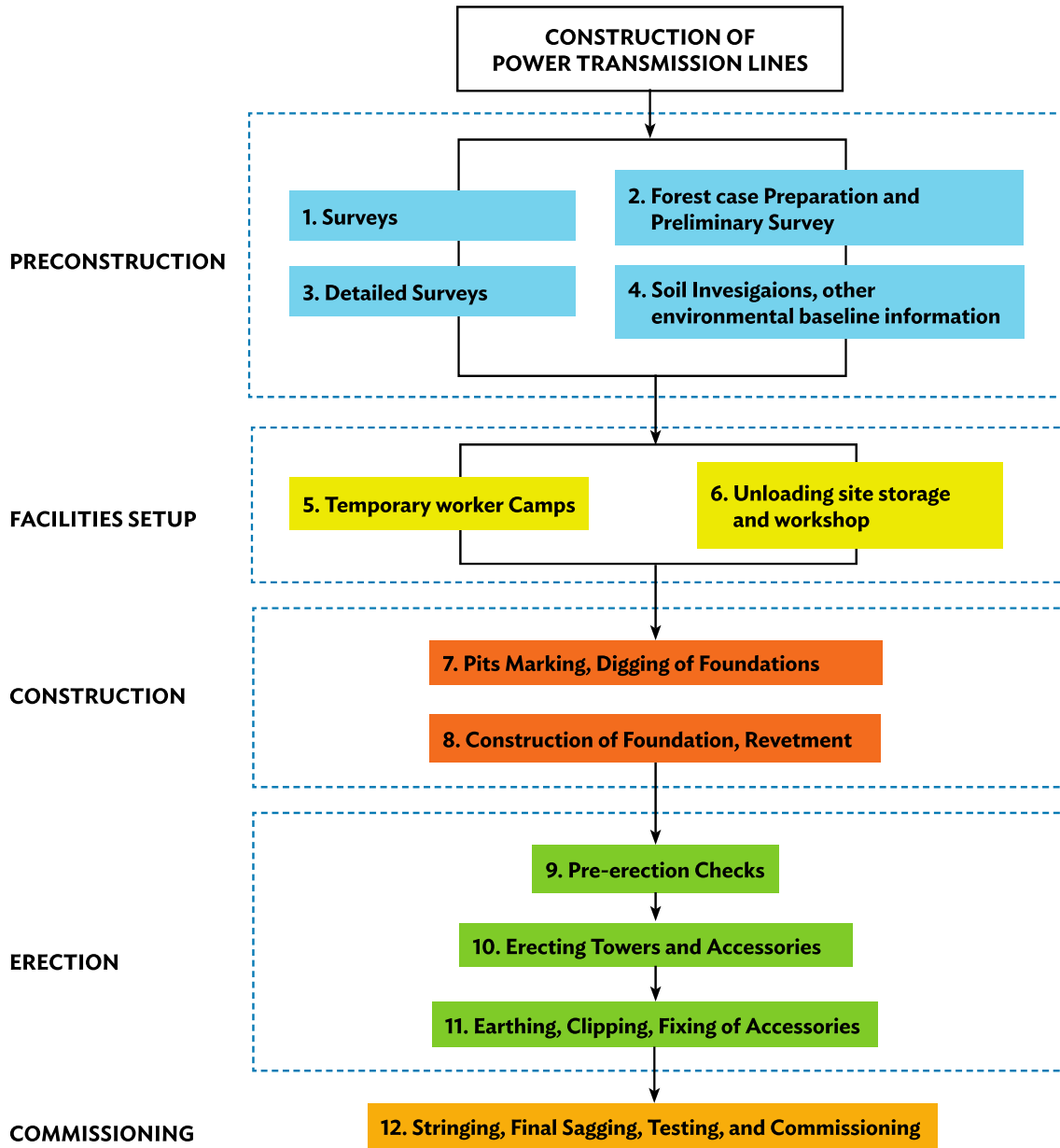


Figure 6: Process Flow Diagram for Construction and Commissioning/Operation of Transmission Lines

3.4.1 Project Design and Pre-Construction Stage⁴⁴

81. Detailed description of site selection and project design is provided in the Feasibility Study and will be included in the tender / bidding documents. Project design will integrate safeguard measures and recommendations of this IEE and EMP as well as BAP/ BMEP (**Annexure 1 and 2**). A summary relevant to this IEE is provided below. The PMU will ensure that the SPV and SPV appointed key contractors / sub-contractors will design the solar PV plant and transmission interconnection infrastructure in accordance with the requirements listed below. The overview of the project schematic is illustrated in Figure 7.

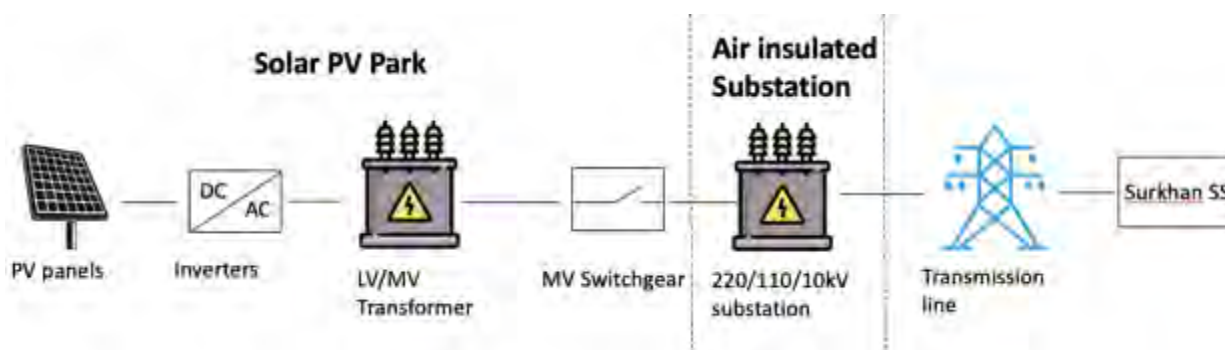


Figure 7 Project Schematic

3.4.1.1 Site Selection and Design for Solar Site Infrastructure

82. **Site selection and design of solar site.** Final selection of the Sherabad solar site was conducted after due consideration of alternative sites; details are included in **Section 6** of the IEE. There is an unlined irrigation channel that runs outside of the site boundary of the Sherabad solar site; this will be maintained in current natural condition by establishing a buffer of at least 25–50 m from the side of the channel during the site design. There is a fenced cemetery with EID prayer grounds and a small brick factory that is located further along the asphalt approach road in the **south** direction. This will be avoided during site design. Detailed engineering design will integrate measures based on recommendations of the ongoing geological, topographical and hydrological studies to maximize site resilience and minimize potential impacts; material resource areas will be identified on site maps as part of detailed design. Details on topography, geology and hydrology are provided in **Section 4** of the IEE.

83. Solar site infrastructure will include perimeter fencing with adequate ground clearance (for passage of animals/ wild species)⁴⁵, drainage design and/or building water retention pond or reservoir (capacity to be estimated during detailed design), common facilities over 600 ha and paving of an existing access road that divides the site (500 ha in west and 100 ha in east) for length approximately **2 km** with road width of 5.5 m (the road length and width is indicative and will be confirmed during detailed engineering design). The new paved access road within the site

⁴⁴ The design and planning have been proposed by the consultant on the basis of the information available at the time of the preparation of the report.

⁴⁵ Fencing around the solar site needs to be permeable to small mammals up to the size of a fox, which are able to squeeze through a 12 cm hole.

will run north to south⁴⁶ and will be constructed and maintained for transportation of the equipment, materials and machinery and further maintained during operation of the solar plant.

3.4.1.2 Design of the Solar PV Plant Infrastructure⁴⁷

84. Solar PV plant. The PV plant will be designed for minimum AC capacity of 200 MWac 48. The technology selection, configuration of the PV system (fixed, tilt, EW, etc) and corresponding foundation type; cleaning of the PV plant (e.g. dry cleaning, wet cleaning, robot cleaning, etc.) will be selected and finalized by the bidder during detailed engineering design. The PV modules shall follow the accepted standards issued by the International Electro-technical Commission⁴⁹. Solar PV arrays will be designed with maximum possible distance from each other⁵⁰. Electrical part of Solar PV plant is expected to have the following infrastructure:

- 35kV indoor switchgear
- Two transformers (220/35kV) of sufficient sizes considering n-1 criteria
- 220 kV outdoor switchgear according to “Bridge” scheme

Main parameters of the electrical part of Solar PV plant:

Rated voltage	220/35 kV
Type of switchgear scheme	220 kV switchgear – “Bridge with switches in line circuits”; 35 kV switchgear – “One main partitioned busbar”.
Design of switchgears	220 kV switchgear – outdoor type with c flexible busbar; 35 kV switchgear – indoor type based on switchgear cubicles.
Composition of power transformers	2 transformers: 220/35 kV

85. In case of PV modules contain hazardous materials, the SPV and SPV appointed key contractors/sub-contractors shall develop and implement plans for environmentally safe disposal in line with applicable national policies, rules and regulations and ADB SPS 2009. The power purchase agreement/contract between the SPV and PV module supplier(s) shall contain a contractual provision that obligate the supplier to take back unused/replaced modules.

3.4.1.3 Design of The Transmission Interconnection System

86. **Substation:** An air-insulated substation (220/110/10kV) will be designed for power evacuation and will require 10–15 ha of land within the 600 ha solar site. Provision of extra 5ha

⁴⁶ The access branch road divides the solar site, 500 ha west of the road and 100 ha east of the road.

⁴⁷ The solar PV plant detailed design will depend on the bidder; recommendations in the IEE will be integrated at minimum. However, the bidder is free to choose the configuration of the PV system (fixed, tilt, EW etc) and hence the foundation. The decision on the size of the PV plant, mode of cleaning of the PV plant (dry cleaning, wet cleaning, robot cleaning etc.) will be at the discretion of the bidder. It is expected that the bidder will most likely propose a single axis tracked system with bifacial modules. Overall, infrastructure requirements will be further clear during detailed engineering design phase.

⁴⁸ One MW requires 1.5 to 2.5 ha of land (depending on **the technology and configuration**); source: **Suntrace**

⁴⁹ Utility Scale Solar Power Plants; A Guide for Developers and Investors, Page 28 of 204 (IFC Feb 2012).

⁵⁰ Refer to array layout example in Figure 9 of Appendix 3. Critical Habitat Assessment; Larger distance between solar arrays will result in less negative impact on reptile, mammals, plants and water-birds that are less likely to mistake such PV arrays for waterbodies thereby reducing the birds’ mortality rate.

is intended is future expansion.⁵¹ This type of substation uses atmospheric air as the phase to ground insulation for the switchgear of the substation. The new Sherabad solar PV plant substation is planned to be designed for 500MWac to accommodate the projects (this and upcoming). It shall have the following infrastructure:

- 220 kV outdoor switchgear according to one-and-half breaker scheme with all the associated infrastructure considering n-1 criteria
- Two autotransformers with voltage of 220/110/10 kV and capacity of 125 MVA (according to request of Ministry of Energy of Uzbekistan) considering n-1 criteria for power supply of 110 kV customers
- 110 kV outdoor switchgear according to “Quadrangle” scheme
- Enough space for future expansion of additional 220kV bays for stage 2 and additional 110kV bays for future load

87. The main parameters of new substation are as follows; the single line diagram of the new 220/110/10 kV substation and technical specifications is illustrated in Figure 6.

Rated voltage:	220/110/10 kV
Type of switchgear scheme:	220 kV switchgear – “Transformer-busbars with one-and-half line connection”; 110 kV switchgear – “Quadrangle”; 10 kV switchgear – “One main partitioned busbar”.
Design of switchgears:	220 kV switchgear – outdoor type with c flexible busbar; 110 kV switchgear – outdoor type with c flexible busbar; 10 kV switchgear – indoor type based on switchgear cubicles.
Composition of power transformers:	Two 220/110/10 kV 125 MVA autotransformers

⁵¹ The substation will be designed for 500 MWac @ 0.85 pf to accommodate project in stages.

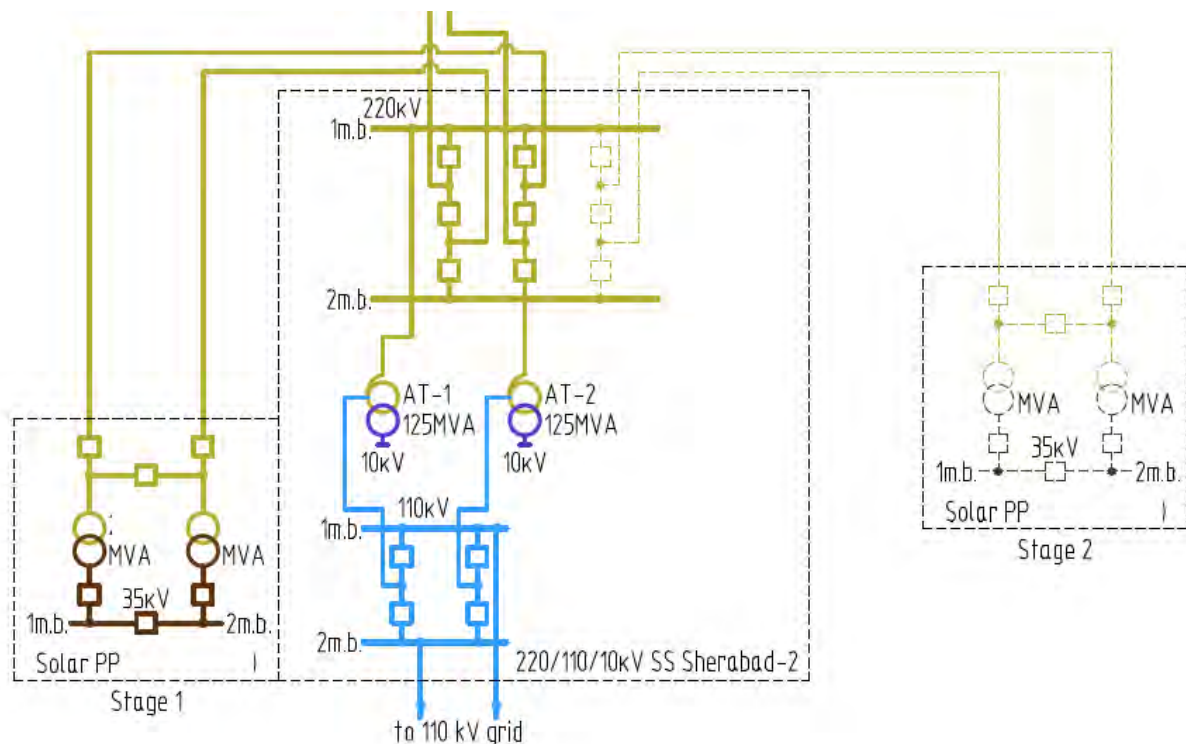


Figure 8 Single Line Diagram for the New Substation at Solar PV Site

88. **Transmission line design.** The proposed transmission alignment is 220 kV overhead double circuit high voltage line for approximately 52 km length between the new substation at the solar site and existing Surkhan substation. Tower types are angle-tension towers of type U330-2 and suspension towers of type P330-2. There will be approximately 163 towers on the 52 km stretch.⁵² Height of towers will be of plus 5 m, 9m and 14 m. An optical ground wire and Aluminium Conductor Steel Reinforced conductors (ACSR) will be used. Design clearances and height for the transmission line will be in accordance with the Uzbekistan Electric Rules and Regulations such as GOST and EIC⁵³, which are mandatory for all transmission line projects.⁵⁴

89. Main parameters of overhead transmission line are as follows:

Line Length	52 km
Starting point of 220 kV transmission line route	Receiving gantry of the designed new 220 kV substation at solar PV site (Sherabad-2), located 18 km South-West of town of Sherabad
Final point of 220 kV transmission line route	Receiving gantry of 220 kV outdoor switchgear of existing Surkhan substation, located at North-Western outskirts of town of Jarkurgan
Type of towers (typical project 3080tm)	U330-2 and P330-2 (double circuit towers)

⁵² Angle-tension towers of type U320-2 and suspension towers of type P320-2 according to typical project 3080tm are used for 220 kV overhead transmission lines on the territory of Uzbekistan in accordance with 1039:2015 “Construction of steel supports for power transmission lines and open switchgears of substations with a voltage of 35 kV or higher”.

⁵³ State Technical Design Standards and Electrical Installation Code.

⁵⁴ The characteristics of supports, foundations of supports, wires, cables, earthing, insulators and even connection fittings are standardized by the GOST.

Line Length	52 km
Number of chains	Two
Brand of wire	ACSR-400/51 according of GOST 839-80
Phase design	Split phase of two wires (2xAC-400/51)
Clearance span	420 m (flat terrain); 350 m (hilly terrain)
Ground wire	One ground wire, two - at approaches to new 220 kV solar substation at solar PV site (Sherabad-2) and existing Surkhan substation.

90. **Route selection.** The preliminary transmission line route will generally follow an existing 110 kV transmission line and will consider avoidance of and / or adjusted to minimize impacts on agriculturally productive land with irrigation channels, land intended for personal subsidiary farming, habitats of conservation value, sensitive areas (e.g. physical cultural resources such as praying grounds, cemeteries, etc.), structures (e.g. households, schools and residential areas) and regional / local roads and utility lines. The ROW will consider suitable slope and soil type and will be of 35 m width (17.5 m width on either side of the transmission center-line) for 220 kV transmission line. The ROW will be adjusted to minimize the cutting of trees. Within the ROW, the height of vegetation and/or trees will be limited to 3 m. A safety zone will be maintained around the ROW as shown in Figure 7, which will be available for agricultural use. The transmission line route will cross the river Karasu (12.4 m); the water course will be crossed by one span.

91. Access tracks in and around the proposed transmission line are classified as earth road. Access to construction sites for tower footings and stringing of conductors will be via temporary access tracks that will be restored to pre-construction conditions after completion of civil works.

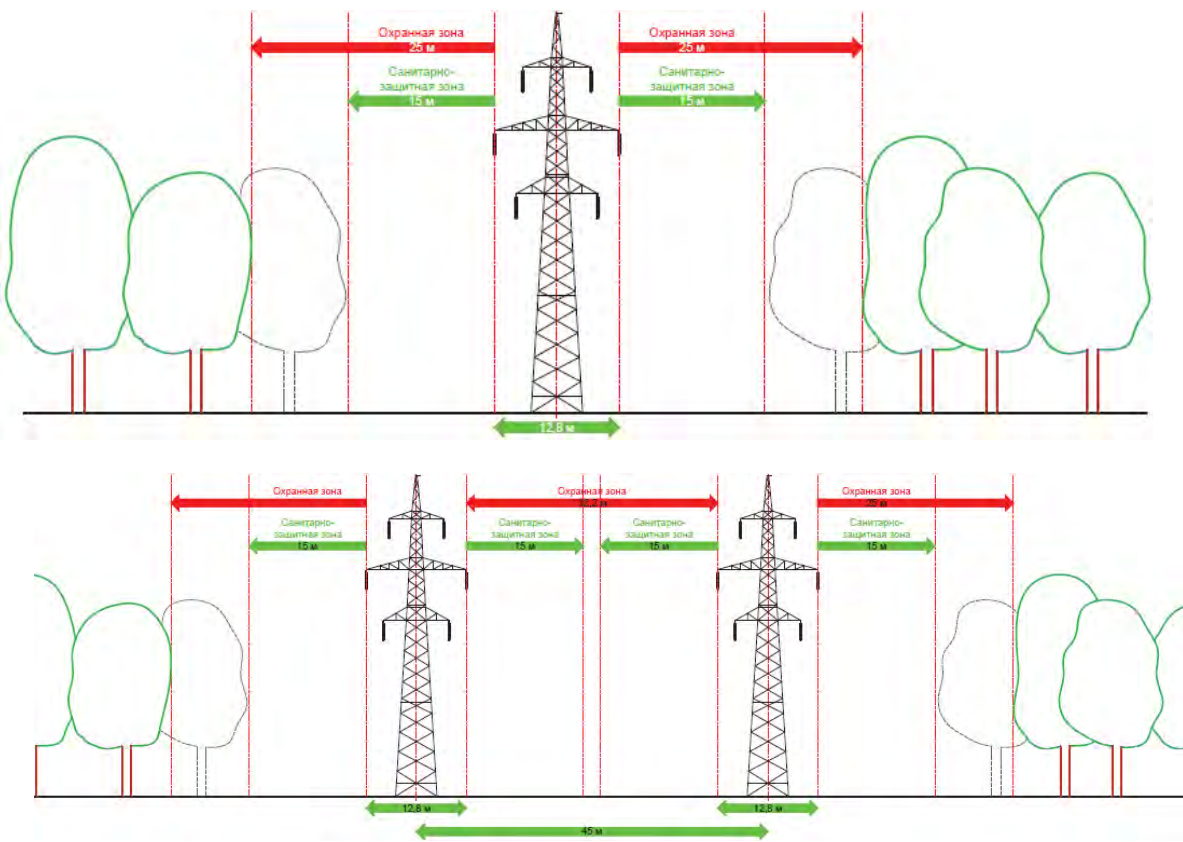
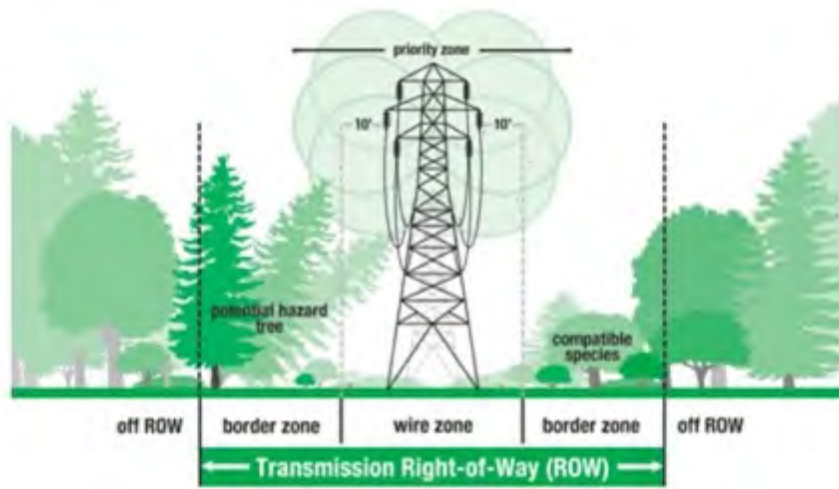


Figure 9 Safety Zone Established around the 220 kV Transmission Line

3.4.1.4 Upgrade to Surkhan Substation (Existing Facility)

92. The technical consultant (STR) has determined that the optimal point of connection of the solar site to the national grid is at the existing 220 kV Surkhan substation. The Surkhan substation top-view is presented in Figure 8. The Surkhan substation is located approximately 52 km from the Sherabad solar site. The scope of work for upgrading existing Surkhan substation will include the following:

- One new bay at 220 kV
- Upgrade of one existing reserved bay (with Circuit Breakers, Isolators, current transformers, etc.)



Figure 10 Surkhan Substation Layout

3.4.1.5 Climate Resilience Measures

93. The project is classified as being at moderate to low risk from future climate change impacts. The project design includes climate proofing measures for the solar project site infrastructure such as measures for increase in temperature and wind speed in project siting and structural design. The key climate vulnerable components will be subject to further analysis during the detailed engineering design. Climate proofing measures that will permanently become part of the solar park infrastructure will be included within the main civil work contract costs.

3.4.1.6 Biodiversity Conservation Measures

94. The project area is classified as a critical habitat for smooth even-fingered gecko⁵⁵. The critical habitat status has been established as a precautionary approach following a discussion with ADB safeguards team on July 3 and 5, 2020. The project design integrates biodiversity risk mitigation measures in line with the biodiversity action plan (BAP) and biodiversity management and evaluation plan (BMEP) developed for the project and will be subject to further analysis during detailed engineering design. Biodiversity measures that will permanently become part of the project infrastructure will be included within the main civil work costs.

3.4.2 Construction Stage

95. Construction activities will be confined to 500 ha solar site for site development including access branch road (within the solar site), construction material storage facility, construction waste storage facility, a fuel storage facility and construction (workers) camps. Transmission line works will be confined to the ROW of 35 m; construction and erection staging areas, construction (workers) camps, and access tracks established for the transmission line alignment will take up land temporarily during the construction stage. Upgrade works will take place within the fenced perimeter of the grid substation in collaboration with NEGU.

3.4.3 Operation and Maintenance Stage

96. The list of activities to be carried out in the operation and maintenance phase would be:
- Monthly cleaning of PV modules;
 - Control of vegetation viz. weeds, bushes etc. within the solar site and those immediately surrounding it;
 - Routine inspection of all PV modules and associated structures viz. cables, transformers, inverters, mounting structures etc.;
 - Operation and maintenance of ancillary facilities such as power substation;
 - Inspection and maintenance of solar site internal pathways/access branch road.
 - Inspection and maintenance of transmission line and vegetation maintenance of ROW

3.4.4 Decommissioning Stage

97. The average life span of the solar modules is +20 years. At the end of this life cycle, the solar modules will either be revamped or replaced and continue with its operation. If decommissioned, all components including foundations and internal roads of the project will be removed and the site will be restored to its pre-construction state. The associated infra-structures will be returned to the Government for use.

3.5 Resources Requirements

98. **Land requirements.** The proposed project will involve permanent land use for the solar site (approximately 500 ha for 200 MW depending on the technology and configuration); however, there is no land acquisition since it is all government owned land. The development of the access branch road within the solar site is included in the land requirement for the solar site (with a ROW width of 5.5 m, length of 2 km - indicative). There is no temporary land-take associated with the solar site; all civil works, unloading / site storage / workshop area as well as temporary

⁵⁵ This gecko is listed as CR on the IUCN Red List and listed as VU within the Uzbekistan Red Data Book (URDB, 2019).

construction (workers) camp set up will be undertaken within the final solar site area. Existing asphalt road to the solar site will be used. Therefore, no permanent impacts to private land or assets are anticipated.

99. The 220-kV transmission line tower footings will require permanent acquisition of land equivalent to 12.96 ha and may temporarily affect a total of 190 ha for the ROW. Facilities such as construction and erection staging areas including unloading / site storage / workshop area, construction (workers) camps, spoil disposal sites and access tracks established for the transmission line alignment will take up land temporarily during the construction stage; this temporary land take areas will be further estimated during detailed engineering design. The location of the above facilities will be determined by the Contractor(s) and no specific location for any camp site has been provided to date by NEGU. The siting will take into consideration of avoidance of any sensitive receptors.

100. There is no temporary land take associated with upgrade works; all civil works will be undertaken within the final solar site acquired area and within the fenced perimeter of the existing substation.

101. Table 10 and Table 11 provide estimates for land use and permanent land use for the project.

Table 10 Total Land Affected by the Project

Infrastructure Type	Land Requirements
Phase I (this project) minimum 200 MWac capacity solar PV	500 ha permanent land take
New substation	10 - 15 ha (included in solar project site land requirements, land area indicative and will be confirmed during detailed design)
220 kV Transmission line of 52 km length with ROW of 35 m between new substation up to and existing grid Surkhan substation	169 ha of land - - temporary land take and disturbance during construction and maintenance for length 52 km
Transmission line tower footings	12.96 ha of land – permanent land acquisition
Access branch road within the solar park (north to south)	2 km road length and 5.5 m width (land requirement included in solar site, numbers are indicative and will be confirmed during detailed engineering design)

Table 11 Permanent Land Use for Transmission Line⁵⁶

Code of tower	Area of permanent allotment of land for one support, sqm	Number, unit	Area of permanent allotment of land, sqm
U330-2τ	80	1	80
U330-2τ+5	110	5	550
U330-2+5	110	28	3,080
U330-2+9	130	7	910
U330-2+14	170	1	170
U330-3	70	9	630
U330-3+14	130	4	520
P330-2τ	65	12	780
P330-2	65	90	5,850
P330-2+5	65	6	390
Total		163	12,960
			(12.96 ha)

102. **Water requirements.** The SPV appointed key contractors / sub-contractors shall include in the Construction Schedule estimates of anticipated annual water usage for construction. The SPV and SPV appointed key contractors / sub-contractors will review, as applicable, the availability and sources of water for usage for the construction and consult with relevant governmental stakeholders and affected communities on water availability, usage and estimated usage for future periods. Within 60 days of each Contract Year after the commercial operations date, the SPV shall provide to PMU reasonable estimates of water usage for purposes of operating and maintaining the Solar PV Plant for the applicable Contract Year. Groundwater abstraction will be prohibited.

103. **Power usage.** The SPV and SPV appointed key contractors / sub-contractors may installed diesel generating sets (DG sets) at the solar site for construction stage and as power back up during operation stage; this will be ascertained during project detailed design and findings will be updated in the IEE and EMP.

104. **Labour requirements.** The labour / staff requirements for the construction and operation of the project will be ascertained by the SPV and SPV appointed key contractors / sub-contractors during project detailed design and findings will be updated in the IEE and EMP; the number of focal point persons are identified in Section 9 under Institutional roles and responsibilities.

3.6 Project Organization Structure

105. The MOE is the executive agency (EA) responsible for the overall supervision and monitoring of project implementation (i.e. the Sherabad Solar IPP project, implementation of the Public Private Partnership (PPP) agreement and subsequent projects under the solar program). The MOE will be assisted by the MIFT and PPPDA of the MOF and ADB in developing and

⁵⁶ This is an indicative estimate and will be confirmed during detailed engineering design.

approving the relevant PPP agreements and monitor project implementation. The MIFT⁵⁷ and NEGU⁵⁸ are the Public Partners as designated by the Cabinet of Ministers of the Government pursuant to decision.

106. A qualified Private Partner (private developer-investor) for the project will be the implementing agency (IA) through a SPV PIU. The SPV PIU will be supported by the current NEGU PMU⁵⁹ and PIC⁶⁰ that will be engaged under this project. The SPV PIU will be responsible for day to day activity and compliance with safeguards during project implementation.

107. The SPV will:

- Design, Build, Finance, Own, Operate, Maintain (and potentially Decommission) a new Solar PV Power Plant with a minimum capacity of 200 MWac in Phase I
- Design, Build, Finance the new 220/110/10kV substation and 52km overhead 220 kV double circuit transmission line to connect to the existing Surkhan 220kV substation and Transfer to NEGU at Commercial Operations Date (COD) of the Project against a capped lumpsum payment

108. Overall, the Project structure will follow international best practice and will be based on well banked precedents. Transparency of the procurement process, timeliness of delivery, balanced risk allocation, affordability of tariff and value for money for the Government of Uzbekistan will be the key guiding principles for the successful delivery of the Project. It is expected that the Project will be structured under the Public Private Partnership Law dated May 10, 2019 (the “PPP Law”). The Project will also take into account the requirements established by the Renewable Energy Use Law dated May 21, 2019 (the “RE Law”).

109. The project organizational structure and key parties is illustrated in Figure 11.

⁵⁷ MIFT will be the signatory of the Government Support Agreement (GSA).

⁵⁸ NEGU will be as sole off-taker of electricity and signatory of the Power Purchase Agreement (PPA); the form of Grid Connection Agreement (“GCA”) to be entered in to will be included as a schedule or clause to the PPA.

⁵⁹ The NEGU functions through the NENs office Main Power Network (MPN) in the Surkhandarya Region.

⁶⁰ The Terms of Reference (TOR) has been prepared for International and National Environment Specialists; this is enclosed as Appendix 6. The project implementation consultant (PIC) services will be engaged to assist PMU and SPV with the implementation of the project and for safeguards in particular, to: (a) update, as necessary, the Initial Environmental Examination (IEE), Environment Management Plan (EMP), Biodiversity Action Plan (BAP), Biodiversity Management and Evaluation Plan (BMEP) and Social Safeguards Due Diligence Report (SSDDR) or preparation of Land Acquisition and Resettlement Plan (LARP), and, after obtaining ADB’s approval, oversee their implementation; (b) work and coordinate with PMU to complete Environmental, Health and Safety Audit (EHS) for existing Surkhan substation that will undergo upgrade / extension work; (c) work and coordinate with SPV contractors to develop and finalize site EMPs (SEMPs), and after obtaining PMU’s approval, oversee SEMP implementation; and (d) supervise the integration of safeguard measures into the design, installation, and commissioning of the solar PV plant and transmission interconnection infrastructure works by the SPV contractor. The PIC will be responsible for building PMU and SPV capacity in safeguards monitoring and reporting. The PIC will also assist the PMU and SPV contractors in conducting project level COVID-19 risk assessment. The PIC will ensure that the SPV contractor’s Occupational Health & Safety plans integrate measures to mitigate COVID-19 health risks that are aligned with Government guidelines and measures listed in the EMP. The PIC will consist of one international and two national specialists recruited for a total of 4 person-months and 14 person-months total over 18 months project implementation period, respectively.

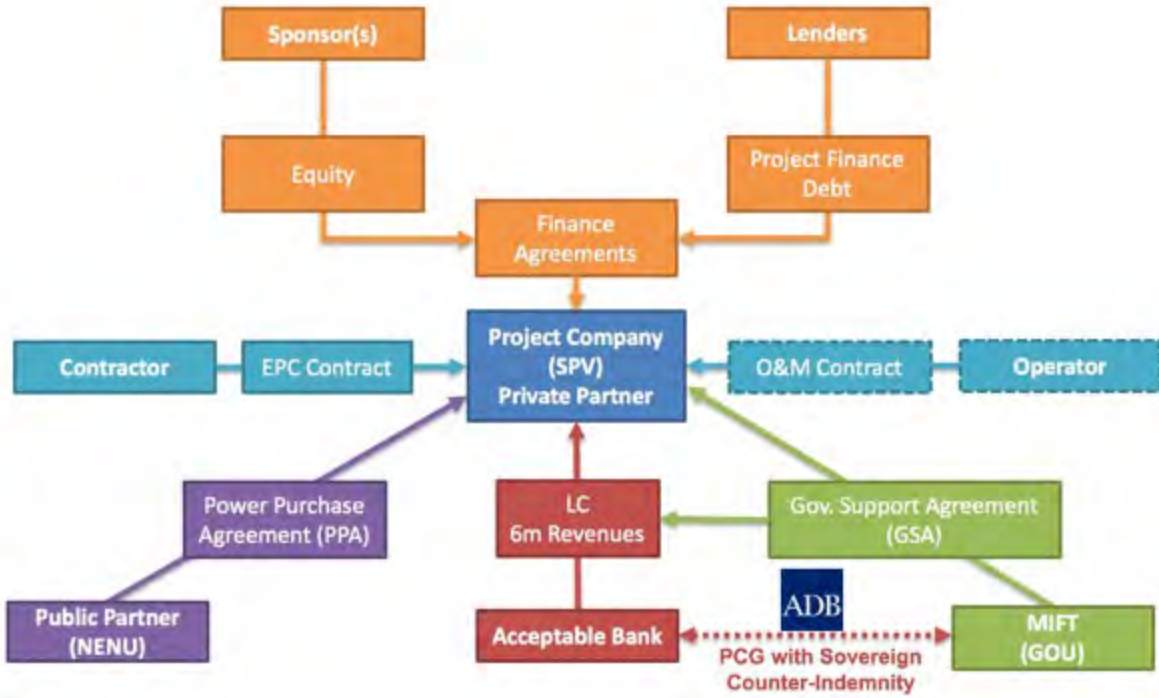


Figure 11 Project Organizational Structure

4 DESCRIPTION OF THE BASELINE ENVIRONMENT

4.1 Area of Influence

110. For the purposes of establishing the environmental baseline and assessing the potential environmental impacts, the area of influence includes the primary subproject site – solar PV plant including the new 220/110/10 KV substation and its surrounding area, transect for 220kV overhead transmission line (length approx. 52 km) and the Surkhan substation which is an existing facility. The area of influence was established such that it may include the project area of influence with primary subproject sites (e.g. for localized impacts arising from noise, vibration and dust) as well as ecological area of analysis to include the wider geographical impacts (e.g. disturbance to ground species and /or bird / bat flyways due to construction and operation of the project⁶¹).

111. Between November 2019 and March 2020, site visits and due diligence of all primary project sites have been carried out; in case of 220kV transmission line transect, a baseline survey of 48 km out of total 52 km has been conducted⁶². The physical EHS audit of existing Surkhan substation is pending and will be undertaken by PIC, however information has been collected from NEGU. The due diligence was further supported by detailed ecological ground surveys and desk-based screening. During site visits, due diligence and ground surveys, particular attention was paid to identify:

- ▶ Sensitive natural environmental receptors such as water bodies, type of habitats and biodiversity;
- ▶ Sensitive human receptors such as households, settlements, schools;
- ▶ Local landscape character;
- ▶ Cultural and heritage sites (such as mosques, cemeteries, other religious sites); and
- ▶ Potential health and safety issues.

112. Since the transmission line transect is not yet fixed or finalized at this stage of project preparation, further transect surveys will be undertaken during detailed design to take into consideration the final transmission line alignment and receptor information will be updated and incorporated in the updated IEE and EMP.

4.2 Baseline Receptor Summary

113. Key receptors information was obtained and collated based on-site visits, stakeholder consultations, habitat assessment conducted for the project, project SDR, consultant reports on topographical, geotechnical and hydrological site study. A summary table for key receptors is provided in Table 12 and maps are provided in Figure 12, Figure 13 and Figure 14.

⁶¹ Refer to Appendix 3.1 Critical Habitat Assessment that has been assessed over an Ecological Area of Analysis (EAA) in line with IFC PS6 requirements.

⁶² At the feasibility study stage in July 2020, only 48 km from total 52 km of the planned transmission line transect was screened for key receptors, starting from the solar project site (specifically starting at tower no. 227 of existing 110 kV line) and heading towards the Surkhan substation. The remaining part of the transect closest to the Surkhan substation will be assessed later when travel restrictions are eased because of COVID-19.

Table 12 Summary of Valued Receptors (Sensitive Natural and Human Receptors)⁶³

Surkhandarya Region/ District	Project Component	Villages Affected	Surface Water Receptors	Socioeconomic and Cultural Receptors	Land Cover/ Ecological Receptors	Existing Utilities Affected	Protected Area /Species
Sherabad district	New solar project site (Solar PV plant and new 220 kV substation, 600 ha)	None	Un-lined irrigation channel outside of the site boundary that divides the site in the South from farm land in the North	No habitations/ settlements within the solar project site; A fenced cemetery with EID prayer grounds and a small brick factory located further along the asphalt approach road in the south direction.	Site situated in the Karakyr Uplands with furrows / unused network of irrigation canals covering over 50% of the site area	None	One gazetted protected area in the wider project area of influence : Surkhanskiy State Nature Reserve (IUCN Management Category Ia); this protected area is separated into two
Sherabad, Kizirik and Jarkurgan districts	New Transmission Line ROW (approximate length 52 km) ⁶⁵	Total No. of Villages 11	Network of irrigation canals; Karasu River crossing (width of at the intersection of the transmission line is approx. 12.4 m)	Some habitations/ settlements along the ROW, e.g. at 33 km from the site (at Point of Interest / POI No. 6) the ROW runs across an existing village for approx. length 5 km ; at 4.0 km from the site (POI No. 1) the ROW runs along a village	ROW will run across agrolandscapes (cotton, wheat and alfalfa fields, orchards, vegetable gardens), tree lines, roads and network of irrigation canals, households / settlements), and will cross the	None	components, namely a small piece along the Amudarya Floodlands bordering Afghanistan 30 km south-east of the site, and a larger piece on the Kugitang Ridge located 22 km north-west of the site

⁶³ The list of valued receptors shall be reviewed on a regular basis as additional baseline on environment and social aspects of the project are ascertained during detailed design.

⁶⁵ For the transmission line, key receptors were identified within an estimated 400 m width (or 200 m) on each side of the midline for a 35 m wide ROW for a total length of 48 km.

Surkhandarya Region/ District	Project Component	Villages Affected	Surface Water Receptors	Socioeconomic and Cultural Receptors	Land Cover/ Ecological Receptors	Existing Utilities Affected	Protected Area /Species
				with lateral distance to the village border at approx. 150m; at 6.5 km from site (POI No. 2), the ROW is surrounded on both sides by towns with lateral distance to the town to the left approx. 50m. A small quarry pit exists along the ROW providing raw material for a cement plant	Shuratakum Gorge, the Karasu River and the Khaudag Ridge (maximum altitude of 553 msl) and Kattakum sands before reaching existing Surkhan substation		bordering Turkmenistan. The Kugitang State Nature Reserve exists in Turkmenistan adjacent to the northern component of the Surkhanskiy State Nature Reserve. Presence of <i>Alsophylax laevis</i> (Smooth even-fingered gecko) in the area of influence ⁶⁴
Jarkurgan district	Existing Surkhan Substation		None	Some settlements and agricultural fields south of the substation site	Semi-desertic land; Upgrade within existing substation boundary	None	None

⁶⁴ Application of the IFC Critical habitat requirements yields results for *Alsophylax laevis*, which based on specialist opinion likely occurs within the project ecological area of influence; this gecko is listed as CR on the IUCN Red List but is listed as VU within the Uzbekistan Red Data Book (URDB, 2019). See detailed discussion under Ecological Resources.



Figure 12 Solar PV Site



Figure 13 Project Area of influence - Solar PV Site with a 50 m buffer and proposed transmission line with 200 m buffer – total area coverage of 2,688 ha

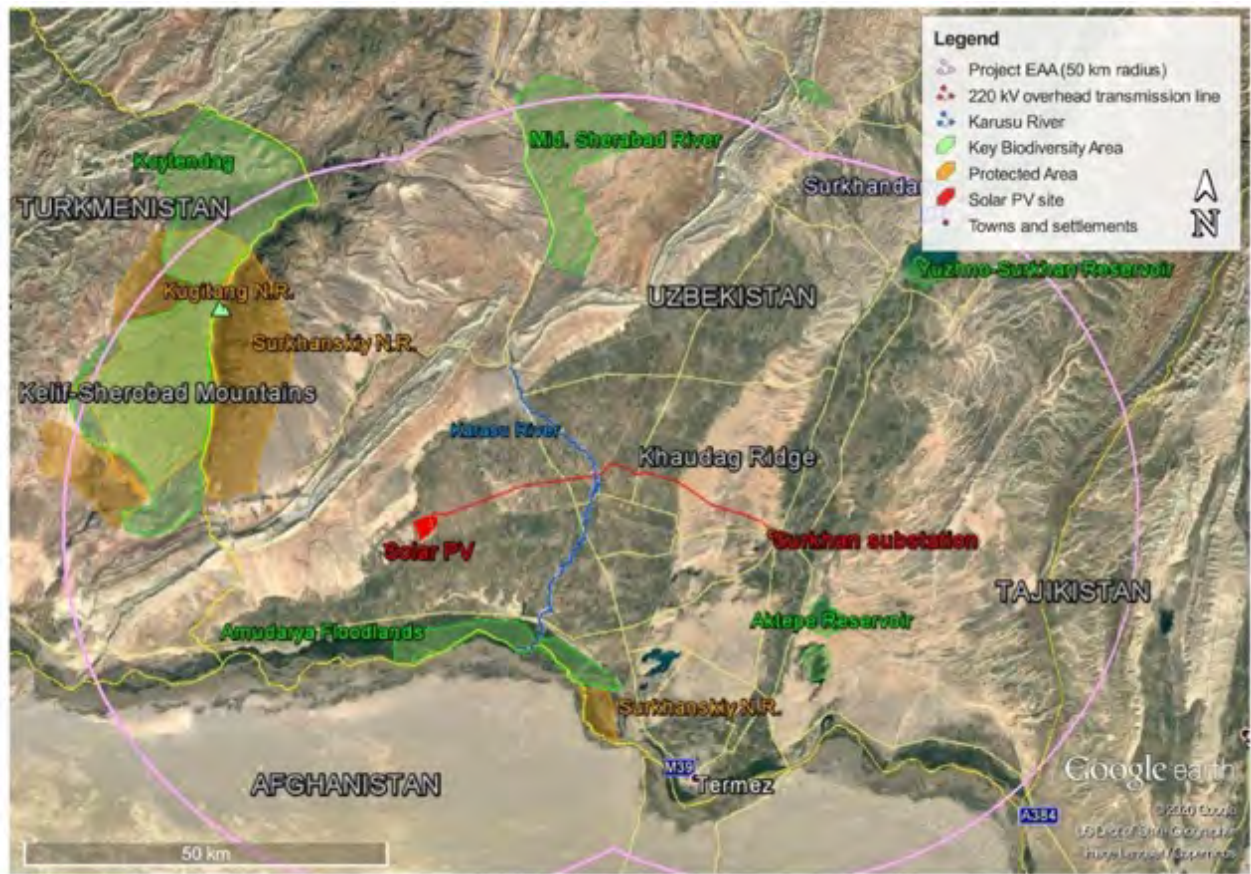


Figure 14 Ecological Area of Analysis - Solar PV Site proposed transmission line within 50 km radius (pink circle) – total area coverage of 1.26 million ha

4.3 Geographical Location

114. The project site is geographically situated between 37°35'37"N and 37°31'6"N Latitudes and 66°50'42"E and 67°24'10"E Longitudes in the Surkhandarya region of Uzbekistan. The project site is territorially related to the rural gathering of citizens "Gulbakhor", the citizens community union "Mehrigiyo" of Sherabad district. The wider project area is bordered by rural settlements/citizens community union of Baikishlak and Pakhtaabad in the south, Yangiyer, Talashkan, Beshkurgan in the east and Navbahor in the west. The project site is located 18 km south-west of Sherabad city.

115. The proposed transmission line will run almost parallel to an existing 110 kV transmission line along total of 11 villages and across a total of three districts – Sherabad, Kizirik and Jarkurgan (districts); the existing Surkhan substation is located in the city of Dzhakurgan in Jarkurgan district – all in the Surkhandarya region.

4.4 Physical Resources

116. The following section describes the physical resources in and around the proposed project components.

117. **Solar PV Site.** The proposed solar PV site has 600 ha of land to its disposal. The site is on an open, flat contiguous piece of unused land that is under Government ownership; the land will be allocated to the SPV / promoters for the development of the proposed project. The local landscape character area comprises of virtually no vegetation within the solar site with the exception of small areas of scrub and ephemeral (fast growing) plants with long views to the horizon. The solar site is divided by an asphalt branch road i.e. 500 ha west of the road and 100 ha east of the road; this branch road runs north to south through the site. West of the branch road, an irrigation channel divides the site in the south from a farm land in the north. There are no habitations / settlements within the site; there are small settlements of low density further down the road towards the south of the solar site. There is a fenced cemetery with Eid prayer grounds located further along the road in the south direction as well as a locally owned brick factory. Nearby villages / settlements use the wider solar site area for pasture and grazing of livestock, with uncontrolled dumps of domestic and construction waste along the periphery of the site.

118. **220/110/10kV substation.** The land required for the new substation that will connect to the solar PV plant shall be utilised from the available 600ha, preferably situated on the east side of the asphalt branch road (within the solar PV site). The land requirement is approximately 10-15 ha but it is expected that substation, considering some space for future expansion, shall have approx. 20 ha.

119. **Transmission Line.** The proposed alignment for the 220 kV transmission line will follow an existing 110 kV overhead transmission line transect across agro-landscapes (cotton, wheat and alfalfa fields, orchards, vegetable gardens), tree lines, roads and network of irrigation canals, households / settlements (in total of 11 villages) and pasture land. The ROW will cross the different habitats (refer to discussion in **Section 4.5.3**), cross the river Karasu (the width of river Karasu at the intersection of the line is approx. 12.4 meters). The final transmission line alignment will be adjusted during the detailed engineering design and VERs (sensitive natural and human receptors) will be avoided. Traveling/commuting along and/or crossing the proposed transmission line alignment will be unavoidable. Community health and safety measures and safeguards are included in the project EMP.

120. **Existing Facility.** Surkhan substation is an existing facility, owned and operated by NEGU. It is fenced on all sides with one main entrance gate with a security check. The area surrounding the existing substation site is open semi-desert landscape with households or structures 600 to 700 m away. All upgrade works will take place within the existing fenced perimeter of the substation. Substation information has been obtained from the MOE and included in the EHS audit template enclosed as **Appendix 4**; the physical on-site audit will be completed by PIC. Upgrade works at Surkhan substation will not result in any direct or indirect impacts on nearby sensitive receptors/physical resources; all works will be within the fenced perimeter of the substation.

121. **PCRs.** With the exception of the fenced cemetery with Eid prayer grounds located further along the road in the south direction from the solar site, there are no other known PCR in the area. No PCRs were found along the walk over survey of the transmission line alignment. The detailed walkover survey for the full transmission line length is yet to be surveyed and distances to PCRs if any, ascertained. After the final survey, findings will be updated in the IEE and EMP and the final transmission line alignment will be planned and adjusted to avoid all PCRs.

122. Table 13 summarizes the land use status of the 11 villages along the proposed transmission line ROW.

Table 13 Land Use and Livestock in Project Affected Villages⁶⁶

Villages along the transmission line	Wheat (ha)	Orchards (ha)	Other land (pasture/ etc.) (ha)	Irrigated land (ha)	Dry land (ha)	Fallow land (ha)	Horses	Sheep/ goats	Cows
Oyinli	1,350	177	0	4,045	0	0	6	3,520	2,456
Oltinvoha	130	15	0	145	0	0	6	958	440
Qishloqbozor	558	51	117	1,128	0	0	7	2,694	793
Bogobod	1,100	68	382	1,800	0	0	0	2,352	1,100
Boyqishloq	630	10	0	1	0	0	4	1,900	1,110
Oqtapa	465	23	42	910	11	0	3	465	
Takiya	575	9	0	1,151	30	30	5	4,000	5,000
Yangi Obod	9	40	0	20	0	0	100	5,040	37,015
Navruz	99	3	0	137	0	0	4	2,800	980
Yangiobod	0	0	71	0	0	0	0	400	100
Qushteppa	230	80	16,000	575	16,000	0	0	3,120	1,230
Total	5,145	477	16,612	9,911	16,041	30	135	27,249	50,224

⁶⁶ Project SSDDR, Surkhandarya Regional Municipality.



Figure 15 Solar PV Site



Figure 16 Farmland across the irrigation channel in with Solar PV site in the background



Figure 17 Irrigation canal with solar PV site in the background

Photo Documentation of the Solar PV site



Figure 18 Existing 100 kV transmission line transect from the site



Figure 19 New 220 kV transmission line – river Karasu crossing (width 12.4 meters)



Figure 20 Surkhan Substation

Photo Documentation of Transmission Line Transect and Existing Substation

4.4.1 Topography, Geology and Soils

123. The project area falls into topo classification as plains (“chul”) and foothill (“adyr”) zones⁶⁷. The site area is situated in the southeast direction of the western spurs of the Hissar Mountains. The wavy character of the plain is due to a combination of peculiar flat valley-like hollows, with their relative depressions up to 10-15 m between them and the watersheds. Absolute elevation of the solar site ranges from 322 to 349 m above sea level, a difference of 27 m. Total surface slope is from north to south.⁶⁸ Since the site terrain is mostly flat, it will require minimal levelling to elevate up to the engineering design. There is no hill cutting anticipated. Topographical study will be conducted for the final transmission line alignment and findings included in updated IEE and EMP during the detailed design.

124. The area of influence is covered with layers of alluvial-deluvial and alluvial-proluvial rocks and the remains of sea salts (rocks of Cretaceous deposits) of middle and upper Quaternary age. The maximum depth of soil freezing is: 24 cm – possibility of occurrence once every 10 years and 30 cm – possibility of occurrence once every 50 years.

125. The agency responsible for environmental monitoring is called the State Specialised Inspection of Analytical Control. This agency does not routinely monitor soil quality and data is not available for the project districts and/or the project sites. The soil quality testing for the solar PV site and the final transmission line alignment will be conducted as part of the engineering scope and will inform the detailed design and update of the IEE and EMP.

4.4.2 Meteorology and Climate

126. The prevailing climate in Sherabad is a semi-arid climate (dry subtropical). The average temperature in Sherabad is 18.1°C. The average annual rainfall in the form of snow, rain or hail is 144.6 mm expressed in large differences in daily and seasonal temperatures, a small amount of precipitation, with an uneven distribution over the seasons of the year. Most precipitation falls in the cold season (October–May). Air temperature has significant seasonal and daily amplitudes. The hottest months are June–July–August; the coldest are December–January–February. The maximum temperature falls in July (an absolute maximum of 47.4°C). The minimum temperature is observed in January (absolute minimum minus 15.5°C). In the warm period (July), north and south winds prevail at a speed of 3.4–3.2 m/s, maximum 3.2 m/s. The number of days with a dust storm and blowing snow per year is four. The standard value of the snow cover weight SO per 1m² of the horizontal surface of the earth is 0.5 kPa.

4.4.3 Air Quality and Noise

127. Field visits indicate that air quality in the project sites is good since these areas are located in rural setting without significant industrial or commercial zones, traffic volume to cause air quality degradation or high noise levels. This was also observed at the existing Surkhan substation site. Typically, in Uzbekistan, outside of main town center there are few industrial pollution sources and the volume of vehicular traffic is low. There is no available air quality data or noise level measurements for the project districts and/or project sites. Air quality and noise monitoring will take place to inform the environmental baseline; the collected baseline data will be incorporated into the updated IEE and EMP during detailed design stage.

⁶⁷ Geographic Atlas of Uzbekistan, 2012.

⁶⁸ Source: GFP–Topographical Report, February and March 2020.

4.4.4 Hydrology, Surface and Groundwater

128. **Hydrology.** The site is framed by irrigation networks of the Amu-Zang canal from the south and drainage networks from the north, east and west; the drainage is also fed by the right branch of the Sherabad canal. The hydrological assessment shows the Amu-Zang canal has not previously discharged over its design flow and flooded the site. Some flooding may occur in the lower irrigated terraces but these are located outside the site boundary. The final site engineering design will maintain the natural drainage pattern. Further, hydrological studies will be conducted (if required) for the final transmission line alignment and findings included in detailed design and in the updated IEE and EMP.

129. **Groundwater.** Groundwater quality analysis was conducted at the solar site to inform the environmental baseline. Groundwater table at site is at a depth of more than 8 m and is sulphate aggressive. The usage of groundwater will not be required and abstraction prohibited.

130. **Surface water.** There are no protected surface water bodies within the site or the project area of influence across the three districts. There is an unlined irrigation channel outside the site boundary that separates the site in the south from a farm land in the north. This will be conserved in its current natural condition by establishing a buffer of at least 50 m from the site fencing. The proposed transmission alignment will run across some man-made drainage canals and river Karasu (width of crossing 12.4 m). Detailed walk over will be conducted to finalize the final alignment and sensitive receptors will be identified. The findings will be included in detailed design and in the updated IEE and EMP.

131. **Water quality.** The State Specialised Inspection of Analytical Control does not routinely monitor water quality. Surface water quality monitoring will take place to inform the environmental baseline (refer to **Section 5** of the IEE). The collected data will be included in the updated IEE and EMP.

132. **Water usage and sources.** The main source of water for household and drinking purposes in the region is the river Sherabad. In-house water supply is available to only 36% of the households in Sherabad district. Tap drinking water supply is available to 55 % of all households in Kizirik district; and drinking water supply is via river Sherabad in Jarkurgan district. Three out of total 11 villages along the proposed transmission line do not have piped water connection and hence, rely on spring water and purchased water for daily usage.

4.4.5 Climate Risks and Natural Hazards

133. **Climate risks.** The project has been screened for future climate risks using a GIS based screening utilizing the UNEP PREVIEW data platform⁶⁹ and **the overall risk level is classified as low to moderate risk.** The screening indicates that the project is located in districts that may experience potential increase in incidences of wind, dust storms and temperature. Following the screening results, project components sensitive to climate risks were identified as listed in Table 14. These risks will be managed through integration of climate proofing / resilience measures in to the project detailed design in accordance with the Guidelines for Climate Proofing Investments in the Energy Sector (ADB, 2013) (also refer to discussion in Section 3 of the IEE).

⁶⁹ Weblink: <https://preview.grid.unep.ch/>.

Table 14 Climate Change Impact on Solar PV and Transmission Line Infrastructure⁷⁰

Climate Change Factor	Risk Level	Project Components Sensitive to Climate Risks
<ul style="list-style-type: none"> • Increase in temperature • Extreme Heat events 	Medium	<ul style="list-style-type: none"> • Lower cell efficiency and energy output • Lower capacity of underground conductors if high ambient temperature increases the soil temperature • Heat waves stress on roads, buildings and other project infrastructure • Can reduce electricity carrying capacity of lines • Can increase losses within substations and transformers
<ul style="list-style-type: none"> • Increase in precipitation including snow 	Low	<ul style="list-style-type: none"> • Can reduce efficiency due to snow accumulation on panels • Snow and ice can damage transmission and distribution lines (e.g., through sagging) • Heavy rains and flooding can undermine the structures due to erosion and can underground cables and control systems • Landslides and mudflows can undermine the infrastructure in mountainous areas
<ul style="list-style-type: none"> • Increase in wind speed 	Medium	<ul style="list-style-type: none"> • Increased efficiency and output with cooling effect of wind • • Scouring of panel and lower output if air is gritty / dusty, increased abrasion • Strong winds can damage transmission lines
<ul style="list-style-type: none"> • Increase in occurrence of extreme weather events (heat wave, flood, storm, drought) • 	Medium	<ul style="list-style-type: none"> • Increased risk of drought episodes and dust damage to solar PV plants • Less water availability for PV panel cleaning and maintenance of vegetation within the solar PV site • Drought can increase dust damage to transmission lines

⁷⁰ Data sources utilized: (i) World Bank's [Climate Change Knowledge Portal](#); (ii) [Guidelines for Climate Proofing in the Energy Sector](#), ADB May 2013; (iii) Global Facility for Disaster Reduction and Recovery. [Think Hazard, Water Scarcity](#); (iv) EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium (v) ADB. 2012. [Climate Risk and Adaptation in the Electric Power Sector](#). Manila.

134. **Extreme weather events.** The Surkhandarya region is susceptible to geophysical (earthquakes), meteorological (storms) and climatological (wild fires, droughts) events. For example, the project geophysical hazard risk is Medium for earthquakes; Climatological hazard risk is Medium for water scarcity and wild fires. Occurrence of extreme heat events is also High. Figure 19 presents the seismic zones in Uzbekistan. Surkhandarya basin is prone to mudflows that may generally occur during the periods of intense rainfall or rapid snowmelt. The project area of influence is outside the susceptible areas as shown in Figure 20 for period 2005 to 2014; however, detailed investigations will be undertaken during detailed engineering design and findings will be included in the updated in the IEE and EMP .

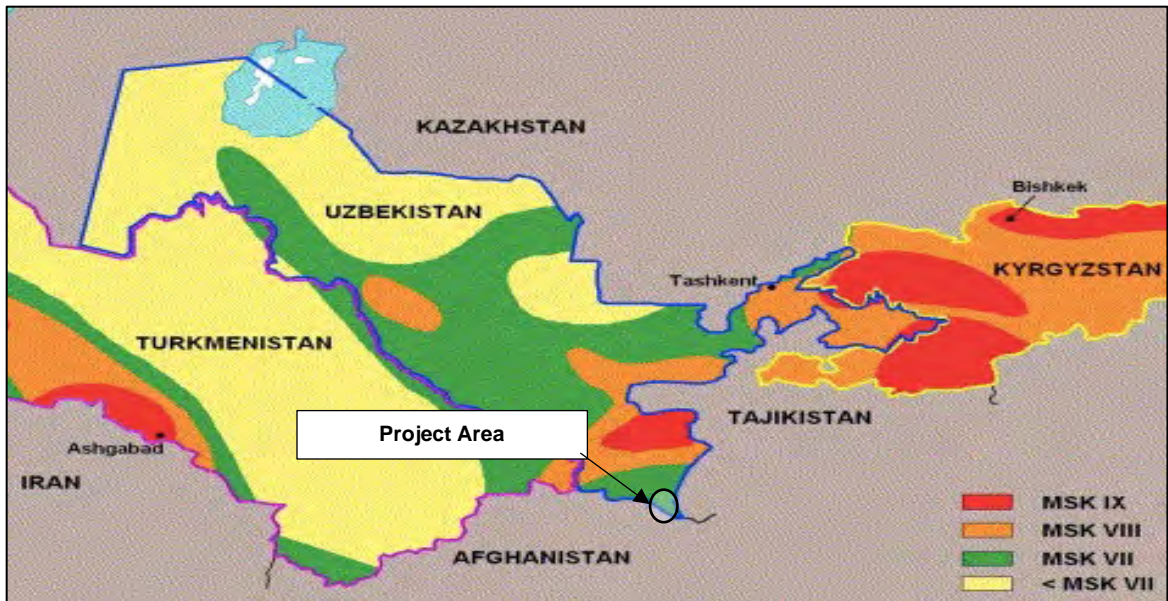


Figure 21 Seismic Risk, Uzbekistan⁷¹

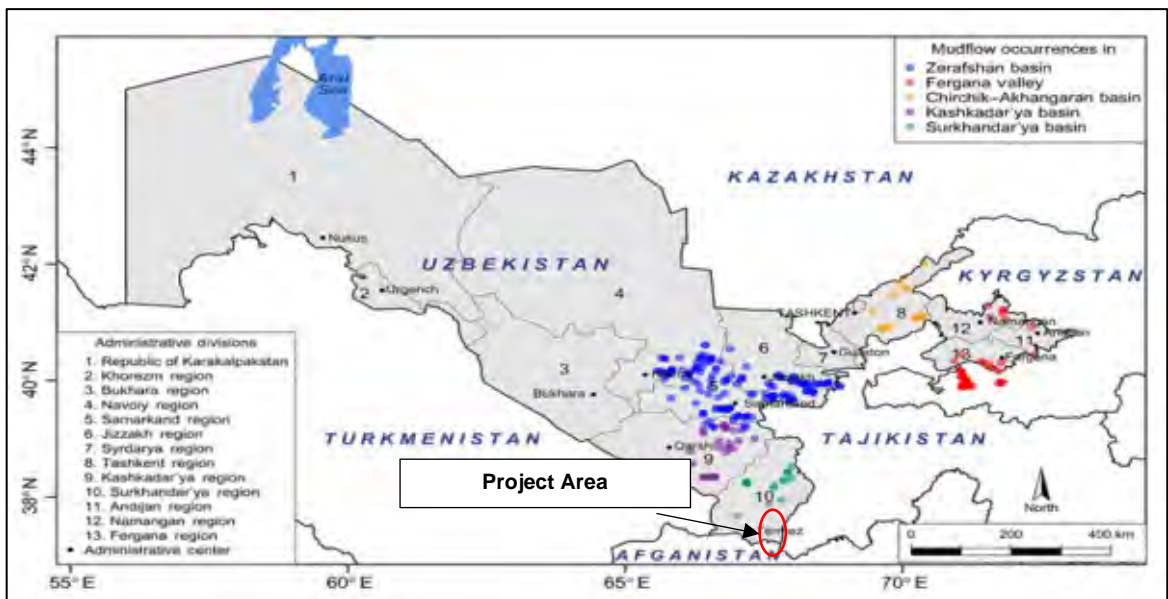


Figure 22 . Mudflow Zones in Uzbekistan⁷²

⁷¹ IEE report Guzar Transmission Line February 2020. Source: Soil Dynamics and Earthquake engineering, Volume 25, Issue 7-10, August – October 2005.

⁷² Source: IEE Guzar Transmission Line, February 2020; Statistical characteristics of mudflows in the piedmont areas of Uzbekistan and the role of synoptic processes for their formation. Natural hazards and earth system sciences discussions. 2018.

4.5 Ecological Resources

135. The following section presents the summary of key findings from the critical habitat assessment conducted for this project; details are enclosed as **Appendix 3**.

4.5.1 Special or Protected Areas

136. Figure 12 illustrates the protected areas in relation to the proposed project. The analysis of protected areas comprises both legally gazetted protected areas and internationally recognized areas with emphasis on Key Biodiversity Areas (KBAs).

137. The ecological survey findings identify one legally gazetted protected area in the ecological area of analysis, the Surkhanskiy State Nature Reserve (IUCN Management Category Ia). This protected area is separated into two components, namely a small piece along the Amudarya Flood-lands bordering Afghanistan 30 km south-east of the proposed solar site and a larger piece on the Kugitang Ridge located 22 km north-west of the solar site bordering Türkmenistan. The Kugitang State Nature Reserve exists in Türkmenistan adjacent to the northern component of the Surkhanskiy State Nature Reserve. These two components of the Surkhanskiy State Nature Reserve are located in fundamentally different habitats and will support different species compositions and ecological processes. Limited biodiversity movement or ecological connectivity is therefore expected between these areas. Overall five KBAs occur in the ecological area of analysis and are listed on the IUCN-map of recognized KBAs. KBAs are associated with each piece of the above Surkhanskiy State Nature Reserve, namely the Kugitang and Baysuntay Mountains KBA overlaps the north-western piece and the Amudarya Flood-lands overlaps the south-eastern piece. The Koyendag KBA occurs within Türkmenistan and overlaps the Kugitang State Nature Reserve. KBAs that are smaller in size and more distant to the project exist east of the project area of influence at the Aktepe reservoir and north at the Yuzhno Surkhan reservoir. The project area of influence does not intersect any of these protected areas/KBAs. These protected areas are associated with either mountainous terrain or wetlands, and therefore support ecosystems that differ substantially from ecosystems associated with the project area of influence. These protected areas are therefore not expected to be influenced by the proposed development and they are not considered critical habitat features associated with the project.

4.5.2 Habitat Description

138. The Solar PV site is located within Karakyr Uplands habitat. The ecological survey findings describe the habitat interlaced with clear patterns of past agricultural practices. The transmission line transect passes through habitats described as agrolandscapes, the Shuratakum Gorge, Karasu River, Khaudag Ridge and the Kattakum Sands. The ecological survey findings describe the Khaudag Ridge and the Kattakum sands as similar and representing a single entity. Table 15 presents a classification against the PS6 definitions for each of these habitats.

Table 15 Assessment of modified and natural habitat in the area of influence

Habitat	Description	PS6 Habitat Classification
Solar PV site		
Karakyr Uplands	<ul style="list-style-type: none"> - In the Soviet period, an unsuccessful attempt was made to develop agriculture, as seen from furrows and remains of a network of canals covering over 50% of the site area. Since last worked, 20—25 years ago, the vegetation has recovered and currently the territory is covered with ephemeral (fast-growing) plants typical of a disturbed environment. - Aridity and strong grazing have resulted in a very low projective cover (10–20%). The vegetation is largely uniform, with low composition, and the only differences between various portions of the site are slightly varying levels of projective cover. - Nearby residents use the area to pasture their livestock, with uncontrolled dumps of domestic and construction waste along the periphery of the site. - Weeds are not abundant and do not play a significant part in the vegetation cover. No rare species included in the national or international Red Data Book were recorded during the field survey. - No naturally occurring IUCN Red List or URDB threatened plant species were recorded during the field survey. - Google Earth imagery for this habitat shows considerable evidence of disturbance, in the form of past cultivation and intersected by abundant pathways (Figure 3). - The botanical report mentions the presence of areas of degraded virgin lands within the Karakyr Uplands, however the over-riding description of the area is one of widespread disturbance. 	Modified Habitat
Transmission Line route		
Agro-landscapes	<ul style="list-style-type: none"> - The affected part of the Sherabad valley features an anthropogenic landscape of cotton, wheat and alfalfa fields, orchards, vegetable gardens, tree lines, roads, networks of irrigation canals and villages. - 48 plant species, including cultivated plants were recorded, with 4 adventitious species and 12 synanthropic weeds. - No naturally occurring IUCN Red List or URDB threatened plant species recorded during field survey. 	Modified Habitat
Shuratakum Gorge	<ul style="list-style-type: none"> - A sandy loam habitat not suitable for agriculture, but actively used for livestock grazing, and in a similar state to the Karakyr Uplands. - No naturally occurring IUCN Red List or URDB threatened plant species were recorded during the field survey. 	Modified Habitat

Habitat	Description	PS6 Habitat Classification
Karasu River	<ul style="list-style-type: none"> - Secondary associations of ruderal and segetal weeds occupy small areas along roads, canals and field borders. Riparian and halophytic (tamarisk, camelthorn, reed) associations were recorded fragmentarily on the floodplain of the Karasu River. - No naturally occurring IUCN Red List or URDB threatened plant species were recorded during the field survey. 	Modified Habitat
Khaudag Ridge and Kattakum Sands	<ul style="list-style-type: none"> - Residents pasture their livestock and dispose of their rubbish here in an uncontrolled way. - A small quarry pit exists at the existing power transmission line, providing raw material for a cement plant. - Overgrazing is the main anthropogenic impact on the vegetation. - Forty plant species were recorded on the site, with 17 aboriginal weeds and only 1 adventitious plant – ruderal weed Xanthium spinosum. - No naturally occurring IUCN Red List or URDB threatened plant species were recorded during the field survey. 	Modified Habitat

4.5.3 Flora

139. The site covered with ephemeral plants and saltwort⁷³ (season April); No rare flora species included in the National or International Red Data Books were recorded during the field survey along the length of the proposed transmission line. Further surveys will be conducted to determine any flora at risk and findings will be integrated in the detailed design for potential risk mitigation and in the updated IEE and EMP.

4.5.4 Fauna

140. There are avifaunal / faunal species of conservation concern in the project ecological area of analysis as shown in Table 16. An initial analysis of bird flight patterns reveals that a diversity of high collision risk species is present within the ecological area of analysis but the number of flights by high collision risk species across project components in the project area of influence appears to be relatively low. Areas of highest sensitivity are avoided by the project. Data suggests that the majority of high and moderate collision risk species are flying at altitudes that exceed the maximum height of overhead transmission line, which reduces the likelihood of collision with these structures. However, data is collected during one season and there is a data gap associated with the transmission line crossing of the River Karasu. Endangered birds do occur, but are wide-ranging species and local populations are unlikely to meet thresholds provided by the IFC Guidance Note 6 (GN6)⁷⁴. Additional bird surveys will be conducted; refer to Appendix 3.1 (d) for terms of reference.

⁷³ A plant of the goosefoot family, which typically grows in salt marshes. It is rich in alkali and its ashes were formerly used in soap-making. Source: Appendix 3.1 Critical Habitat Assessment.

⁷⁴ Guidance Notes to the IFC Performance Standard 6 (updated June 27, 2019): [Online Link](#).

141. Critical habitat requirements are applicable for the reptile called Smooth even-fingered gecko (*Alsophylax laevis*), which likely occurs within the Karakyr Uplands and the Kattakum Sands. There is no data available for assessment of this species against the required thresholds of Criterion 1(a) of GN6⁷⁵. However, based on consultation with species specialists and the ADB, a critical habitat status as per this Criterion is considered appropriate following a precautionary approach in favour of protecting this species.

Table 16: Species of Conservation Concern in the Project Ecological Area of Analysis

FAMILY and Species names	English Name	Threat. Status
Birds		
1. ACCIPITRIDAE <i>Neophron percnopterus</i>	Egyptian Vulture	EN (VU)
2. ACCIPITRIDAE <i>Aquila heliaca</i>	Eastern Imperial Eagle	VU (VU)
3. ACCIPITRIDAE <i>Aquila nipalensis</i>	Steppe Eagle	EN (VU)
4. ANATIDAE <i>Marmaronetta angustirostris</i>	Marbled Teal	VU (EN)
5. FALCONIDAE <i>Falco cherrug</i>	Saker Falcon	EN (EN)
6. ANATIDAE <i>Oxyura leucocephala</i>	White-headed Duck	EN (EN)
7. OTIDIDAE <i>Otis tarda</i>	Great Bustard	VU (CR)
Reptiles		
8. TESTUDINIDAE <i>Testudo horsfieldii</i>	Central Asian Tortoise	VU (VU)
9. GEKKONIDAE <i>Alsophylax laevis</i>	Smooth even-fingered gecko	CR (VU)
10. AGAMIDAE <i>Phrynocephalus sogdianus</i>	Sogdian Toad-headed Agama	NL (NL)
11. LACERTIDAE <i>Eremias nigrocellata</i>	Black-ocellated Racerunner	LC (VU)

4.5.5 Socioeconomic Profile

142. The socioeconomic information is detailed in the project SSDDR, July 2020. A summary of the relevant sections from the project SSDDR is provided below. Since there are no directly affected persons/APs known at this stage, particularly along the proposed transmission line alignment, this section presents the general socioeconomic characteristics of the project area of influence. Once the line alignment is finalized, the socioeconomic profiled will be updated in the project SSDDR to correspond to changes, if any.

⁷⁵ Criterion 1(a) - Globally important concentrations of an IUCN Red-listed EN or CR species, PS6 updated Guidance Notes (revised 27 June 2019).

143. The project area of influence comprises of three districts: Sherabad, Kizirik and Jarkurgan districts in the Surkhandarya region.

144. **Sherabad district.** The main economic activities in Sherabad district are focused on agriculture. Cotton, grain crop, legume, wheat, vegetables, potatoes and fodder are most grown in this district. Grapes and fruit, such as pomegranate and mulberry, are also grown in the area. There are around 2,113 small business enterprises (985 from them are farm enterprises with average land area of 79 ha). The district population amounts 193,200 people (98,000 males and 95,200 females) consisting of 44,439 families who live in 34,364 households. There are 630 poor families registered in the district. Majority, 94.7% (178,700) of people are Uzbeks, 3.7% (7,100) Tajik, 0.9% (1,600) Turkmen, 0.1% (236) Russian, 0.1% (196) Tatar and 0.5% (903) other nationalities and ethnicities. There are no indigenous people living in the region. Power supply is available in 99.4 % of households including rural area and natural gas in 16.6% of urban district households. In-house water supply is available to 36% of the households.

145. **Kizirik district.** The main economic activities in Kizirik district are focused on livestock and poultry. There are 2,035 small business enterprises out of which, 1,197 are farm enterprises). Crops consist of cotton and wheat, grain crop and greens. Grapes and other fruits, such as apples, cherries, apricots, quince are also grown in the area. The district population amounts to 173,868 people (87,244 male and 86,624 female) consisting of 38,200 families living in 29,700 households. There are 324 poor families registered in the district. District urban population is 18.4% and rural population is 81.6%. There are 5 small towns, 79 settlements and 49 Makhalla(s). Majority, 97.4% (165,021) of people are Uzbeks, 2.1% (3,506) Tajik, 0.07% (105) are Turkmen, 0.1% (108) Russian, 0.1% (107) Tatar and 0.3% others nationalities and ethnicities. There are no indigenous people living in the region. Power supply is available in all urban and rural households in the district. Gas supply is available in the cities, except for rural areas. Tap drinking water supply is available to 55,0% of all households

146. **Jarkurgan district.** The main economic activities in the district is focused on agriculture. There are 2,082 small business enterprises out of which, 832 are farm enterprises. Crops are wheat, cotton, vegetables and greens. Grapes, apple, cherries, walnut and mulberry are also grown in the area. The district population amounts to 217,866 persons (111,449 male and 106,417 female) with 51, 697 families living in 37,051 households. There are 139 poor families registered in the district. Majority, 95.5% (203,800) are Uzbeks; 2.7% (5,700) Tajik, 0.3% (600) Turkmen, 0.5% (1,000 people) Russian, 0.2% (400) Tatar and 0.8% other nationalities and ethnicities. Power supply is available in all urban and rural households in the district. There is no gas supply in the area. The main source of drinking water is Sherabad River.

5 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

147. This section assesses the manner in which the proposed project will interact with the physical, ecological and socioeconomic resources in the defined area of influence and produce potential impacts to valued receptors (VERs). Impacts were assessed across all stages of project lifecycle. Potential cumulative and induced impacts were also considered. Impacts are identified and predicted based on analysis of the available information as detailed in the Section 3 - Project Description and Section 4 - Description of Baseline Environment of the IEE.

5.1 Impact Assessment Methodology

148. Predication of impacts. Predication of impacts is an objective exercise to determine the potential interactions between the project and the baseline environment. From these potential interactions, the potential impacts to the various valued receptors or VERs were identified and are elaborated to the extent possible; for type of impacts refer to **Box 1**.

BOX 1. Type of Impacts
▪ Positive or beneficial, when impact is considered to represent improvement to baseline or to have introduced a new desirable factor
▪ Negative, when impact is considered to represent adverse change from the baseline or to have introduced a new undesirable factor
▪ Direct, impacts that result from a direct interaction between the project and a resource/receptor
▪ Indirect, impacts that follow on from the direct interactions between the project and its environment as a result of subsequent interactions with the environment
▪ Induced, impacts that may be considered as special form of indirect impacts, having no direct links with the project activities being assessed but are a result of the changes caused by the project
▪ Cumulative, impacts from further planned development of the project, other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken

149. Evaluation of potential impacts. The evaluation of impacts was considered in the context of the (i) valued receptor, (ii) magnitude of size of the potential impact, and (iii) sensitivity of the valued receptor to change; these are detailed as follows:

- i. "Valued Receptor/VERs": the resource (human/natural environment/economic/social) that is potentially going to receive and have to cope with an impact
- ii. "Magnitude" or the size of the potential impact: Impacts may be short term and considered of small magnitude (e.g. noise, dust or vibration) or long term and considered of large magnitude (e.g. global and regional flyways of migratory birds); it is a function of one or more of the following characteristics:
 - a. **Scale:** refers to the degree of change that may be caused to the VERs⁷⁶

⁷⁶ Medium/Reversible damage to natural environment but likely to easily revert back to earlier stage with mitigation (Perceptible change from baseline conditions but well within acceptable norms); High/Irreversible damage to natural environment and/or difficult or may not to revert back to earlier stage with mitigation (Major changes in comparison to baseline conditions and/or likely to regularly or continually exceed the standard.

- b. **Extent:** refers to spatial / geographical extent of the impact due to the project⁷⁷
 c. **Duration:** refers to temporal duration of the impact due to the project⁷⁸

The magnitude of impact se are further elaborated in **Box 2**

Box 2. Magnitude of Impact			
Criteria	Physical/ecological receptors	Socioeconomic receptors	Ranking
Low magnitude of impact Temporary, short-term and localized which is reversible, likely to occur during peak project activity	Minor reversible impacts on physical resources limited to project area of influence. Minor short-term disturbance or damage to small area of limited significance. Temporary disturbance of habitats which are limited; areas not declared as legally protected habitats. Localized displacement of vegetation, fauna habitats.	Reversible impairment and/or medical treatment injuries not needing hospitalization. Potential land use conflict may arise which could be discussed and readily resolved.	Small
Medium magnitude of impact Temporary, medium term and local / regional, which is reversible	Moderate reversible, medium-term, widespread impacts existing over projects area of influence and surrounding area due to project development. Temporary or localized ad/or regional change in ecological environment	Reversible impairment requiring some hospitalization Irreversible impacts on households, livelihood activities and food sources but acceptable to communities	Moderate
high magnitude of impact, permanent and irreversible	Major impacts associated with irreversible effects due to project development.	Irreversible impairment Land use conflicts, livelihood impacts that may be resolved through serious of negotiations	Large

- iii. “Sensitivity”: ability to cope with an impact and/or its importance to Uzbekistan. It is generally accepted that human health is always a high sensitivity receptor, however in terms of natural resources/receptors, the sensitivity varies according to the receptor e.g. scrubland with no significant biodiversity is considered less sensitive than a water body which may support aquatic ecosystems or the local biodiversity or livelihoods through fishing and/or tourism; refer to **Box 3**.

⁷⁷ Local: Project area of influence and identified buffer; Regional: Project area of influence and the wider surrounding area; National/ Global: Project area of influence and beyond geographical boundaries.

⁷⁸ Short-term: Only during particular activities or phase of the project lifecycle; Medium-term: spread across several phases of the project lifecycle; Long term: Spread beyond the lifecycle of the project.

150. Note: Where an impact may occur, if there is no receptor to potentially receive the impact, then mitigating actions will not be required. This follows the source-pathway-receptor model, whereby in order for there to be an impact, the pollutant or issue (source) needs to be present, the pathway to a receptor is needed (such as water for human consumption) and a receptor must be present to receive the impact, such as humans, flora or fauna.

Box 3. Establishing Sensitivity Criteria			
Establishing Sensitivity Criteria	Definitions for Natural resources / receptors	Definitions for Socioeconomic receptors	Ranking
Sensitive receptor has a high natural resilience to imposed stresses	Existing physical environment quality is good Modified habitat that supports ecological resources that are not sensitive to disturbance	Human receptors are located away from project activities and will not to be affected	Low
Sensitive receptor has a moderate natural resilience to imposed stresses	Existing physical environment quality shows some signs of stress Habitat supports ecological resources that could be sensitive to change in quality or physical disturbance	Human receptors are located adjacent to project activities and likely to be affected yet still retaining an ability to at least in part adapt to change brought by the project and opportunities associated with it.	Medium
Sensitive receptor with little resilience to imposed stresses	Existing physical environment quality is already under stress Habitat supports ecological resources that are sensitive to change (includes protected areas, habitat or species of significant conservation value (national / global))	Human receptors are located within the project footprint and directly affected by project	High

151. Level of impact / impact significance. Once, the magnitude of impact and sensitivity are characterized, the level of impact was assessed which is typically designated using the matrix enclosed in Box 4. With category A excluded, the magnitude of impacts is predictable will be relatively low for project activities. However, to maintain the integrity of the assessment process, the results of impact assessment are enclosed in Table 18. with identified mitigation measures (detailed in the project EMP, BAP and BMEP) and residual impact evaluation.

Box 4. Level of Impact / Impact Significance				
Level of Impact ↓	VERs →	Sensitivity to Impact		
		Low	Medium	High

Magnitude of Impact	Small	Negligible / Low	Low	Medium / Moderate
	Moderate	Low	Medium / Moderate	High
	Large	Medium / Moderate	High	Catastrophic

Table 17: Results of Impact Assessment

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
A. Physical Resources										
1	Climate Risks	Subproject vulnerability due to climate risks	H	Indirect/ Irreversible	x			<ul style="list-style-type: none"> Integrate climate proofing measures into detailed design 	L	SPV PIU / PMU to monitor implementation as per EMP
2	Topography (Land and Vegetation)	Potential adverse impact on valued receptors	H	Direct/Local / Irreversible	x	X		<ul style="list-style-type: none"> Project sites / ROW selected to avoid valued sensitive natural and human receptors 	L	SPV PIU / PMU to monitor implementation as per EMP
		Change in land-scape/ visual impacts	H	Direct/Local /Irreversible	x	X	x	<ul style="list-style-type: none"> Finalize conceptual and design plan and optimize land area, clearance restricted to work sites Installation of movement sensors to reduce light effect at solar site 	M	Speak approval for land use e.g. TL ROW
		Lack of sufficient design and planning to ensure long term sustainability of subproject and	H	Direct/Local /Irreversible	x	X		<ul style="list-style-type: none"> Detailed design to integrate recommendations from geo-tech / topo investigations; including extreme weather events in 	L	SPV PIU/PMU to monitor implementation as per EMP

⁷⁹ With Category A excluded, the magnitude of impacts is predictable and will be relatively low for all project activities. However, to maintain the integrity of the impact assessment process, the "level of Impact" has been categorized as Low, Medium, High (L/M/H) prior to application of mitigation measures while type and nature of impact is described as Direct / Indirect, Local/Regional, Reversible / Irreversible.

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
		protection of assets created						<ul style="list-style-type: none"> design project components Detailed design will include provisions for ensuring effective maintenance and protection of assets created 		
		Change in the natural physical features and current aesthetics due to the construction and operation of the project components	H	Direct/Local /Irreversible	x	X	x	<ul style="list-style-type: none"> Minimize permanent and temporary land take for civil works; clearances restricted to works sites Maintain natural site drainage pattern; Drainage works designed to utilize and maintain natural drainage patterns and to blend in the environment 	M	Site rehabilitation and clean-up after completion of civil works Standard O&M during operation
		Stockpiling of materials	M	Direct/Local /Reversible		X	x	<ul style="list-style-type: none"> Storage of (construction) material confined to work sites Implement – Materials Management Plan (including warehouses/storage) 	L	Continued implementation of 'Plan'
		Borrow pits/Spoils re-use/disposal	M	Direct/Local /Reversible	x	X		<ul style="list-style-type: none"> Maximize the re-use of earth-cut 	L	SPV PIU/PMU to monitor

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								<ul style="list-style-type: none"> materials, spoils, and construction & demolition debris / wastes for backfilling at site • Implement –Spoils Re-use/Disposal Plan 		implementation as per EMP
		Resource materials	M	Direct/Local /Reversible	x	X		<ul style="list-style-type: none"> • Maximize the re-use of earth-cut materials, spoils, and construction & demolition debris/wastes • Specify materials that are recycled, have recycled content or are from sustainable sources • In case required, use borrow pits licensed by the relevant authority, if the re-use options are not feasible 	L	SPV PIU/PMU Monitor implementation as per EMP
		Hazardous materials	M	Direct/Local /Reversible	x	x	x	<ul style="list-style-type: none"> • Temporary and permanent secured area designed/set up for storage and handling of hazardous and polluting materials • Licensed vendors/ suppliers to collect 	L	Continued O&M of secured area and implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								transport and dispose used/unused hazardous materials/wastes, including broken/damaged PV modules		
		Waste generation (including construction & demolition debris / waste) and improper disposal	M /L	Direct/Local /Reversible	x	X (M)	X (L)	<ul style="list-style-type: none"> Implement – Hazardous Materials Control Plan Implement - Waste Management Plan (for all types of waste streams) Hazardous Waste Disposal Plan 	L	Implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP
3	Physical Cultural Resources (PCRs)	Potential impact on archaeological, historical or cultural important sites	H	Direct/Local /Irreversible	x	X		<ul style="list-style-type: none"> Avoid sensitive receptors such as PCRs Implement "Chance Find Procedures" Consult with relevant stakeholders for sensitive periods for religious/spiritual activities 	L	SPV PIU/PMU Monitor implementation as per EMP
B. Biological / Environmental Resources										
1	Air Quality	Impact on air quality during general project	M	Direct/Local /Reversible		x	x	<ul style="list-style-type: none"> Work sites to be enclosed/barricaded 	L	Implementation of 'Plan'

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
		activities due to increase in dust emissions and vehicular emissions						<ul style="list-style-type: none"> Periodic air quality monitoring at work sites / sensitive receptor Implement - Dust Control and Management Plan 		SPV PIU/PMU Monitor implementation as per EMP
2	Noise	Noise/ vibration due to general construction activities and vehicular movement	M/ L	Direct/Local / Reversible		x (M)	x (L)	<ul style="list-style-type: none"> Work sites to be closed / barricaded Periodic noise level measurements at work sites and at sensitive receptor locations Restriction of noise generating activities at night or if required, Deploy low noise equipment with sound insulation/sound proof structures Use of Personal Protective Equipment (PPE) like ear plugs, mufflers, etc. Implement – <ul style="list-style-type: none"> Construction Noise and Vibration Management Plan 	L	Implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP Inform communities close to work sites of scheduled activities

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								<ul style="list-style-type: none"> ○ OHS Plan ○ Community & Health Safety Plan 		
3	Surface Water Quality / Resources	Pollution due to runoff from general construction activities, spills – fuel, lubricant	M	Direct/Local / Reversible	x	x	x	<ul style="list-style-type: none"> • Periodic surface water quality monitoring at irrigation channel at solar site and/or water body along ROW • Implement – <ul style="list-style-type: none"> ○ Construction Wastewater Management Plan ○ Spills Response Plan • Run-off during operation stage to adequate receiving body e.g. rainwater harvesting pits/tanks, without causing on-site/off-site adverse environmental impacts 	L	Implementation of 'Plan' SPV PIU / PMU Monitor implementation as per EMP
		Competition in local water resources/supply	M	Direct/Local / Reversible	x	X	x	<ul style="list-style-type: none"> • Contractor to Forecast water demand during construction and operation 	L	SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								<ul style="list-style-type: none"> Avoidance of groundwater abstraction 		
4	Soil and Geology	Damage due to seismic activity	M	Direct/Regional/Irreversible	x			<ul style="list-style-type: none"> Site selection and design considering the geological conditions and seismicity as per national guidance on seismic design that calls for identification of a maximum credible earthquake scenario and associated ground acceleration parameters 	NA	NA
		Soil erosion	M	Direct/Local/Reversible	x	X		<ul style="list-style-type: none"> Detailed design to integrate recommendations from geo-tech / topo investigations Soil quality testing as part of the detailed engineering design scope Consideration of suitable slope and soil type Proper land levelling and grading for stabilization and other erosion-prone working areas, at 	L	SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								spoils disposal sites and permanent stabilization measures		
C. Ecological Resources										
1	Terrestrial Ecology	Loss of ecology, change in landscape	H	Direct/Local /Irreversible	x	x	x	<ul style="list-style-type: none"> No use of chemicals (pesticides/ herbicides) Minimize vegetation clearing confined to the footprint of work (construction and construction staging) sites Avoidance of dense tree clusters, cutting over 3 m along ROW Maintain field margins; re-vegetate the site immediately after construction; Restoring temporarily disturbed areas / land take to pre-construction conditions 	L	Site rehabilitation and clean-up after completion of civil works Standard O&M during operation
2	Terrestrial Fauna	Species vulnerability to anticipated change in habitat	H	Direct/ Regional/ Irreversible	x	X	x	<ul style="list-style-type: none"> Implement recommendations as per project BAP and BMEP in detailed design, during construction and operation 	L (measures for NNL)	SPV PIU/PMU Monitor implementation as per EMP, BAP and BMEP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								<ul style="list-style-type: none"> Undertake surveys to assess impacts of project activity 		
3	Avifauna	Disturbance to the local avifauna	H	Direct/Regional Irreversible	x			<ul style="list-style-type: none"> Implement recommendations as per project BAP and BMEP in detailed design, during construction and operation Undertake surveys to assess impacts of project activity 	L	SPV PIU/PMU Monitor implementation as per EMP, BAP and BMEP
4	Aquatic Ecology	Not anticipated	L	Direct/Local / Irreversible	x			<ul style="list-style-type: none"> Maintain buffer between tower footing and water bodies, for example river Karasu crossing No placement of tower footings in water bodies 	L	SPV PIU/PMU Monitor implementation as per EMP, BAP and BMEP
D. Human Environment										
1	Occupational Health and Safety	Exposure to hazards for workers working at work sites, on asphalt mixing, concrete mixing, cement, etc.	M	Direct/Local /Reversible	x	X	x	Implement Occupational Health and Safety Plan (including worker's facilities and work areas, COVID-19 risk mitigation) Strictly enforce the use of PPE Employment of trained workers; additional	L	SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								training of workers for specific type of work engagement, e.g. electrical works, transformer operation and maintenance, pumping equipment operation and maintenance, Diesel genset operation and maintenance, etc.		
		Fires, explosion and other accidents	M	Direct/Local/Irreversible		X	x	<ul style="list-style-type: none"> • Same as above 	L	SPV PIU/PMU Monitor implementation as per EMP
		Provision of construction/workers accommodation	M	Direct/Local/Reversible		X		<ul style="list-style-type: none"> • Provide adequate workers accommodation in line with IFC (WBG) guidelines IFC Guidance Note/Workers Accommodation 	L	SPV PIU/PMU Monitor implementation as per EMP
		Unhygienic conditions at construction / workers camps	M	Direct/Local/Reversible		x		<ul style="list-style-type: none"> • Provide water and sanitation facilities (situated separately for men and women); regular cleaning and disinfection of camps • Provide portable water/storage tanks • Provide health check-up/access to medical care 	L	SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
								<ul style="list-style-type: none"> • Provide waste bins and collection, no final disposal onsite • Discharge construction/workers camp sewage/wastewater into onsite septic tanks or connect to local public sewer system 		
2	Community Health and Safety	Excessive disturbance to communities due to prolonged construction	M	Direct/Local /Reversible	x	X	x	<ul style="list-style-type: none"> • Meaningful consultations with communities to keep them informed of anticipated activities, • Identify and adhere to strict construction schedule • Ensure communities are aware of Grievance Redress Mechanism (GRM) entry points • Create awareness of health & safety risks of transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor • Implement – Community Health and Safety Plan 	L	Continued consultations with relevant stakeholders and affected communities Implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
		Temporary traffic management	M	Direct/Local /Reversible	x	X		<ul style="list-style-type: none"> Implement - Traffic and Road Management Plan 	L	Implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP
		Access to construction sites	M	Direct/Local /Reversible		x		<ul style="list-style-type: none"> Make all sites secure, and discourage access by members of the public through appropriate fencing, signage and/or security personnel, as appropriate 	L	Implementation of 'Plan' SPV PIU/PMU Monitor implementation as per EMP
		Utility services interruptions	M	Direct/Local /Reversible	x	X		<ul style="list-style-type: none"> Assess construction locations in advance and identify potential for disruption to utility services and risks before starting construction If temporary disruption is unavoidable, develop a plan in collaboration with relevant local authorities and communicate the dates and duration in advance to affected communities / persons / businesses 	L	SPV PIU/PMU Monitor implementation as per EMP

S. No	Environmental Parameter	Potential Environmental Impacts	Level of Impact L/M/H ⁷⁹	Nature of impact	Project Stage			Mitigation Measures Identified in project EMP	Residual Impacts	Additional Mitigation Measures
					Design & Pre-C	C	O&M			
ALL INFRASTRUCTURE										
		Information disclosure	H	Direct/Local	x	X		<ul style="list-style-type: none"> Conduct meaningful consultations Dissemination of project information booklet 	L	SPV PIU/PMU Monitor Implementation as per EMP
		Issues to land use and acquisition under ROW	H	Direct/Local /Irreversible	x	X		<ul style="list-style-type: none"> Gain additional consent and compensation for land owners as per SSDDR / LARP 	L	SPV PIU/PMU Monitor Implementation as per EMP/SSDDR/ LARP
4	Socio-economics	Beneficial impacts/job opportunities Influx of migrant workers	H	Direct/Regional		X	x	<ul style="list-style-type: none"> Hiring for temporary construction jobs; emphasis to local hiring to avoid social conflict Overall economic growth of the region 		

5.2 Project Environmental Benefits

152. This project is expected to have **positive** environmental benefits. A transition to clean solar energy generation will limit import dependence on coal and other fuels and reduce reliance on old steam-turbines for power generation. This will contribute towards national development priorities for more renewable energy sources (RES); 97% of total RES in the country is solar energy⁸⁰. The project will construct a Phase I of minimum 200 MWac capacity solar site with a possible expansion up to 500 MW and the corresponding GHGs reductions is presented as follows:

Greenhouse Gas Emissions Reductions from Project⁸¹

Installed Capacity	Average Annual Avoided Emissions (tCO₂e)	Lifetime Avoided Emissions (tCO₂e)
Phase I: 200 MW (min.)	272,000	6,800,000
Phase II: 300 MW (500-Phase I)	408,000	10,200,000
Total 500 MW	680,000	17,000,000

5.3 Anticipated Impacts and Mitigation Measures during Design and Pre-Construction Stage⁸²

153. Lack of project readiness checks for effective environmental management and integration of safeguards into project detailed design at this stage of the project cycle will potentially lead to impact significance that is high. These can be readily mitigated as shown in the following paragraphs; residual impacts will be low. Exception is the land use change that will result in direct and irreversible impact since the establishment of the solar PV plant will convert unused land to industrial use (+20 years), therefore, the residual impacts in this case will remain moderate since the land use change is for long term.

154. The potential adverse environmental impacts associated with this stage will be avoided or minimized by: (i) careful site selection and route alignment; (ii) integrating key measures for safeguards that will permanently become part of the infrastructure and will be included in the project detailed engineering design; (iii) implementation of environmental mitigation measures as per EMP for identified impacts; (v) implementation of the biodiversity risk mitigation measures as per BAP and BMEP (refer to discussion in **Section 5.6. Main Findings of CHA**); and (iv) ensuring project environment management readiness. Key measures are discussed below:

Key Measures During Site and Route Selection

155. Site and Route Selection.

- i. Site and route selection is a critical issue for the management of impacts on identified valued receptors, particularly: a) households areas/structures, b) surface water

⁸⁰ Third National Communication to the UNFCCC by the Republic of Uzbekistan. Weblink: https://unfccc.int/sites/default/files/resource/TNC_of_Uzbekistan_under_UNFCCC_english_n.pdf

⁸¹ Assuming 493,438 MWh (P50) for 200 MW and 740,000 MWh for 300MW energy generated by PV plant (Suntrace) and calculating the baseline emission using the grid emission factor for Uzbekistan (source: <https://www.adb.org/sites/default/files/institutional-document/296466/guidelines-estimating-ghg.pdf>)

⁸² Project design is discussed in detail in the updated project Feasibility Study that builds on the draft Feasibility Study undertaken in October 2014

- sources, c) groundwater wells, d) road / railway crossings, e) PCRs, f) protected areas, habitats and species of conservation value, and f) global and regional flyways of migratory birds
- ii. The preferred solar site and transmission line route was selected to avoid areas prone to high climate risks (e.g. Wildfire, Mudflows, etc.) as well as valued receptors (sensitive natural and human receptors) to minimize impacts on crops, orchards and trees of economic value and human health.
 - iii. For site and route selection / assessment
 - MOE / NEGU and ADB undertook site visits and due diligence to assess the project site, the transmission line route options and connection to grid for the project between November 2019 and – February 2020.
 - IBAT screening was conducted across the Surkhandarya region to identify protected areas / KBAs in correlation to the proposed project.
 - Sensitive natural and human receptors across the three districts were compiled, as shown in Table 17.
 - iv. Detailed walk over survey will be conducted for the final transmission line alignment (once confirmed) to inform the detailed engineering design; the alignment will be adjusted as needed to avoid impacts to sensitive natural and human receptors and to minimize the cutting of trees, orchards crops for the ROW.

156. Land Requirements.

- i. **Permanent land-take.** The proposed project will involve permanent land use for the solar site; however, all land belongs to the Government and no land acquisition is involved. There is no permanent land acquisition for the transmission line ROW except for tower footings (total number of towers 163 for length 52 km)⁸³. All land procurement will be completed prior to any award of contracts/civil works. The PMU will undertake appropriate and timely compensation for land take and affected ROW for the final transmission line alignment as described in the project SSDDR developed in accordance with ADB SPS requirements and MOE/NEGU compensation schedule. There will be no permanent restriction to use of ROW e.g. agricultural use within the 'safety zone' except during construction phase.
- ii. **Temporary land-take.** The temporary land take areas will avoid sensitive receptors such as farmland, irrigation canals / dykes that are used and households/structures. All the temporary sites will be vacated and restored or vegetated upon completion of civil works by the contractor (s). There is no temporary land-take associated with the solar site; all civil works will be undertaken within the final solar site acquired area (600 ha). Any temporary impact outside the corridor of impact assessed in the project SSDDR will be subject to compensation at the cost of the contractor(s) and through written agreement with the landowner.

Key Measures during Detailed Design

157. Site and Infrastructure Design.

⁸³ The exact impact on the privately used land and other assets will be determined when the transmission line alignment is finalized and the exact tower location is agreed by the MOE and NEGU.

- i. Integrate measures for potential climate risk impacts and extreme weather events in project detailed design for potential incidences of wildfire, snow fall, water scarcity, increased temperature (intensity and frequency)/heat wave, as shown:

Wildfire / Mudflows
Solar Site and Substation.
<ul style="list-style-type: none"> ○ Where avoidance of wildfire / mudflow prone areas is not possible, the solar site and substation should conform to applicable wildfire land use planning regulations, building regulations and undertake preparation (warning and evacuation) and prevention activities should be conducted regularly (e.g. fuel reduction programs in seasons where risk of wild fire is high; cutting gaps in vegetation to act as fire breaks)
Transmission line.
<ul style="list-style-type: none"> ○ Where avoidance of wildfire / mudflow prone areas is not possible, reinforce existing transmission structure ○ Consider a resilient high capacity overhead for towers
Extreme Snow fall (intensity and frequency)
Solar PV and Substation.
<ul style="list-style-type: none"> ○ Assure free space (panels and mounting) so snow can slide off panel. ○ Design elevated site above projected snow levels, improved protection measures for equipment mounted at ground level, including water reservoir / strengthening natural drainage design that accounts for precipitation / snowfall projections in the area ○ Mitigate excessive erosion, sediment transport, e.g. develop and implement Site Restoration and Clean-up Plan including re-vegetation of the solar site
Transmission Line
<ul style="list-style-type: none"> ○ Avoid the construction of new tower footings in or near irrigation canals / dykes and avoid placement of towers in water sources ○ Consider a resilient high capacity overhead transmission tower ○ ROW to consider suitable slope and soil type ○ Include lightening protection (earth wires, spark gaps) in the transmission infrastructure ○ Protect masts, antennae, switch boxes, aerials, overhead wires, and cables from precipitation (snow); wind; unstable ground conditions (subsidence); and changes in aridity ○ Mitigate excessive erosion, sediment transport, e.g. develop and implement Site Restoration and Clean-up Plans including re-vegetation of sites along ROW
Access branch road / drainage.
<ul style="list-style-type: none"> ○ Build all weather road pavement and raise embankment height of access branch road; build / strengthen drainage at new solar site as well as regular O&M
Temperature Increase / Extreme Heat Wave
<ul style="list-style-type: none"> ○ Specify more passive airflow beneath mounting structures (reducing panel temperature and increasing power output ○ Specify more effective cooling for substations and transformers

Water Scarcity
○ Design water retention reservoir for controlled inflow and overflow and use for operation and maintenance (e.g. landscaping, washing of PV panels, etc.) ⁸⁴
Wind Speed
○ Design structures to withstand higher winds
○ Dry areas, consider panel rinsing system to remove dust and grit.
○ Consider a resilient high capacity overhead transmission tower

- ii. Site design to also consider the geological conditions and seismicity as per national guidance on seismic design that calls for identification of a maximum credible earthquake scenario and associated ground acceleration parameters.
- iii. Site design to conserve the irrigation channel outside the solar site boundary (west of the access branch road) in its current natural condition and establish a buffer of at least 25 to 50 m from the site perimeter
- iv. Site design to integrate recommendations and measures included in the BAP and BMEP
- v. Site design to integrate and align recommendations from the ongoing Topographical / Geotech- studies

158. New Solar PV Plant.

- i. Site design to ensure that Solar PV arrays arrangement considers the maximum possible distance from each other. The larger the distance, the less negative impact on reptile, mammals and birds and plants and water-birds are less likely to mistake such PV arrays for waterbodies and will reduce the birds' mortality rate.
- ii. Provision for adequate perimeter fencing around the solar PV plant

159. Substation.

- i. Select AIS substation to avoid fugitive emissions of Sulfur Hexafluoride (SF6), a potent GHG
- ii. Design the substation location to minimize shading by the transmission line on the solar PV plant
- iii. Design and maintain a permanent ('bundled') impermeable surface and dykes capable of carrying 110% volume of materials for accidental spills or leakage; including an adequate size storage area for new equipment and damaged / discarded equipment and repairs
- iv. Provision for an oil containment system provided at transformer pad of new substation
- v. Provision for adequate perimeter fencing around the substation

160. Transmission Line.

⁸⁴ The volume of reservoir/pond depends on the solar PV plant size, to be ascertained during detailed design stage.

- i. Detailed walk over survey for final route selection to avoid agriculturally productive land, orchards with fruit bearing trees, habitats of conservation value, sensitive areas (e.g. schools, hospitals, parks), residential areas (households, other structures) and PCRs.
- ii. ROW to be adjusted to minimize cutting of trees
- iii. Survey to check ROW where tower / pole footings require extra reinforcement
- iv. Avoid placement of tower footings in water sources / water bodies
- v. Design as per the sanitary protection zone (SPZ) in line with the national standards

161. Upgrade Works.

- i. Upgrade works of existing facility/Surkhan Substation (AIS) to avoid use of circuit breakers or equipment that has fugitive emissions of Sulfur Hexafluoride (SF6), a potent greenhouse gas (GHG)
- ii. Complete physical on-site EHS audit of Surkhan substation and include corrective actions in the updated IEE and EMP.

162. Environment Baseline Surveys.

- i. Undertake key baseline surveys to inform detailed engineering design and the domestic environmental assessment as follows:
 - a) Water quality analysis once before the start of civil works, location: any water source downstream of the new substation, irrigation channel and along the final transmission tower footings (e.g. river Karasu crossing)⁸⁵
 - b) Air quality monitoring once before start of the civil works, location: solar site, at sensitive receptor sites (e.g. households) in close proximity to the final transmission line route alignment.⁸⁶
 - c) Noise level measurements once before start of the civil works, location: solar site and at sensitive receptor sites (e.g. households) along the final transmission line alignment.⁸⁷

163. Additional surveys. Undertake surveys to assess impacts of the new solar site and proposed transmission line alignment on biodiversity to inform the detailed design as per the recommendations included in the project BAP. Details are enclosed in **Annexure 1** BAP.

Key Measures during Pre-Construction

164. Project implementation set up. Contracting of PIC consisting of International and National Environment specialists will be carried out for effective project implementation. Details are detailed in Section 9 of this IEE.

⁸⁵ Water quality analysis will also be conducted once during civil works and once after completion of the civil works for the aforementioned locations (Discussion is included under the Construction Stage of this section).

⁸⁶ Air quality monitoring will also be conducted bi-monthly during the civil works and once after completion of the civil works for the aforementioned locations (Discussion is included under the Construction Stage of this section).

⁸⁷ Noise level measurements will be also be conducted bi-monthly during civil works for the same location and once after completion of civil works/upon commissioning of the substation for the solar site only (Discussion is included under the Construction Stage of this section).

165. **Training and capacity building.**⁸⁸ The capacity of PMU and contractors⁸⁹ responsible for implementation of safeguards measures will be strengthened through periodic training and the following steps:

- i. The PMU will assign one staff person as a safeguard manager and one staff person as safeguards officer (PMU-SS), on full time basis.
- ii. The SPV PIU will assign at least two full time persons on staff to handle safeguards implementation on the field (SPV PIU safeguards staff).
- iii. Each SPV contractor/sub-contractor will appoint at least one environment and social focal point person (C-ESO) within its staff on full time basis.
- iv. Each SPV contractor/sub-contractor will appoint at least one biodiversity focal point person (C-BO)
- v. Each SPV contractor/sub-contractor will appoint at least one health and safety focal point person (C-HHS) within its staff on full time basis.
- vi. Each SPV contractor/sub-contractor will appoint at least one GRM focal point person (C-GRM) within its staff on full time basis.

166. The PMU, SPV PIU and contractors will receive training in EMP, BAP and BMEP implementation, supervision, safeguards monitoring and reporting, project GRM, conducting meaningful consultations and information disclosure and on relevant environmental rules and regulation. Training will be facilitated by PIC. In addition, orientation and briefing of project staff, all contractors/sub-contractors, hired workers will be conducted prior to mobilization on site during construction and operation stages.

167. **Updating the safeguards documents.** Mitigation measures defined in this IEE and EMP as well as BAP and BMEP will be updated based on final detailed engineering design and completion of physical on-site EHS audit by PIC for the Surkhan substation. This will be the responsibility of the PIC with support from PMU. The revised documents will be submitted to ADB and PMU for clearance and disclosure on ADB's website when updated. PIC will develop site-specific checklists for contractors to use in monitoring safeguards and compliance during construction and operation stages.

168. **Safeguard Measures in Bidding Documents, Contracts and Tenders.**

- Updated EMP, BAP and BMEP will be included in the tender, bidding and contract documents ("documents") to provide basis for the SPV / contractors to coordinate with PIC to finalize and implement site specific SEMP's during project implementation.
- Documents will include a provision for imposition of penalties in case non-compliances to safeguards are encountered repeatedly.
- Documents will include a provision to compensate for any temporary or permanent damage and loss or inconvenience as a result of the project during construction outside the assessed Corridor of Impact in the project SSDDR.
- Documents will include a provision for each contractor to appoint Contractor – Environment and Social focal point person (C-ES), Contractor – biodiversity focal point person (C-BO), Contractor – health and safety focal point person (C-HS) and Contractor – GRM focal person (C-GRM) within its staff on full time basis.

⁸⁸ Also see Annexure 1. Environmental Management Plan.

⁸⁹ Contractors imply – SPV Engineering, Procurement and Construction (EPC), any key sub-contractors and facility operators. Note: Safeguards implementation during operation stage will continue through the SPV and for upgraded Surkhan substation through the NEGU.

- Documents will include a provision to integrate COVID-19 risk assessment and corresponding management plan for occupational health and safety that are aligned with government guidelines and measures listed in Part III of the EMP.^{90,91}
- Documents will include a tender requirement for the SPV / IPP to comply with Uzbekistan's environmental requirements.
- The EMP, BAP and BMEP will be attached as an Annex to the bid and contract documents and costs should be allocated for environmental and biodiversity management in the Bill of Quantities in line with the EMP, BAP and BMEP.
- Documents will include a provision to develop an Environmental and Social Management System (ESMS) enclosed as per Schedule 17 of PPA.

169. **Grievance redress mechanism.** The PMU will set up a project GRM that is acceptable to ADB and in accordance with the provisions and timeframes specified in the EMP. The GRM will function from construction to operation stage.

170. **Information disclosure, consultation and participation.** Information disclosure via project information booklet (PIB), meaningful consultation and participation activities will be continued with affected persons/ households / communities and other relevant stakeholders throughout the project implementation period as specified in the EMP; refer to Section 7 of this IEE.

171. **Permits, approvals and environmental clearances.** Obtain all necessary permits, approvals and environmental clearances from the relevant National and State authorities prior to award of work contracts.

172. **Physical cultural resources (PCRs).** There are no known PCRs within or in close proximity to the new solar site, with the exception of one cemetery and Eid prayer grounds. This will not be disturbed. The PCRs along the new transmission line transect will be avoided by adjusting the final line alignment to keep a distance of at least 50 to 100 m from the ROW. However, site preparation and civil works during the construction stage have the potential to disturb PCRs. The following measures will be implemented:

- i. Consultations will be carried out to ensure sensitive religious periods are taken into consideration prior to start of civil works.
- ii. Chance Find Procedures will be established and activated if PCRs are encountered during civil works as follows:
 - a) Civil works will be immediately suspended if any PCRs are encountered
 - b) Destroying, damaging, defacing, or concealing PCRs will be strictly prohibited;
 - c) The regional or main office of Government Ministry of Culture of Uzbekistan will be promptly informed and consulted
 - d) Civil works will resume only after thorough investigation and with the permission of the regional or main office of the Government Ministry

5.4 Impacts due to Project Construction Stage

⁹⁰ National guidance on Covid-19 is issued by the Government Ministry of Health.

⁹¹ The contractor's OHS plans will be reviewed by PIC in consultation with public health inspectors of the area, local medical officers and other relevant health specialists; with a recommendation forwarded to the EA and IA for clearance.

173. Potential adverse impacts during construction stage have been assessed for all proposed infrastructure types (solar site including solar PV plant and new substation and new transmission line). Impacts during this stage are of small magnitude (since these will be confined to work sites/project footprints) and the sensitivity of receptors is medium (exception is species vulnerability to anticipated change in habitat for which sensitivity is high, however, mitigation, monitoring and evaluation measures are prescribed in detail in project BAP and BMEP for species conservation and to achieve no net loss). Overall, the impact significance is moderate and residual impacts are low with the exception of the land use change/visual impacts for which residual impacts will remain moderate. All project activities will be supervised by the PMU safeguards staff in coordination with PIC and implemented and monitored by the SPV PIU and contractor C-ES/C-BO/C-HS/C-GRM focal point persons on staff.

5.4.1 Workforce Organization and Orientation

Orientation for Project Staff, Contractors, Workers

174. Prior to mobilizing on site, the PIC will conduct briefing and orientation for relevant project staff from PMU and SPV PIU including safeguards officers and focal point persons, workers, contractors, contractor appointed staff i.e. C-ES, C-HS, C-BO and C-GRM on the following. These activities will be monitored by the PMU.

- EMP, BAP, BMEP, GRM, Information disclosure and meaningful consultation, safeguards monitoring and reporting requirements
- ADB and Uzbekistan labor standards
- Responsibilities of the contractors in implementing the site EMPs (SEMPs), Standard Operation & Maintenance Plans (SOMPs) and monitoring safeguards compliance with environmental performance indicators and project EMP, BAP and BMEP⁹²
- Responsibility of the contractors in engaging with affected persons/households for project GRM
- Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs, COVID-19), child labor, bonded labor or forced labor⁹³ and implementation of COVID-19 risk management plan (refer to part 2 of IEE, or EMP part III)
- Record and maintain briefing and orientation events log with date, location, duration, and list of attendees

175. Under the supervision of the PIC and prior to mobilizing on site, contractors will conduct briefing and orientation (including training and drills) for workers on:

- SEMP implementation (refer to Table 16)
- BAP and BEMP
- EHS and hygiene at work sites as well as awareness of health & safety risks due to transmittable diseases (HIV/AIDS, COVID-19) to prevent potential incidences
- Record and maintain briefing and orientation events log with date, location, duration and list of attendees

Hiring of Workers

⁹² PIC will develop checklists for the contractors to use in monitoring safeguards / environmental compliance during construction stage.

⁹³ ADB is committed to due consideration of Core Labor Standards (CLS) in the design and implementation of subprojects. A CLS handbook has been developed by ADB with cooperation of International Labor Organization (ILO). The PMU will ensure compliance to applicable CLS of ADB-ILO during project implementation.

176. Project implementation will bring opportunities for local employment. While this is beneficial, it may also be a cause of conflict over transparency of hiring particularly if migrant workers are recruited over local people. The contractors will be required to use local labor for manual work and eligible local workforce for technical and administrative jobs. The PIC will monitor the compliance to priority of local hiring.

Presence of Workers at Construction Sites

177. The presence of project staff and workers at the project site may increase demand for services such as transport, food and beverages. The localized demand of services may result in an opportunity for local communities to set up temporary small-scale business in providing transport, food and beverages outside the new solar site or nearby the transmission line alignment work sites. This will be a beneficial impact to local economy. This may also lead to an increase in transmission of diseases; therefore, occupational health & safety plan and community health & safety plan will be implemented for containment.

Preparation of Site-Specific Environmental Management Plans/Standard Operating & Maintenance Plans

178. The Site Environmental Management Plans will help to avoid unplanned activities of contractors and will guide the smooth implementation of all project activities. The PIC in coordination with the contractors will prepare site-specific SEMP for the key activities; appropriate maps showing where activities will take place and corresponding implementation schedule. PIC will also guide contractors/facility operators to prepare Standard Operation & Maintenance Plans (SOMPs) in line with the environmental component likely to be affected.⁹⁴ The list of site SEMP are provided in Table 18; these will be submitted to PMU for approval.

Table 18 List of Site Environmental Management Plans (SEMP/SOMPs) Subplans⁹⁵

Environmental Attribute Likely to be Affected	SEMPs Sub-Plans
Land and Vegetation	Spills Response Spoils Disposal Plan Hazardous Materials Control Plan (including spill control and clean-up) Site Rehabilitation and Clean-up Plan
Biodiversity	Plans developed as per recommendations in Annexure 1 . BAP e.g. species rescue and release plan and Annexure 2. BMEP
Air	Dust Control and Management Plan
Noise	Construction Noise and Vibration Management Plan
Water	Construction Wastewater Management Plan Drainage and Storm-water Management Plan

⁹⁴ SOMPs will be developed taking reference from the SEMP except for Spoils Disposal Plan which will not be required during the operation stage.

⁹⁵ The plans will be based on construction program and work method statements; and detailed to include approach to environmental management via project EMP/SEMP/SOMP.

Environmental Attribute Likely to be Affected	SEMPs Sub-Plans
Waste	Materials Management Plan (including warehouse / storage) Waste Management Plan (for all types of waste streams) Hazardous Waste Disposal Plan
Humans (Communities / Workers)	Community Health and Safety Plan Occupational Health and Safety Plan (including worker's facilities and work areas, COVID-19 risk mitigation) Emergency Response Plan (ERP) Traffic and Road Management Plan
Physical Cultural Resources	Chance Find Procedures

5.4.2 Site Preparation and Civil Works

179. Site preparation and civil works will integrate key measures during detailed engineering design (refer to the Design and Pre-construction sub-section). Construction activities will be scheduled in the dry season, day-time, avoid sensitive periods for religious activities, breeding periods of fauna/aves, cropping/harvesting season, as possible. If unavoidable, standing crops on affected land will be harvested prior to start of civil works by informing affected persons in advance of the schedule for handing the required land (e.g. along the transmission line route alignment).

Impacts on Topography (Land and Vegetation)

180. **Solar PV plant and substation.** Impacts on land and vegetation will result from mobilization of workers, construction equipment and materials; setting up temporary construction (workers) camps; site preparation (vegetation clearance, backfilling /land levelling and grading for laying foundation⁹⁶) and civil works over 600 ha as well as construction and permanent paving of the access branch road (indicative width 5.5 m, length 2 km) within the solar site. Land levelling and grading works may alter drainage patterns at the solar PV and Substation site that may result in surface erosion and generation of spoil. Impacts will also result from operating cranes for unloading and installation of equipment, and commissioning of new equipment. These impacts will be temporary, short-term (during peak construction period) and localized at these work sites. The potential impacts on land and vegetation will be mitigated through the following measures set out in the EMP:

- Clear demarcation of work sites, no encroachment outside the demarcated zone
- Schedule civil n works in the dry season and avoid of other sensitive periods (for religious activities, breeding periods of fauna/aves, cropping/harvesting season), if possible
- Access to grazing sites in the wider project area will be maintained
- Construction (workers) camp set up at least 200 m from any other water source at site or in close proximity to the site including drainage/irrigation canals
- Vegetation clearances will be strictly restricted to the work sites and for permanent access branch road; hedges and field margins will be retained
- Use of herbicides/pesticides will be prohibited for vegetation clearing to prevent soil contamination

⁹⁶ For the solar site, the levelling of the site will ensure direct irradiance from the sun.

- Any damage to areas and infrastructure outside the agreed work sites (Corridor of Impact assessed in SSDDR) will be restored to pre-construction conditions and will be subject to compensation at contractor cost and through written agreement with the land owner, as applicable
- Stockpiling of materials to be within work sites
- Implement engineering and biological measures to prevent surface erosion such as provision of silt traps or sowing soil-binding grass, as needed.
- Restore loose soil from foundations through ramming, if required
- Proper land levelling and grading for stabilization and other erosion-prone working areas and permanent stabilization measures at least within 30 days of end of construction period
- Borrow pits for backfilling at solar PV and substation site and spoils disposal sites (if any), utilized as per pre-approved plans from the relevant authority
- Disposal of spoils on farmland or within 200 m of any water source will be prohibited
- Excess spoils will be backfilled onsite or spread onsite in a manner that it causes no disturbance to the natural drainage pattern, irrigation canal
- Restore vegetation cover on any backfilled areas to prevent soil erosion; If restoration is carried out during periods of hot or extreme weather, ensure adequate aftercare to maximize survival
- Installation of security lighting around solar site perimeter with movement sensor and as such the lighting would only come on when triggered
- Implement the following SEMP sub-plans
 - Spoils Disposal plan⁹⁷
 - Drainage and Storm-water Management Plan
 - Site Rehabilitation and Clean-up Plan after completion of civil works to improve visual aesthetics and to restore work sites to pre-construction conditions as possible including landscaping along the fenced site perimeter, maintain hedges and field margins to reduce visual and dust impact, re-seeding most or all of the site with native plant species (soil-binding grass) to stabilize the soil and restore habitat

181. **Transmission line.** Impact on land and vegetation will result from temporary land take for setting up temporary construction (workers) camps, workers, waste/recycling sorting area, mobilization of construction equipment and materials (these will be restricted to the construction (workers) camps and not along the line alignment except prior to installation); setting up temporary access tracks to the line ROW; site preparation and vegetation clearance along the 35 m ROW for the full length of the line. There will also be minimal earthworks, levelling and grading for laying foundations; placement of towers sequentially along the verge of the alignment prior to hole auguring and tower erection; and stringing of conductors. Land within the line alignment will be permanently impacted due to tower/pole footings, some trees may be permanently felled while other trees may be affected (lopping/pruning for ground clearance and maintenance of minimum sag). Land levelling and grading works at work sites (tower footings) may alter drainage patterns that may result in surface erosion, generation of spoil and/or localized flooding. These impacts will be temporary and localized. The line will cross river Karasu (width 12.4 m) and may cross smaller water canals/ streams but these crossings will not require any tower footings in the water bodies. The line may also cross roads (refer to discussion under Impact on Human Environment).

⁹⁷ Excess spoil will be backfilled onsite or temporary / permanently disposed as per pre-approved plans by a relevant authority on clearly identified disposal sites on site specific map, with corresponding distance and number of trips made will be maintained (this will help avoid disposal of spoil on farm land or within 200 m of any water source). Vehicles will be covered during transportation to avoid spillage. Spoils disposal sites (if any) will be rehabilitated and re-seeded within 30 days after closure to prevent soil erosion and dust generation.

The potential impacts on land and vegetation will be mitigated through the following measures set up in the EMP:

- Clear demarcation of work sites, no encroachment outside the demarcated zone
- For the transmission line, stockpiling of materials to be at the construction (workers) camp and not along the line except prior to installation
- Construction (workers) camps to be set up at least 200 m from any water source, drainage / irrigation canals or dykes
- Access to adjacent properties and agricultural land will be maintained, as necessary
- Vegetation clearances will be strictly restricted to work sites (tower footings, line ROW and temporary access tracks, if required)
- Use of herbicides / pesticides will be prohibited for vegetation clearing to prevent soil contamination
- Trees below 3 m will not be cut along the ROW; only tree looping / pruning will be done for ground clearance and to maintain minimum sag; for any tree cutting above 3 m, prior permission shall be obtained from the local relevant authority
- Schedule civil works in the dry season and avoid of other sensitive periods (for religious activities, breeding periods of fauna/ aves, cropping / harvesting season), if possible
- Record of crops and trees loss along the line alignment will be maintained in accordance with project SSDDR
- Any damage to areas and infrastructure outside the agreed work sites (Corridor of Impact assessed in project SSDDR) will be restored to pre-construction conditions and will be subject to compensation at contractor cost and through written agreement with the land owner, as applicable
- Restore loose soil from tower foundations through ramming, if required
- Excess spoil will be backfilled onsite or spread out at the tower footings in a manner that causes no disturbance to existing drainage / irrigation canals or local drainage pattern
- Disposal of spoils on farmland or within 200 m of any water source will be prohibited
- Implement engineering and biological measures to prevent surface erosion such as sowing soil binding grass along the line ROW after completion of civil works
- Implement the following SEMP sub-plans
 - Spoils Disposal plan⁹⁸
 - Drainage and Storm-water Management Plan
 - Site Rehabilitation and Clean-up Plan after completion of civil works to restore temporary land take along the transmission line to pre-construction conditions including vegetation planting along transmission line ROW to stabilize soil where it does not compromise the intended transmission function

182. **Upgrade works.** All civil works will be planned and executed within the fenced perimeter of the existing Surkhan substation plot and there is no new land acquisition or site clearing envisaged while minimal construction/civil works will be involved. The upgrade works will result in temporary and localized impacts and these will be mitigated and managed as per the EMP prepared for the project inclusive of any corrective measures and finding as per physical EHS audit.

⁹⁸ Excess spoil will be backfilled onsite or temporary / permanently disposed as per pre-approved plans by a relevant authority on clearly identified disposal sites on site specific map, with corresponding distance and number of trips made will be maintained (this will help avoid disposal of spoil on farm land or within 200 m of any water source). Vehicles will be covered during transportation to avoid spillage. Spoils disposal sites (if any) will be rehabilitated and re-seeded within 30 days after closure to prevent soil erosion and dust generation.

183. **Waste generation.** Impacts on resource use and impacts associated with disposal will arise from waste generated during site preparation and civil works. This includes generation of inert wastes e.g. spoil, biodegradable wastes (e.g. cleared vegetation), construction debris, packaging waste, metal scrap, domestic waste. Impacts of disposal and wind-blown litter will be seen at the construction areas and construction (workers) camps. Waste generation activities at existing substation will comply with the following requirements listed below and corrective measures based on physical EHS audit findings.

184. The potential adverse impacts will be mitigated through the following measures as set out in the EMP:

- Compliance with National laws and regulations on waste management/IFC (WBG) EHS Guidelines on Waste Management, Electric Power Transmission and Distribution⁹⁹
- Establish a covered onsite sorting and recycling area away from existing water sources, drainage/irrigation canals
- Transport of recyclables, scrap, discarded equipment to NEGU warehouse/depots, dedicated storage yards for resale or auction to authorized dealers
- For other type of wastes, licensed companies will be hired to collect, transport and dispose of wastes at government approved and licensed dump facilities; these will be marked on site maps
- Biodegradable waste such as cleared vegetation may be provided to local communities for use
- Provide multiple waste containers at construction/workers camps
- Waste burning will be prohibited
- No final waste disposal on site; coordinate with local agency for final disposal
- Implement the following SEMP sub-plans that will apply the waste hierarchy to ensure efficient use and management of resources with priority to prevent waste at source as much as possible, reduce impact to human receptors and prevent contamination to land and water sources.
 - Materials Management Plan
 - Waste Management Plan
 - Map with clearly identified waste disposal sites with corresponding distance and number of trips made to be maintained in a log book (this will help avoid disposal of construction debris on farmland or within 50 m of any water source)
- Contractor/sub-contractor(s) will be responsible for proper removal and disposal of any significant residual materials and wastes that remain on work sites after completion of civil works
- Implement corrective measures for Surkhan substation undergoing upgrade works

185. **Hazardous and polluting materials.** Inappropriate transportation, storage, usage, hazardous and polluting materials waste disposal, leakage and spills may result in adverse environmental impacts. A temporary secured hazardous material handling and waste storage area will be provided across all work sites. As part of a design feature, a permanent secured ('bunded') impermeable surface and dykes capable of carrying 110% volume of materials for accidental spills or leakage will be constructed and maintained at the solar site for the new substation; a provision will be made for an oil containment system at the transformer pad and a dedicated storage area within the substation plot for new equipment and damaged/discarded equipment and repairs will be established. Any hazardous and polluting materials generation

⁹⁹ The most stringent standards shall apply.

activities at existing substation will comply with the following requirements listed below and corrective measures based on physical EHS audit findings.

186. The potential adverse impacts will be mitigated through the following measures as set out in the EMP:

- Compliance with National laws and regulations on Hazardous Waste Management/IFC (WBG) EHS guidelines for Hazardous Materials Management, Waste Management, Electric Power Transmission and Distribution¹⁰⁰
- Controlled area set up for handling hazardous and polluting materials
 - Secured areas to be sited away from direct sunlight and 200 m from existing drainage/irrigation canals/and/or any water sources
- Delivery and acceptance of all hazardous materials/equipment will be accompanied by a Materials Safety Data Sheets (MSDS) and/or be certified that it is polychlorinated biphenyl-free (PCB) free
- NEGU warehouses/depots to collect, transport and store used/unused hazardous materials / wastes and coordinate with local agency for final disposal
- Licensed vendors/ companies to collect transport and dispose used/unused/broken PV panels
- Asphalt making process for access branch road (within the solar site) will be located at least 200 m downwind from the construction (workers) camps and/or nearest dwellings
- Vehicle / equipment maintenance and refuelling to be done offsite or within designated service area on impermeable surfaces and away from water sources
- Implement SEMP sub-plan
 - Hazardous Materials Control Plan (including spill control and clean up)
 - Hazardous Waste Disposal Plan
- The following records will be maintained:
 - Record of equipment and corresponding PCB free certificates
 - Record of MSDS
 - Record of used/un-used hazardous materials/waste collection for transport to and storage at NEGU warehouses/depots
 - List of licensed vendors/companies that collect, transport and dispose used/unused/broken PV panels
 - Record of incidents, spills/accidents/near-miss/fatalities
- Implement corrective measures for substation undergoing upgrade works

Impacts on Human Environment

187. **Construction (workers) camps.** There will be an influx of workers to work sites and construction (workers) camps set up that may result in adverse impacts due to unhygienic conditions or incidences of transmittable disease. The work sites will align with measures provided in Part III of the EMP for COVID-19. The work sites will be provided with facilities such as structures to house workers and sanitary facilities. The contractors will ensure that sanitary facilities are in good condition, wash areas are clean, safe drinking water is available, waste container bins provided in designated locations and good housekeeping is observed at all times. Construction (workers) camps will be set up at least 200 m away from any drainage/irrigation canals, dykes or water bodies. Construction (workers) camps are not required for upgrade works at existing substation since there is space within the substation perimeter to carry out all activities and substation is supplied with running water.

¹⁰⁰ The most stringent standards shall apply.

188. **Information disclosure and consultation.** Lack of information disclosure and meaningful consultation may result in lack of project acceptance. Information disclosure and consultation with nearby local residents (Community Awareness Program) and authorities will be conducted one month prior to commencement of civil works and intermittently during civil works. These activities will be conducted in and around the villages situated close to the solar site, proposed transmission line alignment and Surkhan substation. The following measures will be undertaken as set out in the EMP.

- Distribute PIB in local language and make it publicly available during consultations, at project construction field offices and at Makhalla or the Khokimiyats
- Record of consultations will be maintained in a log book
- Record of incidents/accidents/near-miss/fatalities associated with the project will be maintained
- Records of issues raised will be maintained in accordance with project GRM
- Implement corrective measure for Surkhan substation undergoing upgrade works

189. **Physical cultural resources.** During the construction stage, there may be moderate temporary air quality impacts due to fugitive dust generation and noise to any existing PCRs in close proximity to project site. These will be mitigated as per the steps detailed under Impacts on Air Quality, Noise and Vibration and by conducting consultations with local communities to avoid sensitive religious functions/periods. In addition, site preparation and civil works during the construction stage have the potential to disturb as yet unknown PCRs. A Chance Find Procedures will be implemented as necessary.

190. **Landscape change, visual impact.** The development of the solar site will result in landscape change from open, flat land to an area with an industrial character, with associated lighting; however, this is an area of low population density with no human receptors in and around the site. The proposed facility would sit low in the landscape and from more distant viewpoints would not read strongly in the view during the daylight hours. Steps to reduce visual impacts e.g. installation of security lighting around solar site fenced perimeter with movement sensor and as such the lighting would only come on when triggered, maintenance of hedges and field margins around the fenced perimeter will be incorporated during and after completion of civil works. Such impact due to the new transmission line will be localized to the tower foundation/footing sites.

191. **Interruption to existing utilities, interference or disturbance to surrounding areas.** Some inter crossings of the proposed transmission line with the existing lines are expected due to the geographical location of the new substation and the Surkhan substation. NEGU are experienced and have the requisite solutions that will be integrated into the detailed engineering design. Additionally, to reduce impacts on existing utilities (such as power outages), transmission line works and upgrade works at existing Surkhan substation will be scheduled in a phased manner such that existing power outages are no more than 12 hours in duration, and if possible, these will be scheduled during low use times in the 24-hour cycle. A 24-hour advance notice shall be provided to the affected communities for interference to existing utilities (e.g. power outages during interconnection of substation and transmission line). There are no anticipated interruptions to existing utilities within the solar site. Access to properties, farmland, village roads, ground water wells that are adjacent to work sites will be maintained or alternative route provided, as necessary.

192. **Use of existing access roads.** Delivery of equipment, materials and machinery to work sites at the solar site and transmission line alignment, construction (workers) camps and Surkhan substation may lead to increase in traffic and road congestion. In particular for the transmission line works, it may cause interference with road crossings during stringing of conductors.

Movement of transport vehicles will also result in moderate air quality impacts (dust and increase in vehicular emissions) as well as an increase in noise (due to operation of transport vehicles) during peak construction period (these are discussed under Impact on Air Quality, Noise and Vibration).

193. The potential impacts due to increase in traffic and road congestion will be mitigated through the following measures as set out in the EMP:

- Implement SEMP sub-plan: Traffic and Road Management Plan
- Follow planned transportation routes and delivery schedule
- Local communities to be made aware and signs to be erected in advance warning of planned detours, timing and duration
- Any traffic detours to have danger and clearly visible warning signs as well as flag persons
- Compliance with local speed limits vehicle load carrying capacity and other road regulations
- Access to village roads to be maintained or nearest alternative route to be provided
- Any damage to roads to be restored to pre-project condition at contractor cost
- Record of incidents/accidents/near-miss/fatalities/road damage will be maintained
- For the transmission line - when stringing and stretching conductors across road, the following practices will be followed:
 - Comply with existing NEGU standard operating procedures if any and the following:
 - Workers/Communities will be briefed in advance to plan activities
 - Advance approval from Ministry of Transport will be sought
 - Traffic will be diverted as appropriate to ensure safety
 - Scaffolding will be used to support conductors and minimize traffic disruptions
- Implement corrective measures at for Surkhan substation undergoing upgrade works

194. **Occupational Health and Safety.** Lack of occupational health and safety may result in high incidences of fatalities or injuries. Contractors will comply with the relevant health & safety measures required by law, national guidelines and those stipulated in Part III of EMP (COVID-19) and the potential impacts to workers will be mitigated through the following measures:

- Implement SEMP sub-plan: Occupational Health and Safety (OHS) Plan that will include COVID-19 health & safety risk mitigation measures
- Establish and implement ERPs as required
- Compliance with Uzbekistan Occupational Health & Safety laws and regulations/International Best Practices as per IFC (WBG) EHS guidelines on Occupational Health and Safety¹⁰¹
- Provide sanitary facilities and wash areas, safe drinking water and waste container bins
- Provide health assessments (health & fitness) to workers once every two months
- Periodic training will be provided to workers in all aspects of the ERP and OHS Plan
- Coordinate with nearest medical clinic / hospital for arrangements in case of accidents
- Provide first aid treatment for construction (workers) camps
- Assess safety risks and safety protocols (such as for electrical works, working at heights, etc.), and implement
- Workers will be equipped with PPE including proper safety clothes and protection gear/equipment to avoid accidents

¹⁰¹ More stringent standards shall apply.

- Provide communication devices to designated site officers/engineers
- Specifically, for works on transmission line
 - Compliance to relevant national electrical safety standards, Government Ministry of Energy and NEGU
 - Electrical safety risks will be assessed and safety protocols will be developed and implemented such as for electrical works, working at heights, etc.
 - All works at height will be prohibited during night time, periods off fog and strong wind on the Beaufort Wind Scale¹⁰²
 - All workers climbing towers/poles will have a Safety Certificate of Class 3¹⁰³ or above
 - All towers, steel structures and equipment will be properly earthed and equipped with lightning protection
 - When testing electrical equipment, all unrelated works in the flagged zone – marked as danger zone- will be stopped and unrelated workers will leave the zone
- Records of health assessments/incidents/accidents/near-miss/fatalities will be maintained
- Implement corrective measures at for substations undergoing extension works

195. **Community Health and Safety.** Site preparation and civil works, numerous terminating gantries for incoming and outgoing lines, erection of towers/poles, stringing of conductors, movement of vehicles bringing equipment, materials, supplies and machinery may interfere with road crossings, flow of traffic and may cause an increase in local traffic congestion. Access to farmlands, properties, village roads may be disrupted. These activities may pose safety risks to the communities residing in close proximity to the work sites and to the general public. In addition, construction (workers) camps and an influx of workers may cause social conflict or even lead to the spread of transmittable diseases. Transmission line tower footings are not anticipated close to road easements and this will be confirmed during detailed walk over survey for the final alignment. Since this is an overhead transmission line, crossings over roads will result in temporary disruption to movement of traffic and public. Contractors will obtain permissions from relevant authority before commencement of activities and inform communities on the schedule on a continuous basis including around Surkhan substation.

196. The potential impacts to communities and public will be mitigated by the following measures as set out in the EMP:

- Adhere to strict schedule for completion of civil works and avoid prolonged construction and disturbance
- Implement SEMP Sub-plans
 - Community Health and Safety Plan
 - Traffic and Road Management Plan
- Provide perimeter fencing to mitigate trespassing (fencing will be constructed with adequate ground clearance for passing of wild animals/other species at the solar site)
- Provide barricade to temporarily enclose open excavated tower foundations

¹⁰² The Beaufort Wind Scale is an empirical measure with 12 wind speed classes. Winds above Class V are higher than 10.8 m/sec.

¹⁰³ Electric Safety Classification is regulated in Circular 31/2014/TT-BCT (2014). The Circular stipulates five Safety Classifications (1 to 5), with 5 being the highest. A Class 3 Safety Certificate designates a worker capable of working in the field, and is given to workers/technicians who: 1) pass 80% of the training; 2) have knowledge of the proper use of PPE; 3) master the method to extract an electrocuted victim from the power source; 4) can provide first aid to an electrocuted victim; 5) is able to determine unsafe practices; and 6) is able to supervise electric workers working at height and near electric equipment.

- Provide sufficient lights, clear warning signs and danger signals
- Assign security personnel to prevent accidents, trespassing and pilferage
- Warning signs and cones will be installed in and around the transmission tower site and along access tracks/roads, with clearly marked danger zones
- Safety flags and flag persons will be used, as needed
- Record of incidents/accidents/near-miss/fatalities associated with the project will be maintained
- Records of issues raised will be maintained in accordance with the project GRM
- Outreach to local communities and information disseminate e.g. on project implementation schedule, health & safety and ERPs at the solar PV plant and substation, transmission line alignment and Surkhan substation will be provided via information disclosure and meaningful consultation activities and dissemination of project information booklet (PIB) in local language in the project area of influence.
- Implement corrective measures at for existing Surkhan substation undergoing upgrade works

Impacts on Air Quality, Noise and Vibration

197. **Air quality.** Moderate temporary or short-term air quality impacts are anticipated at peak construction phase (which will be scheduled in the dry season) such as fugitive dust generation associated with construction works and transport (of materials, equipment and machinery), loading, unloading and haulage of materials and corresponding increase in vehicular (exhaust) emissions and/or mobile generators. This will impact the construction workers at works sites and communities/households in the local area and downwind of the proposed transmission line alignment¹⁰⁴. Use of construction machinery and equipment and movement of transport vehicles may also levels of nitrogen oxides (NOx) and sulphur oxides (SOx), affecting air quality. Building access branch road within the solar site (asphalt road pavement) will produce fumes containing small quantities of toxic and hazardous chemicals such as volatile organic compounds (VOC) and poly-aromatic hydrocarbons (PAH). The Contractors will conduct air quality monitoring at the solar site and at sensitive receptor sites (e.g. households) downwind of the final transmission line alignment bi-monthly during the civil works and once after completion of the civil works to monitor and mitigate exceedances (if any) with respect to the Ambient Air Quality Standards (refer Section 2 of the IEE or EMP, Part II) . Dust generating activities at existing substation will comply with the following requirements listed below and corrective measures based on physical EHS audit findings.

198. The potential adverse impacts on air quality will be mitigated by following measures as set out in the EMP as follows:

- Work sites to be enclosed/barricaded
- Conduct air quality and noise monitoring (see Environmental Surveys)
- Periodic watering at construction sites, construction staging areas, unpaved areas, exposed dust prone construction stockpiles; Use of chemical dust suppressants prohibited
- Air quality and noise/vibration level monitoring to be undertaken using handheld portable air and noise/vibration monitoring devices at select locations for Occupational Health and Safety Purposes
- Use of chemical dust suppressants will be prohibited
- Maintenance of project construction vehicles, equipment, machinery, etc.

¹⁰⁴ The transect will be located away from households/settlements due to restrictions associated with the safety protection zones. However, access tracks to some towers may run close to households/settlements.

- Control vehicle speed to ≤ 8 km/h in unpaved areas including unpaved approach roads; Post the speed limit sign in the project work areas
- Asphalt making process will be located at least 200 meters downwind from the construction (workers) camps or nearest dwellings in order to reduce the impact of fumes on humans
- Storage areas/warehouse for materials required for construction and civil works will be provided onsite (construction (workers) camps at the solar site and along the transmission line alignment) to reduce construction vehicle trips of transporting materials and minimize stockpiling
- Vehicles transporting materials that generate dusts will be covered with tarps; Construction vehicles and machinery will be maintained to a high standard to minimize vehicular emissions and noise
- Log of monitoring/incidences of non-compliance and rectification will be recorded and maintained
- Install wheel washing equipment or conduct wheel washing manually at each exit of the construction sites and at asphalt/concrete mixing stations to prevent trucks from carrying muddy or dusty substances on public roads
- Construction activities utilizing heavy machinery work will be restricted between 6 AM – 6 PM; night time works only after receiving due permission from relevant authority
- Implement:
 - Dust Control and Management Plan
 - Construction Noise and Vibration Management Plan
 - Traffic and Road Management Plan
 - Record and maintain log of monitoring/incidences of non-compliance and rectification.
 - Implement corrective measures at for existing Surkhan substation undergoing upgrade works

199. **Noise and vibration.** Moderate noise impacts are anticipated during peak construction period; these will be temporary and localized at all work sites as construction machinery, mobile generators and vehicles generate noise as they operate. Other noise sources include loading, unloading and haulage of equipment and materials. Noise impacts will be experienced by construction site workers/operators; construction machinery may produce noise levels up to 90 A-weighted decibels (dBA). For the solar site and Surkhan substation only construction workers will be this close to the noise generating equipment, machinery and vehicles for extended periods of time. Any households/communities residing within 250 m of work sites along the final transmission line alignment are likely to be subject to moderate and intermittent noise impacts above the WHO limit of One Hour Equivalent Continuous Level 'A weighting' (LAeq)¹⁰⁵ 55 dBA. Measurement of noise levels at the solar site and at sensitive receptor sites along the final transmission line alignment will be conducted by the contractors bi-monthly during the civil works and once after completion of the civil works (the latter will be conducted at the solar site only i.e. upon commissioning of the new solar substation) to monitor and mitigate exceedances (if any), with respect to the Ambient Noise Standards (refer to Part 2 of IEE, or EMP, Part II).

200. The potential impacts due to noise and vibration will be mitigated by the following measures as set out in the EMP:

- Compliance with national laws and ambient noise standards

¹⁰⁵ 'A'-weighting = correction by factors that weight sound to correlate with the sensitivity of the human ear to sounds at different frequencies

- Noise monitoring will be conducted utilizing hand held noise monitors at select locations identified on site map
- Log of monitoring / incidences of non-compliance and rectification will be recorded and maintained
- Drivers will be required to observe low speed wherever necessary and no blowing of horns
- Construction activities utilizing heavy machinery work will be restricted between 7 AM – 7 PM
- Advance warning to communities will be provided with respect to the timing of noisy activities
- Construction vehicles and machinery will be maintained to a high standard to minimize emissions and noise
- All construction workers / operators will use appropriate PPE including ear defenders when operating machinery
- Implement SEMP Sub-plans
 - Noise and Dust Control Plan
 - Traffic and Road Management Plan
- Implement corrective measures at for substations undergoing extension works

Impacts on Water Quality and Resources

201. Moderate impacts are anticipated on water quality and resources during peak construction period; these will be temporary and localized at all work sites in terms of increased turbidity, run-off of construction related wastewater and sewage discharge and contamination due to improper handling of hazardous and polluting materials. Most of the construction activities will take place in the dry season when the irrigation channel outside the solar site perimeter is dry. The irrigation channel will also be conserved in natural condition and a buffer of at least 25 – 50 m will be established from the site perimeter fencing. The work sites will be provided with temporary sanitation facilities for workers, construction wastewater management plan will be implemented and the new substation design will construct a permanent secured ('bunded') area on impermeable surfaces and dykes capable of carrying 110% volume of materials for accidental spills or leakage, the secured areas will be sited away from direct sunlight and 200 m from existing irrigation channel or other water sources (if any). Moreover, the solar site will be designed to maintain the natural drainage pattern. The transmission line alignment design will avoid placement of tower footings in water bodies e.g. in river Karasu. Furthermore, surface water quality testing will be conducted at the irrigation channel (outside the solar site perimeter) and any water sources along transmission line alignment once during the civil works and once after completion of civil works to ascertain if any changes have occurred with respect to surface water quality standards (refer to Section 2 of the IEE; also provided in Part 2 of IEE, or EMP Part II). Upgrade works are not anticipated to result in any adverse water quality impacts; however, activities at existing substation will comply with the following requirements listed below and corrective measures based on physical EHS audit findings.

202. The potential adverse impacts on water quality and resources during construction stage will be mitigated by the following measures as set out in the EMP.

- Compliance with national surface water quality standards
- Construction (workers) camps to be established at least 200 m from any water source
- No washing or repair of equipment / machinery will take within 200 meters of any water source
- Provision for adequate short-term drainage, storm drains or ditches will be made to prevent contaminated construction run-off entering water bodies, if required

- Provision for a temporary and secured hazardous materials handling and waste storage area will be provided across all work sites
- Provide temporary sanitary facilities (e.g. portable toilets) at construction (workers) camps and safe drinking water
- Groundwater abstraction will be avoided
- Contractors to include in the construction schedule estimates of anticipated annual water usage and sources of water for construction
- Implement SEMP Sub-plan
 - Drainage and Storm-water Management Plan
 - Construction Wastewater Management Plan
 - Hazardous Materials Control Plan
- Implement corrective measures at for substations undergoing extension works

Impact on Ecological Resources/Biodiversity

203. While no protected habitats or species of particular conservation value have been identified within the project area of influence, the wider ecological area of analysis has been designated as a critical habitat for the smooth even-fingered gecko or *Alsophylax laevis*; refer to **Appendix 3**. During detailed engineering design, further surveys will be conducted to identify flora and fauna at risk. The final transmission line alignment that will be adjusted as needed to avoid other sensitive natural receptors and minimize the cutting of trees, orchards for the ROW. Upgrade works will not result in any direct or indirect impacts on ecological resources since these will be undertaken within the existing substation perimeter.

204. The potential impacts on ecological resources will be mitigated by the following measures set out in the EMP and additional measures detailed in project BAP and BMEP:

- Minimize shrub clearing, confined to the footprint of the solar site and in particular new substation plot
- No use of chemicals (pesticides/herbicides)
- Maintain hedges, retain field margins along the site perimeter as long as it does not interference in the project function
- After completion of civil works, implement Site Rehabilitation and Clean-Up Plan including landscaping along the fenced perimeter of the site
- Restore temporarily disturbed areas to pre-construction conditions
- Minimum vegetation clearing confined to the footprint of the transmission line ROW
- Trees below 3 m will not be cut or felled, minimum lopping and pruning will be undertaken as necessary
- Any identified bird / bat roosting sites will not be disturbed
- Vegetation planting with native species along the transmission line ROW to stabilize soil where it does not compromise the intended transmission line function
- Restoring temporary land use along transmission line ROW (used for material storage) to pre-construction conditions
- Economic loss due to loss of crops, trees, orchards and agricultural land along the transmission line alignment/ROW will be mitigated by appropriate and timely compensation as described in project SSDDR
- Any damage to areas and infrastructure outside the agreed work sites (Corridor of Impact assessed in SSDDR) will be restored to pre-construction conditions and will be subject to compensation at contractor cost and through written agreement with the land owner, as applicable

- Implement mitigation measures as per BAP and BMEP (The mitigation measures for adverse impacts on biodiversity are enclosed in discussion under Section 5.7 - Main Findings of CHA.)

5.5 Operation & Maintenance Stage

205. Potential adverse impacts during operation stage have been assessed for all proposed infrastructure types (solar site including solar PV plant and new substation and new transmission line). Overall, impact significance is low and residual impacts are low; exception is the resultant ant land use change/visual impacts for which residual impacts will continue to remain moderate. All activities will be supervised by the PMU safeguards staff in coordination with PIC and implemented and monitored by the facility operators (SPV/NEGU).

5.5.1 Workforce Organization and Orientation

Orientation for Project Staff, Contractors, Workers

206. The PIC will conduct briefing and orientation for all project staff (PMU), contractors/new facility operators (SPV and NEGU), contractor C-ES, C-HS, C-BO and C-GRM focal point persons on:

- EMP, BAP, BMEP, GRM, Information disclosure and meaningful consultation, safeguards monitoring and reporting requirements
- ADB and Uzbekistan labor standards
- Responsibilities of the contractors/facility operators in implementing SOMP and monitoring safeguards compliance with environmental performance indicators and project EMP, BAP and BMEP ¹⁰⁶
- Responsibility of the contractors / facility operators in engaging with affected persons for project GRM
- Environment, health and safety and hygiene at work sites
- Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs, COVID-19), child labor, bonded labor or forced labor
- Searching for an assessing, monitoring and recording keeping of carcass searches (birds/bats)
- Record and maintain briefing and orientation events log with duration and list of attendees

5.5.2 Project Component Operation

Impact on Topography (Land and Vegetation)

207. **Vegetation Management.** Periodic vegetation maintenance will be undertaken at the solar site including site margins and transmission line ROW. The existing Surkhan substation will not require vegetation management within its existing fenced perimeter because the site surface is mainly gravel or asphalt. The potential impacts during operation will be mitigated through the following measures as set out in the EMP:

¹⁰⁶ PIC will develop checklists for use (by the contractors) in monitoring environmental compliance during construction stage; these will be amended for further use during the operation stage.

- Restore and maintain landscaping (with native vegetation species) along the fenced perimeter of the solar site
- Maintain the re-seeded site; maintain hedges and shrubs at field margins
- Employ manual vegetation maintenance methods such as grazing by local cattle/sheep or manual trimming of grasses and plants within the solar site and employ local labor
- Maintenance of vegetation along permanent access branch road within the new solar site
- No chemicals (herbicides/pesticides) will be used
- Restore and maintain landscaping (with native vegetation species) under 3 m along the distribution line ROW
- To avoid build-up of trimmed vegetation and branches, these will be allowed for collection by local people for firewood or facility operator will contact the relevant local authorities for collection, transport and disposal

208. **Waste generation.** While it is not expected that solar PV panels will require replacement since their life span is 25+ years; however, some may fail due to snow, dust, humidity or heat. Inverters at the new substation will likely be rebuilt as opposed to replaced. Any discarded/broken equipment (other than the PV panels) or PPE will be stocked at NEGU warehouses / depots for rehabilitation. Small amounts of domestic solid waste will be generated at the new solar site during operation stage. Lack of proper handling, storage and disposal of domestic waste and / or broken PV panels may result in adverse impacts. Waste generation will not be an issue due to operation of the transmission line. Waste generation activities at existing substations will comply with the following requirements listed below and corrective measures based on EHS audit findings.

209. The potential impacts due to waste generation will be mitigated by following the measures:

- Compliance with national laws and regulations on waste management/IFC (WBG) EHS Guidelines on Waste Management, Electric Power Transmission and Distribution¹⁰⁷
- Utilize licensed vendors/suppliers for collection, transportation and disposal of broken / unused PV panels; maintain a register of activities in log book
- Implement SOMP for
 - Materials Management Plan
 - Waste Management Plan
- O&M as per the corrective measures for existing Surkhan substation with upgrade works.

210. **Hazardous and Polluting Materials.** Hazardous and polluting materials will not be an issue along the transmission line ROW during operation stage. Operation of transformers at the new substation within the solar site and existing Surkhan substation may result in accidental spillage or leakage of mineral oil that may contaminate land and water. Existing Surkhan substation will comply with the following requirements listed below. Erection processes and operation will follow manufacturers' specifications and contractors will adhere to the following measures as set out in the EMP:

- Compliance with National laws and regulations on Hazardous Waste Management/IFC (WBG) EHS guidelines for Hazardous Materials Management, Waste Management, Electric Power Transmission and Distribution¹⁰⁸
- Maintain controlled area set up for handling hazardous and polluting materials
- Maintain MSDS and PCB free certification for equipment

¹⁰⁷ The most stringent standards shall apply.

¹⁰⁸ The most stringent standards shall apply.

- Maintain a register of activities involving hazardous materials, including collection, transport and storage at NEGU warehouses/depots
- Coordinate with local agency for final disposal of hazardous waste
- Record of incidents, spills/accidents/near-miss/fatalities will be maintained
- Implement SOMP:
 - Hazardous Materials Control Plan
 - Hazardous Waste Disposal Plan
- O&M corrective measures for substation with extension works

Impacts on Human Environment

211. **Occupational health and safety.** Contractors/Facility Operators will comply with the relevant safety measures required by law and as per International Best Practices. The potential impacts to workers will be mitigated through the following measures as set out in the EMP:

- Compliance to local Occupational Safety and Health laws and regulations
- Compliance to relevant national electrical safety standards of Government Ministry of Energy and NEGU
- Provide and maintain signage as per Institute of Electrical and Electronics Engineers standards at dangerous places for warning of electrical hazards
- Provide and maintain health assessment by a competent medical practitioner for all workers
- Provide periodic training to all workers with access to electrical and hazardous conditions and workers will be certified to work on site
- Provide and maintain workers appropriate PPE
- Equipment and tools will be inspected before use to ensure proper and safe operation
- Appropriate grounding and deactivation of live power equipment during maintenance work or if working in close proximity to the equipment; provision of lightning arrestors as appropriate
- Record of health assessments, incidents, accidents, near-miss, fatalities will be maintained
- Electro-magnetic field (EMF) levels expected to be below the limits set by International Commission on Non-Ionizing Radiation Protection which is 4.17 kV/m for electric field and 833 miliGauss for magnetic field; periodic EMF monitoring using hand held devices as required
- Implement SOMP:
 - Occupational Health and Safety Plan (includer worker's facilities and work areas)
- O&M as per the corrective measures for Surkhan substation with upgrade works

212. **Community health and safety.** The presence of a new substation at the solar site and the new overhead high voltage transmission line may pose potential hazards such as electrocution, lighting strike due to accidental failure of power transmission and exposure to EMF. Information and consultation with local residents (community awareness program) and authorities will be conducted intermittently during operation stage. These activities will be conducted in and around the villages situated close to the solar site, Surkhan substation and at sensitive human receptors (e.g. households) along the final transmission line alignment.

213. The potential adverse impacts will be mitigated by the following measures as set out in the EMP:

- Distribute PIB and make it publicly available during consultations

- Communicate with communities on potential adverse health and safety risks and mitigation measures including ERPs
- Record of consultations will be maintained
- Security and inspection personnel will be deployed to avoid vandalism of equipment and pilferage of lines/cables that may cause accident and/or electrocution
- Periodic monitoring of EMF using hand held devices at select locations along the new transmission line alignment
- Record of incidents, accidents, near-miss, fatalities associated with the project will be maintained
- Records of issues raised will be maintained in accordance with project GRM
- Implement SOMP for
 - Community Health and Safety Plan

214. **Landscape change, visual impact.** The solar site will result in changed landscape and visual impact and may also result in induced access to the area. Movement sensors for security lighting around the fenced perimeter will be maintained as well as maintenance of hedges and field margins. This project will showcase green development of the (renewable) energy sector in Uzbekistan as well as preserve the area ecological resources. Solar panel glare issues are not anticipated for solar PV plants¹⁰⁹. Visual impact due to the new transmission line will be localized to the tower foundation/footing sites; vegetation in and around the tower footing will be restored and maintained as long as it does not cause interference to its intended function. Since the Surkhan substation is an existing facility, no additional visual impacts are anticipated during operation.

215. The development of the solar site in particular will result in landscape change from open, flat land to an area with an industrial character, with associated lighting; however, this is an area of low population density with no human receptors in and around the site. The proposed facility would sit low in the landscape and from more distant viewpoints would not read strongly in the view during the daylight hours. Steps to reduce visual impacts e.g. installation of security lighting around solar site fenced perimeter with movement sensor and as such the lighting would only come on when triggered, maintenance of hedges and field margins around the fenced perimeter will be incorporated during and after completion of civil works. Such impact due to the new transmission line will be localized to the tower foundation / footing sites.

Impacts on Air Quality, Noise and Vibration

216. **Air quality, noise.** Operation of the solar PV plant and new substation and the new transmission line will not impact the air quality except for some fugitive dust generation due to movement of transport vehicles. Noise-generating equipment (such as inverters/transformers) at the new substation and Surkhan substation will be enclosed and periodic maintenance of equipment will be conducted to minimize disturbance.

Impacts on Water Quality and Resources

217. Operation impacts on water quality and resources at the new solar site and upgraded Surkhan substation may result due to potential contamination to nearby irrigation channel/water sources due to accidental spills and leakage as well as due to accidental discharge of wastewater. No impacts are anticipated during the operation of the transmission line. Contractors within 60

¹⁰⁹ Current glint / glare studies for solar systems at airports have proved that these are not an issue. Source: FS Tech team.

days of each contract year after the commercial operations date, will be required to provide to the PMU reasonable estimates of water usage for purposes of operating and maintaining the solar PV plant for the applicable contract year.

218. The potential impacts on water quality and resources will be mitigated by the following measures that will be set out in the EMP:

- Maintain water retention pond/reservoir for use for PV cleaning
- Periodic cleaning of water retention pond/reservoir to remove debris
- No use of chemicals/detergents for cleaning purposes
- Groundwater abstraction will continue to be prohibited
- Maintain permanent sanitary facilities to workers and safe drinking water
- Maintain a septic system for wastewater collection and disposal; tank system will be located at least 200 m from any water sources, to avoid contamination
- Maintain permanent secured ('bunded') areas on impermeable surfaces and dykes capable of carrying 110% volume of materials for accidental spills or leakage
- O&M corrective measures for upgrade substation

Impacts on Ecological Resources / Biodiversity

219. The large area of PV panels in the solar project site may create a 'lake effect' which could attract birds that mistake the solar panels for a water body and the hot panels could kill or seriously injure birds, which attempt to land on them especially the young inexperienced ones. Bird collisions can also happen with the new transmission line. The mitigation measures for adverse impacts on biodiversity are enclosed in discussion under Section 5.7 - Main Findings of CHA

5.6 Decommissioning Stage

220. The solar PV plant lifespan is expected to be >25 years, at which point it might be decommissioned. Typical activities during the decommissioning and site reclamation phase include facility removal, breaking up of concrete pads and foundations, removal of access branch road that are not maintained for other uses, re-contouring the surface (if required), and land re-vegetation and replantation of trees. Associated impacts include erosion, noise, dust and vehicle exhaust, and the need to properly manage large amounts of debris, solar panels, wire and cabling, electronics, etc. The solar substation and transmission line may have a much longer lifespan than the solar PV plant (order of 45 to 60 years), which may be further extended through maintenance and periodic equipment replacement. Therefore, decommissioning of substation and transmission line is not further evaluated.

221. The EMP plan provides a preliminary assessment of potential mitigation measures/safeguards that may be implemented at a minimum of six months prior to plant closure at that time. This will be followed by a detailed decommissioning and site reclamation plan to be developed at that time. The preliminary assessment will include measures for avoiding and/or minimizing surface erosion, impact to air and water quality, noise and vibration, flow alteration, waste generation, impact to flora and fauna, traffic related issues as well as health and safety of workers and communities.

5.7 Main Findings of the Critical Habitat Assessment

222. The following discussion presents the summary and classification of mitigation measures to address impacts to biodiversity as detailed in the project CHA; these are further detailed in BAP and BMEP as enclosed in **Annexure 1 and 2**, respectively.

Design and Pre-construction Stage
Additional Studies
<ul style="list-style-type: none"> ➤ The overhead transmission line crossing of the Karasu River likely represents the area of highest collision risk; however, no data is available to assess this risk. Additional field studies of bird flight patterns are therefore proposed to gather data to improve the collision risk assessment, inform the transmission line alignment and identify all areas where collision risk mitigation is required. The season of assessment needs to coincide with either the southward or northward bird migrations (August/September and March/April respectively). The team that collected data for this report should ideally be involved to maintain consistency with the methods applied. The scope of additional survey needs to cover the entire transmission line route, and terms of reference (TOR) for this study is enclosed as Appendix 3.1 (d).
Design Criteria (as Avoidance Measures)
<ul style="list-style-type: none"> ➤ Solar PV arrays are to be installed with a maximum possible distance from each other (Figure 9). The larger the distance, the less negative impact on reptile, mammals and birds and plants. Water-birds are less likely to mistake such PV arrays for waterbodies and will reduce the birds' mortality rate. ➤ The design of transmission line towers must be altered to reduce the vertical spread of cables, so that all cables are in the same horizontal plane to reduce the number of cables a flying bird or bat can collide (Figure 10). Note that the earth wire needs to be properly marked with visibility devices. This design is a deviation from the currently proposed tower designs ➤ Bird visibility devices are to be installed at 5 m, 10 m and 20 m intervals on exposed wires for transmission lines traversing the Khaudag Ridge and the Karasu River crossing. Figure 6 provides guidance of suggested designs. ➤ Overhead jumper cables will be avoided, and transmission towers will be designed with suspended insulators and wires, which present the lowest electrocution risk (Figure 12).
Preconstruction Survey and Translocation
<ul style="list-style-type: none"> ➤ Preconstruction surveys shall be conducted by competent botanists and herpetologists to locate and identify any flora and fauna present within the construction footprint that is unable to escape and at high risk of mortality. Preconstruction surveys will include the herpetologist team involved in the recent update of the URDB ¹¹⁰, or specialists recommended by them. The same team will be involved in habitat restoration activities and development of a monitoring programme as described below. Sufficient resources shall be made available for these activities to ensure there is no net reduction in the CR and EN species (as determined by the specialist team) and to contribute towards the recommended conservation actions provided by the global IUCN Red List and the URDB for the Smooth even-fingered gecko, as described earlier in this report. ➤ Appropriate translocation sites will be identified in advance, and all flora and fauna at risk will be safely translocated. The translocation sites will support a habitat similar to the capture site prior to impact and offer safe refuge for these species. Special attention will be given to tortoises and other reptiles listed in Table 12 of Appendix 3 Critical Habitat Assessment.

⁽¹¹⁰⁾ Contact: Roman Nazarov (r_nazarov@mail.ru).

Construction Stage
Avoidance Measures
➤ A 100 m buffer will be designated on either side of the Karasu River. Construction within the buffer zone will be avoided and vehicle parking, equipment dropdown sites, repair works, storage facilities, accommodation and toilet facilities will be excluded from the buffer zone.
➤ No placement of tower footings in the river / buffer zone
➤ All equipment brought to site, including vehicles, will be 'as clean as new' to avoid the introduction of alien invasive plants.
Minimisation Measures
➤ Construction footprints are to be planned, and minimised in extent. To avoid footprint creep, these areas are to be clearly demarcated on the ground including the construction site, equipment dropdown areas, site office, vehicle parking, worker's rest areas, ablution facilities and any other requirements.
➤ Construction works for the transmission line are to be well planned in advance so that the construction period is kept to the shortest possible period of time to minimise the duration of disturbance to species in the field.
➤ Fencing around the Solar PV site should to be permeable to small mammals up to the size of a fox, which are able to squeeze through a 12 cm hole.
➤ Faunal hazards are to be mitigated, for example: (i) pits and trenches must not be left exposed for long periods; (ii) escape routes are to be incorporated into trenches and pits that are exposed overnight or longer periods; and (iii) appropriate capacity will be available to safely remove and release after translocation any fauna trapped onsite.
➤ Construction workers and operational staff shall be aware of faunal sensitivities, and required to avoid unnecessary killing of fauna, vehicle speed limits will be controlled, hunting and possession of hunting equipment will be prohibited, taking pets and/or purchase/sale of wild animals or animal products will be prohibited.
➤ Earthworks, the removal of trees and riparian vegetation within the buffer zone will be avoided to the full extent possible.
➤ There will be no use of pesticides and herbicides.
➤ Full accountability will be maintained throughout the construction period for the handling of environmentally dangerous chemicals, including fertilizers, and hydrocarbon oil and fuels. This will minimise the spillage events and reduce the likelihood of contamination of aquatic ecosystems.
Operation & Maintenance Stage
Rehabilitation and Restoration Measures
➤ Hedges and field margins around the Solar PV site perimeter shall be maintained.
➤ All construction sites are to be rehabilitated to the extent possible, involving the following: (i) Rehabilitation is to be implemented as soon as practically possible after construction activities end; (ii) All waste and broken equipment is to be removed from construction sites; (iii) Restoring temporary land use (such as material storage) to pre-construction conditions; (iv) Soils are to be returned to excavations in a manner that restores the natural profile of soil horizons; (v) Landscaping of the fenced perimeter of the Solar PV site; (vi) Rehabilitated sites shall be planted with indigenous grasses; (vii) Vegetation planting along the transmission line ROW to stabilize soil where it does not compromise transmission line functions; and (viii) An alien invasive species control programme will be incorporated into the site rehabilitation plan.
➤ Rehabilitation works within the Karasu River buffer zone following completion of civil works at the area will be prioritised over rehabilitation of other areas.
➤ Habitat restoration will be applied along the transmission line route to develop suitable habitat including appropriate burrows for the Smooth even-fingered gecko, Central Asian tortoise, sand racerunner and other reptiles. These works are not expected to involve complicated

activities. Opportunities for habitat development within and around the Solar PV site will be investigated, and implemented where possible. The herpetologist team involved in the recent update of the URDB,¹¹¹ or specialists recommended by them, shall be involved in developing the habitat restoration requirements. The same team will also be involved in conducting preconstruction surveys, with sufficient resources and time on site during preconstruction and habitat restoration to achieve the conservation recommendations for these species (Table 12). Increased costs incurred will be budgeted as additional conservation actions required for alignment to the IFC PS6.

- A monitoring programme to assess the survival of these reptiles will be developed by the above herpetologist team, and will be applied as deemed appropriate by the team. This monitoring programme shall be incorporated into an appropriately compiled Biodiversity Management Plan.

5.8 EHS Audit¹¹²

223. The physical on-site EHS audit will be conducted by PIC and findings included in the updated IEE and EMP as follows:

- Review of safeguards documentation.
- Site conditions.
- Corrective Measures.

5.9 Cumulative and Induced Impacts

224. A key component of the planned renewable energy deployment in Uzbekistan is the first project of total 1GW solar photovoltaic program developed with the support of the Asian Development Bank (ADB). Given the above scenario, cumulative impacts could arise from other similar solar PV plants in the vicinity of this Sherabad IPP solar project. There are no existing commercial solar PV plants in operation in close proximity to the proposed Sherabad IPP solar project at the moment.¹¹³ The IFC funded solar project in Navoi region is approximately 440 km from Sherabad site. In addition, at this time no information is available on current or potential construction works on other transmission line projects that could overlap with this project. Given the constraints in availability of information, it is only possible to qualitatively assess cumulative impacts.

225. Topography and land-use. Field visits suggest that 600 ha in and around the solar project site are heavily disturbed by human activities and is considered as a modified habitat; impacts resulting from land use change and future solar PV plants at the site are expected to be medium. However, all solar PV power plants will have negative impact on land use.

226. Soils, surface and groundwater. When preparing sites for PV panels, some developers clear the entire site of vegetation, often levelling and grading the whole extent of the site. This may result in soil compaction, soil disturbance and erosion and increase the sedimentation of irrigation canals and/or any water bodies in the area. As solar PV plants occupy large areas, potential cumulative impacts could be significant if not managed properly especially if more solar

¹¹¹ Contact: Roman Nazarov (r_nazarov@mail.ru).

¹¹² Due to prevailing pandemic, travel is restricted in the region.

¹¹³ Other infrastructure development projects of similar impacts in the geographical area and in particularly in the project area of influence are not known at this time.

PV plants were to be constructed and operated in the future in the surrounding wider area. During operation, PV panels require water for panel cleaning. Some facility operators may undertake groundwater extraction that may affect the groundwater table, excess usage and shortage in water availability for other users in the area. With stipulated mitigation measures to avoid disturbance to the soils as well as surface and groundwater usage e.g. undertaking a water use sustainability study, the cumulative impacts associated with future solar PV plants in this regard are expected to be minor.

227. Air, noise and vibration: Most solar PV plants will have negative impacts on air, noise and vibration during peak construction stage, which are temporary and localized in nature, the cumulative impacts in this regard are expected to be minor. There will be no air quality issues during operation except for fugitive dust emissions arising from movement of transport vehicles on access roads. There will be some noise generation due to movement of vehicles and operation of new substations. However, cumulative impacts during operation in this regard are expected to be minor.

228. Ecology/biodiversity. The CHA confirmed that the wider project site supports species of significant conservation value. Given the considerable space requirements of commercially viable solar PV plants (>600 ha) and corresponding site/vegetation clearances and overhead transmission lines, the effect on ecology could be significant and should be informed by detailed cumulative ecological assessment of the area under future consideration.

229. Human environment. Resettlement and rehabilitation of affected persons may have higher relevance for solar PV plants in cases of land acquisition of paddy fields (that also serve as a livelihood source for most rural communities) and associated power evacuation. However, with implementation of safeguard measures such as careful site selection that avoids agriculturally productive lands, private assets and appropriate and timely compensation, the cumulative impacts associated with solar PV plants in this regard are expected to be minor.

230. Waste. All solar PV plant development will need to effectively manage their wastes such as biodegradable waste (vegetation clearances), construction debris, presence of workers and hazardous materials, leaks and spills. In case solar PV plants utilize lithium ion batteries for energy storage, then certified vendors will need to be identified for collection and disposal of batteries at the end of its life span. The cumulative impacts associated with solar PV plants in this regard are expected to be minor if managed effectively.

231. Visual and aesthetics. Within the wider surrounding area, there are no sensitive human receptors, no sites of particular importance, visual or scenic features, environmental reserves or parks that will be affected by the current or future development. Another issue is the potential for glare caused by sunlight reflected off the PV panels from the future developments in the wider project area. PV panels work on the concept of absorbing sunlight rather than reflecting it, the design will integrate spacing between arrays. While minimal reflections from the panels are inevitable, this is not anticipated as a major issue. Thus, impacts in this regard are expected to be minor.

232. Induced impacts would include more frequent use of major roads and access roads for the transportation of workers, equipment and machinery to the solar project site. This will result in traffic nuisance to nearby communes and increase in dust due to movement of vehicles and increase in vehicular emissions affecting air quality. However, with mitigation measures, the impacts are expected to be minor.

6 ANALYSIS OF ALTERNATIVES

6.1 Site Selection

233. An evaluation of several sites for the solar program was done in the Feasibility Study (FS) 2014. Two additional sites (Kurkumgan solar site and Surkhan solar site) and one original preferred site (Sherabad solar site, FS, 2014) were assessed for the solar plant location during the project preparatory technical assistance (PPTA) phase in November 2019. All of the sites are located in the Sherabad district. The November 2019 site visit reconfirmed that the Sherabad solar site is the preferred site for the solar PV plant and associated infrastructure; refer to Figure 1.

234. The two alternative sites were excluded due to potential accessibility issues and unsuitable terrain. For example:

- **Kumkurgan solar site.** Access to this site was through a dirt road along an existing canal and then through a farmer's private property, passing over a small and weak bridge; refer to Figure 21. The site is located on an uneven / hilly terrain on unconnected land parcels covering 11ha (the 240 MW solar PV plant requires a land area of at least 600 ha, assuming 1.5 – 2 ha per 1 MW of installed capacity). The site is small, has accessibility issues (through private property, over unstable bridge), uneven terrain and limiting in scope for 240 MW solar PV plant. Therefore, it was dropped from further evaluation.
- **Surkhan solar site.** There was no option of direct access to this site due to sandy soil conditions. During field visits, however, two stops were made a) one at a distance of 3.5 km from site and b) second at a distance of 2.7 km from the site; refer to Figure. The surrounding site area consisted of sand dunes. Due to lack of preliminary investigation and inaccessibility issues as well as the need for new construction of an access road to the site (approx. length 4 km), makes this site unsuitable. Therefore, it was dropped from further evaluation.

6.2 Route Selection

235. From the outputs of preliminary transmission line walkover survey, the direct route to existing facility at 33 km from the Original Sherabad site (at Point of Interest (POI) No. 6) runs across an existing village for approx. length 5 km (this is indicative); refer to proposed transmission line marked in blue in Figure 23. An indirect route at this POI No. 6 for length 5 km will be selected for further evaluation at detailed walk over survey.



Figure 23 Kumkurgan Solar Site



Figure 24 Surkhan Solar Site



Figure 25 Transmission Line Transect at POI No. 6

6.3 Technology Selection

PV Module Technologies

236. A number of PV module technologies were assessed for use in the project, and selection was based on minimum environmental impacts and disposal method and procedures as follows:

237. **Monocrystalline bifacial modules.** Most manufacturers of crystalline modules have a performance guarantee of 25 years however; these panels can have a longer lifetime if maintained properly. Crystalline modules pose little to no risk to the environment in terms of toxicity since most of the module is made of common construction materials such as tempered glass and aluminium. Furthermore, the PV cell is made from silicon, which is a common earth element. Some panels contain a small amount of lead however; it is sealed in a panel to reduce the risk of environmental release¹¹⁴. Even though these modules do not pose a significant environmental risk, they should be recycled. PV Cycle is an organization of PV module manufacturers that collects and recycles PV modules within the EU with the costs of these services included in the selling price of the modules¹¹⁵. In 2016, PV Cycle extended its collection and recycling service to include Japan¹¹⁶. The waste management solution is also offered to other countries outside of the EU however; an additional fee may be required for services. Recycle Solar is another option for PV recycling. The company recycles damaged or defect PV modules of all types in the UK and Ireland¹¹⁷.

¹¹⁴ NC Clean Energy Technology Center (n.d.). Health and Safety Impacts of Solar Photo-Voltaics.

¹¹⁵ <http://www.pvcycle.org/services/european-union/>.

¹¹⁶ <http://www.pvcycle.org/press/pv-cycle-launches-take-back-and-recycling-service-in-japan/>.

¹¹⁷ <https://recyclesolar.co.uk/>.

238. **CdTe thin film modules.** CdTe modules also have a warranty of 25 years.¹¹⁸ The modules contain small amounts of cadmium, which is a toxic heavy metal. Tests have shown that in the event that these panels are damaged, only a negligible amount will be leached from the panel. Also, in the event of a catastrophic event such as a fire, the release of cadmium is below human health evaluation levels.¹¹⁹ Recycling of CdTe modules is the best option after decommissioning due to the potential release of cadmium into the environment. First Solar, a leading CdTe module manufacturer, has a take-back policy to pay for collecting and recycling modules at the end of their life cycle.¹²⁰

239. **CIGS thin film modules.** CIGS modules typically have a shorter lifetime than other PV module technologies. These cells consist of copper, indium, gallium and selenium, which are all not considered to be very toxic elements. However, the potential formation of hydrogen selenide from selenium is a concern because it is a carcinogen. Also, some cells contain a thin layer of cadmium, which is toxic to the environment. The release of these compounds into the environment is not a significant risk when the panels are in normal use however; special disposal is required at the end of the product life. For recycling, CIGS modules can be collected through programs such as PV cycle.

240. For the purpose of this project, crystalline modules (mono) will be utilized in the solar PV plant. For end of life/failure or at decommissioning, provision in tender agreements with suppliers/vendors will ensure proper and safe collection, recycling and/or disposal, as needed.

6.4 With and Without Project Scenario

241. Table 19 presents a comparison of a “With project” and a “Without project” scenario.

Table 19 “With” and “Without” Project Scenario

No.	Parameter	With Project Scenario	Without Project Scenario
1	Electricity	Major effect, improve the electricity supply and stability of the national grid, diversity the power generation mix, increase the percentage of clean energy supply Less expensive than current oil and gas-based generation Improve the electricity supply and stability of the national grid	Negative Effect, increase in greenhouse gas (GHG) emissions due to continued reliance on inefficient oil and gas and coal-based energy generation
Environment			
2	Effect on protected, sensitive or forest areas	No effect, avoids national protected areas, environmentally sensitive and forest areas	No effect
3	Effect on endangered species	No effect identified to date; further surveys to be carried out for selected site	No effect

¹¹⁸ <http://www.firstsolar.com/Modules/Our-Technology>.

¹¹⁹ Centre for Renewable and Sustainable Energy Studies (2015). First Solar's CdTe Module Technology – Performance, Life Cycle, Health and Safety Impact Assessment.

¹²⁰ Environment Canada (2012). Assessment of the Environmental Performance of Solar Photovoltaic Technologies.

No.	Parameter	With Project Scenario	Without Project Scenario
4	Tree cutting, looping and trimming	No effect due to selected site Minor effect along transmission line ROW; shall comply with the project EMP (environmental safeguards provision of the ADB SPS 2009 and relevant national environmental regulatory standards)	No effect
5	Air emissions	Minor effect during construction; increase in air emissions because of construction activities / trenching, dust generation Major effect during operation: Decrease in GHG emission	Negative effect, Increase in GHG emissions due to continued reliance on fossil-fuel based energy generation and
9	Water supply	Minor effect during construction and operation; increase in groundwater withdrawal compared to without project; shall comply with project EMP and withdrawal limits as prescribed in clearances, permits and licenses obtained from relevant authorities. Major effect during operation; improved water accessibility for agriculture purposes due to available power	No effect
Social			
10	Disturbances to people/ communities	Minor effect during construction phase; temporary and localized impact due to power outage, dust and noise due to movement of machinery and construction vehicles; shall comply with project EMP (community health and safety plan, traffic control and road management plan, noise and dust control plan) Influx of migrant workers; shall comply with project EMP (emphasis on local hiring)	No issue
11	Effect of business	Construction activities may employ local populace generating economic and livelihood generation opportunities	No issue
12	Status of living	Major effect, improved access to electricity, reduced domestic load for persons such as women involved in cooking activities or in accessing water supplies;	No change
Economic			
13	Economic development	Greater rate of economic development expected	Slow development

7 INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

7.1 Consultation and Participation

242. Initial consultations with local stakeholders in the project area of influence were conducted in November 2019 before the commencement of any project activity to inform them of the proposed project and obtain feedback. Information disclosure and meaningful consultations will continue throughout the project cycle.

243. Based on discussions with the local stakeholders/villagers working on fields adjacent to the proposed solar PV site, the proposed site is not used for animal grazing; the locals have other designated areas for grazing their livestock. Overall, the proposed project was highly welcomed by the interviewed stakeholders/villagers. The stakeholders/villagers expressed dire necessity of the project for their overall development of the villages in the area, including improved access to electricity, particularly during the harsh winters and hot summers and improved quality of life. Access to electricity in their homes, schools, health clinics will result in better functioning of such facilities; access to electricity would also reduce time needed for domestic tasks that are often performed by women. The local stakeholders/villagers hope to gain temporary employment during construction stage and a number of permanent employment positions at the solar PV plant during operations stage thereby increasing livelihood opportunities for both women and men. The project will enable young skilled locals to remain in their villages with their families, as presently, many young men leave for Russia in search for jobs.



Site Visits and Consultations Photos - I



Site Visits and Consultations Photographs – II



Site Visits and Consultations Photographs – III

244. Second round of consultations were conducted in December 2019 and January 2020 when the technical and local environment consultants/specialists conducted a number of field visits for primary and secondary data collection. Consultations with local stakeholders re-confirmed that they are aware of the project and expect the project to improve the current power supply situation to their villages/households. The villagers stated the area in and around the proposed transmission line is used for the livestock/animal grazing. No environmental concerns were raised during consultations. Table 20 lists the number of persons met during the initial and second round of consultations.

Table 20 List of Persons Met in the Project Area

S. No	Gender, Age, Occupation, Place of Residence	Date	Location
1	Man, 42 years, shepherd, Kuktash settlement.	7/3/2020	Karakyr upland- Solar plant site
2	Man, 30 years, shepherd,	7/3/2020	Karakyr upland- Chapanchi-Mekhriyo settlement, Solar plant site
3	Man, 45 years, shepherd,	7/3/2020	Karakyr upland- Chapanchi-Mekhriyo settlement, Solar plant site

S. No	Gender, Age, Occupation, Place of Residence	Date	Location
4	Man, 60 years, shepherd,	11/3/2020	Karakyr upland-Muzrabat settlement
5	Man, 23 years, shepherd,	11/3/2020	Karakyr upland
6	Man, 60 years, Head of Buyuk Ipak Yuli settlement.	10/3/2020	Kampyrtepa, IBA Amudarya floodlands
7	Man, 63 years, shepherd	11/3/2020	Karakyr upland- Yangier settlement
8	Man, 44 years, shepherd,	11/3/2020	Karakyr upland-Yangier settlement, Solar plant site
9	Man, 44 years, shepherd,	11/3/2020	Karakyr upland-Solar plant site
10	Woman, 47 years, Head of Bogobod settlement, (this settlement locates to the North from Solar site)	11/3/2020	Karakyr upland-Solar plant site
11	Man, 57 years, famer	12/3/2020	Karakyr upland-Solar plant site, Bogobod settlement
12	Man, 65 years, Senior huntsman in Surkhandarya region, chief hunter at Aktepa hunting area (IBA Aktepa and three lakes).	9/3/2020	Dzharkurgan (transmission line)

7.2 Information Disclosure and Future Consultations

245. The PMU will supervise and ensure meaningful information sharing, consultations and active participation of concerned stakeholders. The intention of the meaningful consultation and information disclosure is to prevent misconceptions on project impacts, project implementation process and doubts or misconceptions on the project that may cause delays in project implementation.

246. The PMU, assisted by PIC, will identify various groups of potential project stakeholders and their different roles and interests in the project and prepare a detailed Consultation Plan for active engagement of such persons in the project area of influence. The Consultation Plan will have a schedule, location, invited participants, information to be disseminated and methods of consultation. An overview activity outline for a Consultation and Participation Plan and Information Disclosure is presented in Table 20.

247. The SPV PIU and contractor focal point persons, assisted by PIC, will conduct consultations with the identified project stakeholders e.g. affected persons/APs, members of the local Khokimiyat and Makhalla, and these will include information disclosure on the project environmental impacts (positive and negative), safeguards measures including community health and safety, training in emergency response plans, project implementation schedule and process, results from baseline surveys, acquisition and compensation process, affected persons/APs right to complain and Project GRM. Consultations with affected persons/APs will provide a two-way information sharing channel, ensuring that the concerns, questions and ideas of the affected persons/APs will be discussed and responded to in an appropriate and gender inclusive way.

248. The SPV PIU and contractor focal point persons, assisted by PIC will record all information dissemination and consultation activities and the results from consultations with the affected persons/APs, including how concerns raised and recommendations made are addressed in the

updated IEE and EMP. These will be documented and reported to the PMU in the contractor monthly reports. Consultations with project stakeholders will continue throughout project implementation and will be open and gender inclusive.

249. The updated IEE and EMP will be disclosed on ADB website (www.adb.org) as required by the ADB SPS 2009. A PIB will be made available in an easy to understand local Uzbek or Russian language for the affected persons/APs and communities in public consultation meetings, project construction field offices and at the local Khokimiyat and Makhalla centres/offices. The PIB will contain project information including procedures for project GRM and key contact information e.g. PMU, SPV PIU safeguards officers, contractor focal point persons such as C-ES, C-HS, C-BO, C-GRM, PIC and Facility Operators.

Table 21 Activity Outline for Consultation and Participation Plan and Information Disclosure¹²¹

Project Implementation Schedule	Activity	Stakeholders
Detail design phase: Detailed Walkover Survey and once prior to construction	Public information meetings Informal meetings on subproject design for aligning people's responses in detailed design Dissemination of Project Information Booklet (PIB) Community Awareness Program one month prior to civil works, including informal meetings for information updates on project schedule and activities through village leaders and Khokimiyat and Makhalla	APs Affected Households Villages, Village leaders, Khokimiyat and Makhalla
Civil works construction	Informal meetings for information updates on project schedule and activities through village leaders and Khokimiyat and Makhalla Public information meetings as needed Community Awareness Program once during civil works PIB made available at consultations, project field offices and Khokimiyat and Makhalla	
Operation and Maintenance	PIB distributed to communities Informal meetings for information updates and concerns	

¹²¹ All consultations and information disclosure material will be made available in the local language (Uzbek/Russian).

8 GRIEVANCE REDRESS MECHANISM

8.1 Awareness of Stakeholders

250. Stakeholders and project affected persons were informed of the proposed project, potential temporary impacts, project benefits and project GRM at the time of the initial consultations in November 2019.

251. A PIB in Uzbek/Russian language containing details of project information and project GRM will be made available at the project construction field offices and at the local Khokimiyat and Makhalla centres/offices during subsequent consultations. The project GRM information will pertain to procedures for making complaints and key contact information e.g. PMU, SPV PIU, contractor focal point persons such as C-GRM, PIC and Facility Operators.

8.2 Need for Grievance Redress Mechanism

252. The project GRM will provide an accessible platform for receiving and facilitating resolution of complaints from affected persons/APs on project implementation. GRM will cover both environment and social safeguard issues such as those raised on environment such as temporary increase in dust, noise or traffic causing inconvenience to local people, access to adjacent properties/agricultural land or other relevant issues.

8.3 Current Scenario

253. This project will utilize the GRM established for current ADB funded energy projects in the region by NEGU. The NEGU is aware of the procedures of handling complaints/grievance attributed to social or environmental issues due to previous projects with ADB such as the Northwest Region Power Transmission Line Project. With assistance of PIC, the PMU and SPV PIU and contractor focal point persons will proactively engage with affected persons/APs and other concerned stakeholders via a project community awareness program prior to start of civil works. The program will cover the scope of the project, schedule of construction activities, identified impacts and mitigation measures, health and safety issues and GRM. There will be ongoing public consultation during project implementation as described in the EMP.

8.4 Project GRM

254. The project GRM is detailed in Section 10 EMP and the process flow diagram is shown below in Figure 26. The PMU will ensure that (a) local level project safeguards GRM acceptable to ADB is established in accordance with provisions and within timeframes specified in the EMP and SSDDR to consider safeguards related complaints; and (b) a task force is functioning effectively to:

- Review and document eligible complaints of Project stakeholders;
- Proactively address grievances;
- Provide the complainants with notice of the decisions made;
- Prepare periodic reports to summarize:
 - i. the number and types of complaints received and resolved at all levels;
 - ii. chosen actions and time required for resolution; and
 - iii. final outcomes of the grievances; and
 - iv. Make the reports available to ADB as part of the regular Safeguards Monitoring Reports.

- Eligible complaints will include
 - v. those related to the project activities,
 - vi. any of the service providers,
 - vii. any person responsible for carrying out the project,
 - viii. complaints on misuse of funds and other irregularities, and
 - ix. grievances due to any safeguards, labor and gender issues.

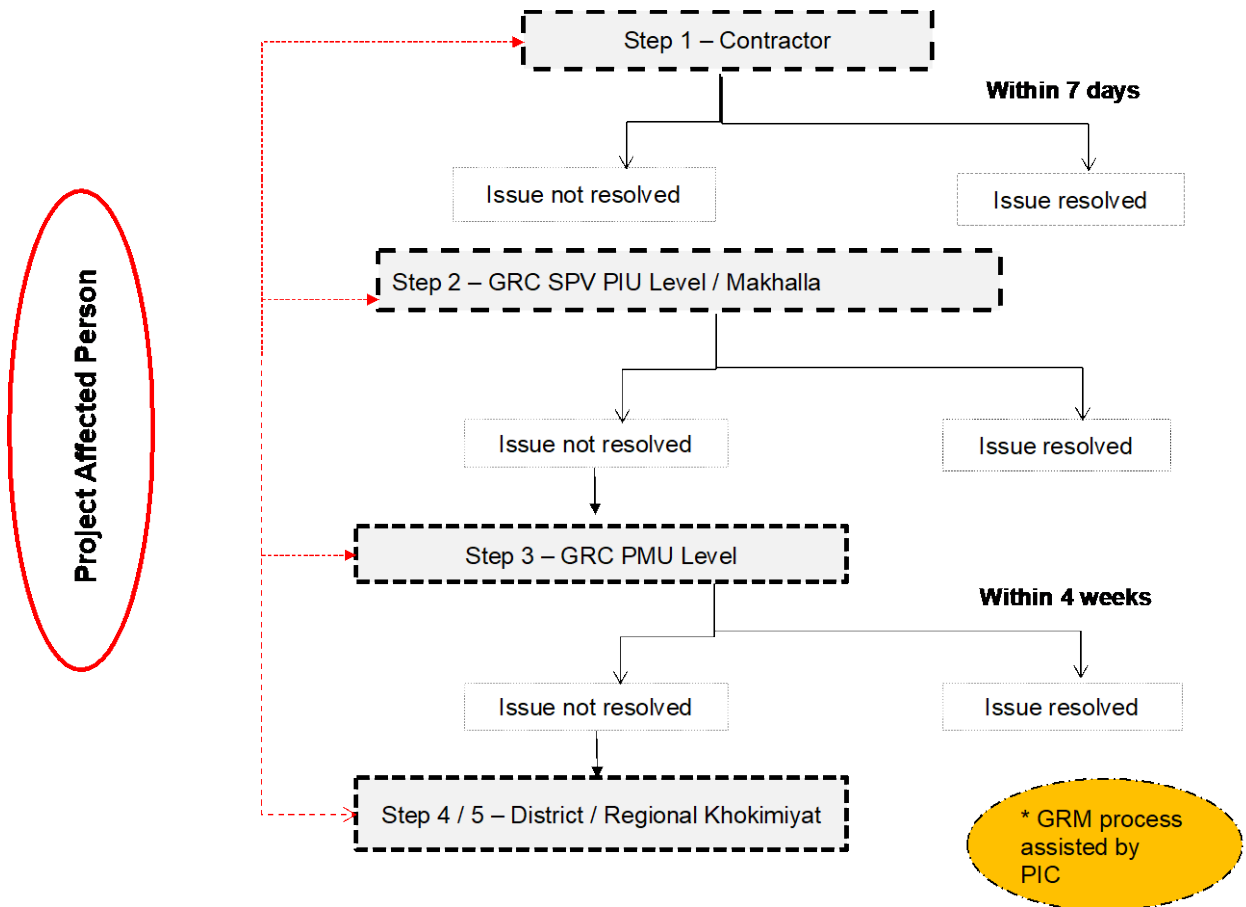


Figure 26: GRM Process Flow Diagram

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

255. This project Environmental Management Plan (EMP) identifies the potential project environmental impacts and defines mitigation measures and monitoring requirements for the design and pre-construction, construction and operation stages of the project. It also defines the institutional arrangements, roles and responsibilities of institutions involved and cost estimates for implementation of the EMP. The EMP will ensure environmental protection activities during all stages of the project implementation in order to prevent, reduce or mitigate adverse environmental impacts and risks. The EMP draws on the findings of the project initial environmental examination (IEE) report and discussions and agreements with the National Electric Grids of Uzbekistan (NEGU) and the Asian Development Bank (ADB).

256. This EMP is based on inputs from the Feasibility Study (FS) team for the project as of August 2020. Detailed engineering designs are yet to be finalized and may require subsequent revisions to this EMP. The FS team will provide the detailed designs to NEGU PMU and ADB for review to determine if the EMP requires revision. The draft and final EMP will be disclosed on the ADB public website (www.adb.org) and included in the ADB Project Administration Manual (PAM). The final EMP will be included as a separate annexure in all bidding, tender and contract documents. The SPV and contractors¹²² will be informed of their obligations to implement the EMP and to include EMP implementation costs in their bids for project works.

9.2 Mitigation and Monitoring Plan

257. This EMP covers the project area of influence and consists of three components: (i) project readiness checks for effective environmental management during design and pre-construction stage and environmental mitigation measures during construction and operation stage; and (ii) environmental monitoring measures during all stages of project implementation.

9.3 Institutional Arrangements and Implementation Responsibilities

258. Executing Agency. The Government Ministry of Energy (MOE) will be the executing agency (EA) responsible for overall supervision and monitoring of project implementation and a Private Partner (private-developer-investor) through a Special Purpose Vehicle (SPV) will be the implementing agency (IA).

259. Project Management Unit. The NEGU will utilize the project management unit (PMU) set up for current ADB funded energy projects in the region.¹²³ The PMU will have the responsibility to supervise and oversee compliance with (i) environmental safeguards requirements, (ii) coordinate the project Grievance Redress Mechanism (GRM), (iii) coordinate with line ministries and social safeguards plans to ensure smooth implementation of the project¹²⁴,

¹²² Contractors imply = SPV appointed Engineering, Procurement and Construction (EPC) contractors, any key sub-contractors and facility operators. Note: Safeguards implementation for solar PV plant(s) during operation stage will continue through the SPV and for transmission interconnection infrastructure directly through NEGU.

¹²³ The NEGU functions through the NENs office Main Power Network (MPN) in Surkhandarya Region.

¹²⁴ The PMU will ensure that subproject activities are synchronized between the SSDDR and EMP implementation. The PMU will also ensure that no physical or economic displacement of affected persons/APs will occur until: (i) compensation at full replacement cost has been paid to each affected person/AP for subproject or sections of subprojects that are ready to be constructed; and (ii) other entitlements listed in the REGDP are provided to the APs.

(iv) engage the project implementation consultancy (PIC) services, (v) supervise the procurement process, and (vi) report to the ADB. In particular, the PMU will ensure consistency of safeguards documents with government policy, legal and administrative framework across all jurisdictions – national, state and local level. To ensure effective implementation of environmental safeguards procedures, the PMU will assign one staff person as an safeguards manager and one staff person as safeguards officer (PMU-SS), on full time basis.

260. Project Implementation Unit. The SPV will set up a Project Implementation Unit (PIU) at Sherabad district. The SPV will assign to PIU at least two full time staff persons to handle safeguards implementation on the field. (SPV PIU safeguards staff); the SPV PIU will be responsible for day to day activity and compliance with safeguards during project implementation including engaging in project GRM, information disclosure and meaningful consultations.

261. Project Implementation Consultancy Services. PIC services will be engaged by the SPV to assist PMU and SPV PIU with the implementation of the project, EMP and oversight of the contractors. At the end of PIC services contract, PMU and SPV PIU will be directly responsible for ensuring compliance with safeguards.

262. The PIC will: (a) update, as necessary, the Initial Environmental Examination (IEE), Environment Management Plan (EMP), Biodiversity Action Plan (BAP), Biodiversity Management and Evaluation Plan (BMEP) and Social Safeguards Due Diligence Report (SSDDR) or preparation of Land Acquisition and Resettlement Plan (LARP), and, after obtaining ADB's approval, oversee their implementation; (b) work and coordinate with PMU to complete Environmental, Health and Safety Audit (EHS) for existing Surkhan substation that will undergo upgrade/extension work; (c) work and coordinate with contractors to develop and finalize site EMPs (SEMPs), and after obtaining PMU's approval, oversee SEMP implementation; (d) supervise the integration of safeguard measures into the design, installation, and commissioning of the solar PV plant(s) and transmission interconnection infrastructure works by the SPV/contractor or sub-contractors; and assist PMU, SPV PIU and contractors/sub-contractors with compliance to ADB SPS requirements including handling complaints and/or grievances filed through the project GRM, if any.

263. The PIC will be responsible for building PMU and SPV PIU capacity in safeguards monitoring and reporting. The PIC will assist the SPV in coordination activities with relevant Government agencies and local authorities on permits and clearances and compliance with relevant national regulatory requirements.

264. The PIC will also assist contractors in conducting project level COVID-19 risk assessment as well as conduct random checks/audits of SPV PIU and contractor's EHS and OHS performance. The PIC will ensure that the all Occupational Health & Safety plans integrate measures to mitigate COVID-19 health risks that are aligned with Government guidelines and measures listed in Part III of the EMP ^{125,126} .

265. The PIC will support SPV to prepare and submit the domestic environmental due diligence documents required (PZVOS, ZVOS and ZEP) to State Committee on Ecology and Environment

¹²⁵ National guidance on Covid-19 is issued by the Uzbekistan Government Ministry of Health.

¹²⁶ OHS plans will be reviewed by PIC in consultation with public health inspectors of the area, local medical officers and other relevant health specialists; with a recommendation forwarded to the EA for clearance.

(SCEEP or the “Goskomekologiya”) and obtain clearance and approval, as required, prior to any contract awards.

266. The PIC will consist of one international and two national specialists recruited for a total of 4 person-months and 14 person-months total over 18 months project implementation period, respectively.

Positions	Number	Person–Months
International		
Environment Specialist – 1	1	4
National		
Environment Specialist – 2	1	14
Total		18

267. Contractors. All contractors will be responsible for implementing the mitigation measures during construction and operation under the direct supervision of the PIC and SPV PIU and overall supervision of the PMU. To ensure that the contractors comply with the EMP provisions, the PMU will ensure that the safeguards requirements are included in all bids, contracts and tender documents including the provision to apply penalties in case non-compliances to safeguards are encountered repeatedly.

268. Each contractor will be required to work with PIC to finalize package specific site Environmental Management Plan (SEMP) during construction¹²⁷, appoint a C-ES, C-HS, C-BO and C-GRM focal point persons within its staff on full time basis and submit monthly progress reports on the implementation of the site SEMP / EMP. Contractors will integrate COVID-19 health risk mitigation in their OHS plans. Contractors will also engage in project GRM via C-GRM focal point person and will be required to regularly co-ordinate with relevant stakeholders such as affected persons/APs, households, Village Assembly of Citizens, Council of Farmers, Makhalla leaders¹²⁸ , Khokimiyat¹²⁹ to provide up to date information on project activities and address any issues that arise during project implementation during construction stage. The PIC will assist SPV PIU, contractors/facility operators in developing and implementing the Standard Operation & Maintenance Plans (SOMPs) during operation stage. The SPV PIU and facility operators will be required to regularly co-ordinate with the relevant stakeholders to provide up to date information on project activities and address any issues that arise during subproject implementation during operation stage.

9.4 Monitoring and Reporting

269. The PMU will be responsible for safeguards reporting. The SPV PIU, assisted by the PIC, will conduct monitoring for the project and provide the environment input based on site visits, compliance checks and prepare the subproject Quarterly Progress Reports (QPRs) for submission to the PMU; the PMU will verify the information and submit the project QPRs to ADB.¹³⁰ The PIC will support the PMU to use the information from the project QPRs and prepare a safeguards monitoring report for submission to ADB semiannually during construction stage

¹²⁷ The SEMP will need to be fully compliant with the EMP and will need to be prepared within 30 days of contract award and approved 10 days prior to access to the site.

¹²⁸ Makhalla – See glossary for description.

¹²⁹ Khokimiyat – See glossary for description.

¹³⁰ Initially the safeguards reporting will be via the project QPRs.

and annually during operation stage. The safeguards monitoring reports will be publicly disclosed on the ADB website. Reporting to ADB will continue until project completion report is issued.

270. The SPV PIU will be responsible for safeguards monitoring. The SPV PIU, assisted by PIC, will coordinate and interact with the PMU on compliance to ADB safeguards requirements and with relevant government agencies and local authorities on permits and clearances and national environmental requirements, update and finalize the IEE and EMP as needed.

271. The PIC will assist the PMU, SPV PIU and contractors¹³¹ in handling complaints and/or grievances filed through the project GRM, if any. The PIC will oversee three types of project monitoring conducted under the EMP.

- Project readiness monitoring. To be conducted by the PMU with assistance of PIC (see Project Readiness Checklist)
- Environmental monitoring. To be conducted by the SPV PIU and contractors, assisted by PIC, across all stages of project implementation as described in the EMP and assessing compliance with applicable Uzbekistan environmental quality standards (This is provided in Part II of this EMP)
- Compliance monitoring. To be conducted by the PMU, assisted by PIC to verify EMP mitigation and monitoring compliance during project implementation, including random checks / audits of SPV PIU and contractor's EHS performance.

272. During construction, the contractor(s) will submit monthly progress reports to the SPV PIU on site SEMP/ EMP implementation which will inform the project QPR and semiannual safeguard monitoring reports. The contractor monthly progress reports will include compilation of daily monitoring sheets (that will be prepared for use by PIC) that is duly signed by the SPV PIU.

273. During operation, the SPV PIU, contractor/facility operator will also submit monthly progress reports to PMU for the first year of operation and quarterly progress reports thereafter. These will inform the annual safeguard monitoring reports.

274. ADB will oversee project compliance on the basis of the project QPRs and semi-annual and annual monitoring reports provided by the PMU and site visits (generally one to two times per year). For any non-compliance, ADB will make suitable recommendations for undertaking remedial measures for mid-term correction and improvement, if required. ADB's monitoring and supervision activities are carried out on an on-going basis until a project completion report is completed.

¹³¹ Contractors imply = SPV Engineering Procurement, Construction (EPC) contractors, any key sub-contractors, and facility operators. Note: EMP implementation during operation stage will continue through the SPV PIU and for transmission interconnection infrastructure through NEGU.

Project Readiness Checklist

S. No	Indicator ¹³²	Criteria	Assessment
1	IEE and EMP update	<ul style="list-style-type: none"> IEE and EMP aligned and updated in line with technical detail engineering design and approved by ADB 	Yes No
2	BAP and BMEP update	<ul style="list-style-type: none"> BAP and BMEP aligned and updated in line with technical detail engineering design and approved by ADB 	Yes No
3	Compliance with safeguards covenants	<ul style="list-style-type: none"> The SPV complies with safeguards covenants related to project design and environmental management planning, including ensuring IEE and EMP is updated before award of contracts 	Yes No
4	EHS audit	<ul style="list-style-type: none"> EHS audit for existing substation undergoing upgrade / extension works completed 	Yes No
5	Climate risk measures / extreme weather events	<ul style="list-style-type: none"> Climate resilience measures and measures for extreme weather events integrated into final detailed engineering design 	Yes No
6	Design Features for Environmental Impact Mitigation	<ul style="list-style-type: none"> Features integrated into final technical detailed engineering design (all infrastructure) including mitigation measures and recommendations as per BAP, BEMP, corrective measures from the EHS audit findings in design for existing Surkhan S/S 	Yes No
7	Domestic environmental assessment by SCEEP	<ul style="list-style-type: none"> Domestic environmental assessment documents prepared and submitted to SCEEP for review and approval 	Yes No
8	Implementation Set up	<ul style="list-style-type: none"> PIC services hired, including International and National Environmental Specialists SPV PIU set up - safeguards persons appointed within staff at SPV PIU on full time basis 	Yes No Yes No
9	Training and Capacity Building	<ul style="list-style-type: none"> Training and capacity building conducted for PMU, SPV PIU and contractors 	Yes No
10	Public involvement effectiveness	<ul style="list-style-type: none"> Meaningful consultations completed 	Yes No
		<ul style="list-style-type: none"> GRM / GRC established with entry points 	Yes No
		<ul style="list-style-type: none"> Safeguard manager and safeguards officer appointed within staff at PMU on full time basis 	Yes No
		<ul style="list-style-type: none"> Contractor environment and social focal point person (C-ES) appointed within staff on full time basis 	Yes No
		<ul style="list-style-type: none"> Contractor health and safety focal point person (C-HS) appointed within staff on full time basis 	Yes No
		<ul style="list-style-type: none"> Contractor biodiversity focal point person (C-BO) appointed within staff on full time basis 	Yes No

¹³² BAP = Biodiversity Action Plan; BMEP = Biodiversity Management and Evaluation Plan; SCEEP = State Committee on Ecology and Environment; SSDDR = Social Safeguards Due Diligence Report; SEMP = Site Environmental Management Plan; SOMP = Standard Operation & Maintenance Plan; GRM = Grievance Redress Mechanism.

S. No	Indicator ¹³²	Criteria	Assessment
		<ul style="list-style-type: none"> Contractor GRM focal point person (C-GRM) appointed within staff on full time basis 	Yes No
11	SSDDR / social safeguards documents	<ul style="list-style-type: none"> SSDDR / social safeguards documents updated 	Yes No
12	SEMP / SOMP	<ul style="list-style-type: none"> Site specific SEMP / SOMP prepared containing site maps with receptor information 	Yes No
13	COVID-19 risk measures	<ul style="list-style-type: none"> COVID-19 risk mitigation measures integrated into project planning 	Yes No
14	Chance find procedures for PCRs	<ul style="list-style-type: none"> Identification of sensitive periods conducted Ocular inspection/ Transect survey Chance Find Procedures established for PCRs 	Yes No
15	Baseline monitoring / surveys	<ul style="list-style-type: none"> Baseline monitoring / surveys conducted, findings and recommendations shared 	Yes No Yes No
16	Pre-construction Surveys	<ul style="list-style-type: none"> TOR prepared for recruitment of third-party survey contractor Surveys as per BAP and BMEP conducted, findings and recommendations shared 	Yes No
17	Bidding documents and contracts with environmental safeguards	<ul style="list-style-type: none"> Bidding documents and contracts incorporating the project EMP as partial credit assurance 	Yes No
18	Permits, Clearances, Approvals	<ul style="list-style-type: none"> Permits, Clearances, Approvals obtained 	Yes No
19	EMP financial support	<ul style="list-style-type: none"> The required funds have been set aside for EMP implementation 	Yes No
20	PIB prepared for dissemination	<ul style="list-style-type: none"> PIB in local language prepared with project information and key contact information including GRM focal point person contacts 	Yes No
21	ESMS prepared	<ul style="list-style-type: none"> ESMS prepared for implementation by SPV 	Yes No

9.5 Training and Capacity Building

275. The capacity of PMU, SPV PIU and contractors' staff responsible for EMP implementation, GRM and supervision, monitoring and reporting will be strengthened through appointment of dedicated and trained officers at the PMU and SPV PIU as well as ensuring appointment of contractors focal point persons (this will be for each contractor); refer to discussion under Institutional arrangements and implementation responsibilities.

276. The PMU, SPV PIU and contractors will receive training in EMP and GRM implementation, site inspections, supervision, monitoring and reporting, conducting meaningful consultations, information disclosure, handling complaints/dispute resolution, as well as on the relevant environmental rules and regulations. Training will be facilitated by the PIC. In addition, orientation and briefing of project staff, all contractors/sub-contractors, hired workers will be conducted prior to mobilization on site during construction and operation stages.

Training and Capacity Building Plan with Cost Estimates

Training	Attendees	Content	Schedule	Period (days)*	Frequency	No of persons	Cost (USD /person/day)	Total
EMP implementation	PMU, SPV PIU, Contractors	ADB SPS (2009)	Once prior to start of civil works	1	1	20	100	2,000
		Uzbekistan's relevant environment, health and safety laws, environmental regulations and policies, including domestic environmental clearances, permits and approvals						
		IFC (WBG) EHS Guidelines						
		EMP - environmental management monitoring and reporting						
		BAP and BEMP requirements						
		Requirements for information disclosure, meaningful stakeholder consultation, community awareness program						
		SSDDR / LARP						
Project GRM		Roles, Responsibilities and Procedures						
	Project Staff, Workers,	Same content as above	Once prior to mobilization	1	3	40	50	6,000

Training	Attendees	Content	Schedule	Period (days)*	Frequency	No of persons	Cost (USD /person/day)	Total
Orientation and Briefing on Safeguards	Contractors / Sub-contractors / Participating Makhallas		on site for construction and two more times during construction					
	Facility Operators	Same content as above	Once before start of operation and 2 more times during operation	1	3	40	50	6,000
Total Estimated Cost								14,000
BAP = Biodiversity Action Plan; BMEP = Biodiversity Management and Evaluation Plan; EMP = Environmental Management and Monitoring Plan; PMU = Project Management Unit; ; LARP = Land Acquisition and Resettlement Plan; IFC (WBG) EHS = International Finance Corporation (World Bank Group) Environment, Health and Safety; GRM - Grievance Redress Mechanism; SSDDR = Social Safeguards Due Diligence Report								

9.6 Information Disclosure, Consultation and Participation

277. Consultation during design and pre-construction. Section 7 of the IEE describes the public consultations, information disclosure and participation activities carried out during project preparation.

278. Future Consultations. A detailed Consultation and Participation Plan will be prepared for the APs and relevant stakeholders such as households and communities in the project area of influence with schedule, location, invited participants, information to be disseminated and methods of consultation. PIC will assist PMU in preparing the Consultation and Participation Plan. An overview activity outline for a Consultation and Participation Plan is enclosed. Consultations with the APs and relevant stakeholders will include dissemination of project information booklet (PIB) in local language. The PIB will include project information such as on project environmental impacts (positive and negative), safeguards measures including community health and safety, health & safety risks due to transmittable diseases (HIV/AIDs, COVID-19), training in emergency response (ERPs), project implementation schedule, results from baseline surveys, biodiversity conservation measures, land acquisition and compensation processes as per SDDDR, APs right to complain and the project GRM. The PIB will also include the contact information including PMU, SPV PIU, PIC and contractors address and telephone numbers for focal point persons/local entry points e.g. C-ES, C-BO, C-HS, and C-GRM, Makhalla village leaders.

279. Consultations with the APs and relevant stakeholders will provide a two-way information-sharing channel, ensuring that the concerns, questions and ideas of the APs/relevant stakeholders will be discussed and responded to in an appropriate and gender inclusive way. The SPV PIU, PIC and contractors will record all information dissemination and consultation activities and the results from consultations with the APs and relevant stakeholders. The SPV PIU and PIC will also record how concerns raised and recommendations made are addressed in the updated IEE and EMP. Consultations will be supported and supervised by PMU. Consultations with APs and relevant stakeholders will continue throughout project implementation and will be open and gender inclusive.

280. The updated IEE and EMP will be disclosed on ADB website as required by the ADB SPS 2009 and Access to Information Policy (September, 2018)¹³³.

Activity Outline for Consultation and Participation Plan and Information Disclosure

Project Implementation Schedule	Activity	Stakeholders
Detail design phase: Detailed Walkover Survey and once prior to construction	Public information meetings Informal meetings on subproject design for aligning people's responses in detailed design Dissemination of Project Information Booklet (PIB) Community Awareness Program one month prior to civil works, including informal meetings for information updates on project schedule and activities through village leaders and Khokimiyat and Makhalla	APs Affected Households Villages, Village leaders, Khokimiyat and Makhalla

¹³³ <https://www.adb.org/documents/access-information-policy>

Project Implementation Schedule	Activity	Stakeholders
Civil works construction	Informal meetings for information updates on project schedule and activities through village leaders and Khokimiyat and Makhalla Public information meetings as needed Community Awareness Program once during civil works PIB made available at consultations, project field offices and Khokimiyat and Makhalla	
Operation and Maintenance	PIB distributed to communities Informal meetings for information updates and concerns	

9.7 Project GRM¹³⁴

281. A project specific GRM will be used as part of this EMP to receive and manage any public concerns, issues or grievances that may arise due to the project. The GRM comprises: (i) a set of clear procedures developed by the PMU to receive, record and address any concerns which are raised by affected stakeholders; and (ii) specific contact details for individuals at the PMU, SPV PIU and contractor level that serve as focal point persons for access to the GRM.

282. Composition and Area of Jurisdiction. The PMU will set up a project specific Grievance Redress Committee (GRC) as soon as the project commences. GRC will function from construction to operation stage. The GRC will be established at two levels across the project area of influence where the project will be implemented.

- GRC at SPV PIU level (SPV PIU Office in the Region). As practiced, the GRC at SPV PIU level will include local two representatives of AP, including a woman representative, one Makhalla leader from the local area, contractor focal point persons, one representative from concerned line agencies (e.g. Revenue, Land, Forest, district Khokimiyat, Village Assembly of Citizens, Council of Farmer, etc.), SPV PIU safeguards staff person, PIC national specialist.
- GRC at PMU Level (NEGU PMU Office i.e. NENs office Main Power Network (MPN)). GRC at PMU level will include one representative of PMU safeguards staff (safeguards manager, officer), project implementation (NEGU / NENS) director in charge.

283. Responsibilities. The GRC is expected to: (i) resolve issues on dust, noise, vibration, construction related nuisances to APs, households or public; (ii) resolve issues on land acquisition (if any), compensation to temporary damages to crops, orchards, trees and other use of land such as temporary/permanent areas for towers and ROW; (iii) convene once a month to review complaints lodged (if any); (iv) record the grievances and resolve the issues within the stipulated time from the date the grievance was filed; and (v) report to the APs, households and public upon the status of grievance resolution and the decisions made or action taken and receive feedback. All contractors including contractor focal point persons and work staff will be briefed by the PIC on project GRM.

¹³⁴ Project GRM takes reference of Guzar 500 kV IEE.

284. **Procedures.** The key contacts for the GRC will be included in the PIB for dissemination in the project area of influence and also posted at project field construction sites, field offices, construction (workers) camps and public notice boards in affected villages, local Makhalla and Khokimiyat in local (Uzbek/Russian) language. There are multiple entry points to the project GRM, including face-to-face meetings, written complaints, contractor information, anonymous drop-boxes for written comments, and/or e-mail. All concerns received will be treated confidentially and professionally. The identity of individuals will not be circulated among project agencies or staff and will only be shared with senior staff and then only when there is clear justification. The GRM will consist of the following steps of conflict resolution:

Step 1 (Contractor)

- At field level, the contractor can act as an entry point, where an AP/complainant can be presented to the contractor either verbally in person or in writing.¹³⁵ The AP can also approach the local Makhalla directly (see Step 2). The contractor will be obliged to provide immediate written receipt of the complaint and take it forward in a written format. The contractor assisted by PIC will resolve the issue with the AP/complainant within seven (7) days through direct negotiation, maintain the record of grievances received and redressed and share with GRC at SPV PIU level.

Step 2 (GRC SPV PIU Level/Makhalla)

- If or when the AP/complainant is not satisfied with the action or decision of the Contractor, the AP/complainant will take the issue to GRC at SPV PIU level. In all cases, the grievances will be recorded in writing. The GRC at SPV PIU level will have two (2) weeks to resolve the complaint through a hearing and negotiation and will be assisted by the PIC. If the issue is not handled within two (2) weeks, or if the AP/complainant is not satisfied with the result, he/she can bring the issue to the GRC at PMU level. Note: the GRC at SPV PIU level may forward or accelerate the case to GRC at PMU level if it cannot be redressed at GRC SPV PIU level. The grievance redress process at GRC at SPV PIU level is as follows:
 - GRC at SPV PIU level will review the filed complaint and prepare a Case File for GRC hearing and negotiation
 - A formal GRC hearing will be held at a mutually agreeable date between GRC members and AP/complainant or representative of AP
 - On the date of the hearing, the AP/complainant or representative of AP will appear to air the issue/grievance/complainant
 - All proceedings shall be recorded and documented
 - Final resolution issued by GRC at SPV PIU level will be communicated to the AP/complainant or representative of AP

Step 3 (GRC PMU Level)

- If the issue/complaint cannot be resolved in a way that is satisfactory to all parties, the GRC at SPV PIU level will bring the issue to the GRC a PMU level. The GRC at PMU level will meet the AP/complainant or representative of AP and try to resolve the issue/grievance. Within four (4) weeks of the submission of the

¹³⁵ If APs do not have sufficient writing skills or are unable to express their grievances verbally, it is a common practice that they are allowed to seek assistance from any recognized local NGO or other family members, village heads or community chiefs to have their complaints or grievances written for them. APs will be allowed to have access to the detail measurement survey or contract document to ensure that all the details have been recorded accurately enabling all parties to be treated fairly. Throughout the grievance redress process, the responsible GRC will ensure that the concerned APs are provided with copies of complaints and decisions or resolutions reached.

complaint to the GRC PMU level, it has to take a decision and inform in written to the AP/complainant or representative of AP, GRC at SPV PIU level of the decision.

Step 4 (District Khokimiyat)

- If the issue/complaint cannot be resolved in a way that is satisfactory to all parties, the AP/complainant (or representative of AP) can bring the issue to the District Khokimiyat. The district Khokimiyat will meet the AP/complainant or representative of AP and try to resolve the issue. Within thirty (30) days of the submission of the complaint to the District Khokimiyat, it has to take a decision and inform in written both the AP/complainant or representative of AP and GRC at PMU Level of the decision.

Step 5 (Regional Khokimiyat)

- If the AP/complainant gets no response from the District Khokimiyat or is not satisfied with the result, he/she can bring the case to the Regional Khokimiyat. The Regional Khokimiyat will make a written decision.

Step 6 (ADB)

- If efforts to resolve disputes using the grievance procedures remain unresolved or unsatisfactory, AP/complainant have the right to directly discuss their concerns or problems with the ADB's Energy Division, Central and West Asia Department through the ADB Uzbekistan Resident Mission (URM). If AP/complainant is still not satisfied with the responses of URM, they can directly contact the ADB Office of the Special Project Facilitator. The Office of the Special Project Facilitator procedure can proceed based on the accountability mechanism¹³⁶ in parallel with the project implementation.

285. Access to Country Legal System: The AP/complainant will avail the right to approach the national or state judiciary or Courts directly if they like, without approaching the GRC.

286. GRC Recordkeeping and Reporting. The GRCs at PMU level and SPV PIU level will keep a record of all the grievances received including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions, the date these were affected and the final outcome. Documentation of the grievances filed and resolved will be summarized, submitted to the PMU and reported in the project QPRs and semiannual safeguard reports during construction stage.

287. Disclosure of Information. Under the direction of the PMU, the SPV PIU with assistance from PIC will disseminate PIBs and also inform APs/complainants or representative of APs on grievance redress procedure, who to contact and when, where and how to file a grievance, time likely to be taken for redressal of minor and major grievances, etc. It will be made known that AP/complainants are not charged any fee under project GRM. It is a good practice to provide the APs/complainants/representative of AP with transport facilities to the GRC hearings. Grievances received and responses provided will be documented and provided to APs/complainants/representative of APs during the process. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the project construction field offices, local Makhalla, district/regional Khokimiyat (if required).

288. Review of the Process. The PMU will periodically review the implementation of the project GRM and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

¹³⁶ <https://www.adb.org/site/accountability-mechanism/main>

289. Moreover, ADB safeguards indicators include assessment of whether the project GRM is functioning effectively, indicators of a functioning GRM, include:

- PMU provided a formal letter that confirms that the GRM has been established and is operational with a list of GRC committee members at each level including PMU and SPV PIU focal point persons for GRM
- The PIB has the GRM steps explained and GRM focal point person contact information and has been handed out to all APs, households and available at local offices
- Evidence of consultation/verbal dissemination of the project GRM to APs, households and public consultation (This could be shown through presentation materials, minutes of meetings, photos and attendance sheet)
- Evidence of project signage within the community and at construction sites / camps with GRM focal point person contact information
- GRM focal point persons mobilized and functioning in their role
- GRM record-keeping system is established and functioning
- Complaints and resolutions included in project QPR and semi-annual safeguards monitoring reports.

9.8 Mechanisms for Feedback and Adjustment

290. The EMP is a living document. The need to update and adjust the EMP will be reviewed during final project detailed engineering design or when there are design changes, changes in construction methods and program, unfavourable environmental monitoring results or inappropriate monitoring locations and ineffective or inadequate mitigation measures. Based on environmental monitoring and reporting systems in place, PMU (with the support of the PIC) shall assess whether further mitigation measures are required as corrective action, or improvement in environmental management practices are required. PMU will inform ADB promptly on any changes to the project and needed adjustments to the EMP. The updated EMP will be submitted to ADB for review and approval and will be disclosed on the ADB project website.

9.9 Safeguard Contract Clauses for Inclusion into Bid Documents and Civil Works Contracts

291. Bid Documents. The Bid Documents for the SPV/contractor(s) will contain two sections relating to environmental issues, firstly a basic clause indicating that the SPV/contractor(s) will be responsible for following the requirements of the EMP and that they should prepare his own SEMP/SOMP for the project as well as be responsible for following the requirements of BAP and BMEP. Secondly, the EMP, BAP and BMEP will be repeated in its entirety as Annexures to the Bid Documents so as the bidder is aware of their safeguards requirements under the project and help them in putting environmental costs to their proposal.

292. Contract Documents. The Contract Documents will follow a broadly similar pattern to the bid documents. It is not considered necessary to repeat the mitigation measures verbatim in a list of environmental contract provisions, rather the Contract will specify that the SPV/contractor(s) is responsible for implementation of the EMP via his SEMP and SOMP as well as BAP and BMEP. Again, the EMP, BAP and BMEP will be included as Annexures to the Contract so the contractor will be liable for any non-conformances with the safeguards requirements specified in the project EMP, BAP and BMEP; and thereby the IEE.

9.10 Cost Estimates

293. There are three types of mitigation measures and corresponding costs:
- i. Measures that will permanently become part of the infrastructure such as landscaping, re-seeding of sites, hedge planting, maintenance of field margins, perimeter fencing with adequate ground clearance for passage of wild species/animals, road signage, permanent access branch road within the solar project site, detailed engineering measures for preventing soil erosion, construction of water retention pond/reservoir for PV panel cleaning, designing and maintaining natural drainage/storm-water canals), climate resilience measures will be included within the main civil works contract cost and not double-counted as part of the EMP costs.
 - ii. Measures such as conducting environmental baseline surveys and/or pre-construction surveys, EHS audit can be counted as part of the environmental impact mitigation. The indicative cost estimates are provided below. Note: Costs for biodiversity conservation mitigation measures are included in BAP and BMEP and hence, not included in the EMP.
 - iii. Measures during the construction stage (e.g. periodic watering for dust suppression, use of hand held portable air and noise/vibration monitoring devices, EMF measuring devices, quiet / low noise machinery and equipment, PPE, etc.) as well as measures to mitigate unforeseen impacts due to construction activities will need to be included in the tender documents to ensure that all contractors budget these as a specific line item in their bids. Contractors will also bear all environmental monitoring costs during the operational stage.
 - iv. Information disclosure, developing PIB, project GRM related costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the NEGU.
 - v. Human resources for EMP support are part of the Project Implementation Consultancy Services (PIC). The indicative cost estimates are provided below.

Environmental Management Plan / Cost Estimates - (item A to Item B)

S.No	Item	Number	Cost per Unit (USD)	Total Cost (USD)	Sources of Fund
A Human Resources for EMP Support					
A.1	International Environment Specialist, No. person - 1	4 person-months (spread over entire project implementation period of total 18 months)	20,000	80,000	Part of Project Implementation Consultant Services (PIC)
A.2	International Environment Specialist - Travel	Assumes 6 visits, 14 days per visit (including travel time); 6 RT @1500/RT; 84 days per diem @ \$110 /day	18,240	18,240	
A.3	Site Visits / Transportation Costs for International Specialist	Assumes 6 site visits	lumpsum	2,400	
A.4	National Environment Specialist , No. persons 2	7 person months each or 14 months total (spread over entire project implementation period of 18 months)	1500 per month	21,000	
A.5	Site Visits / Transportation Costs for National Environment Specialists	Assumes 20 site visits	lumpsum	8,000	
	Sub-total			1,29,640	
	Contingencies (3%)		3.0%	3,889	
	A. TOTAL			1,33,529	
B. EMP Costs					
B.1	Training and Capacity building PMU, SPV PIU and Project Contractors; Orientation of Project Staff and Contractors		see tab 2	14,000	c/o PIC
B.1	Physical on-site EHS audit of existing facility			5,000	
	Sub-total			19,000	
	Contingencies (3%)		3.0%	570	
	B. TOTAL			19,570	

Environmental Management Plan / Cost Estimates - (item C to Item D)

S.No	Item	Number	Cost per Unit (USD)	Total Cost (USD)	Sources of Fund
C	Administrative Costs, GRM, Consultations, Survey				
C.1	Public consultations and Information Disclosure		lumpsum	40,000	Borne by NENU
C.2	GRM implementation		lumpsum	40,000	
C.3	EMF monitoring device		lumpsum	1,000	
C.4	Permits and Approvals		Lumpsum	19,000	Borne by SPV
		Sub-total		1,00,000	
		Contingencies (5%)	5.0%	5,000	
	C. TOTAL			1,05,000	
D	Pre-Construction, Construction and Operation Management				
D.1	Environmental monitoring survey to establish baseline (air, noise, surface water) (including equipment such as PPE, hand-held noise meters, air quality measuring devices, EMF measurement devices)	Project area of influence	lumpsum	1,00,000	Borne by Contractor (included in contractor costs)
D.2	Environmental monitoring during civil works and once after completion of civil works		lumpsum	50,000	Borne by Contractor (included in contractor costs)
D.2	Preparation and Implementation of SEMP / SOMP such as Site Restoration Plan, Spills Reponse Plan, OHS Plan, ERP, Community Health and Safety Plan, Traffic Control Plan, etc		lumpsum	2,50,000	Borne by Contractor (included in contractor costs)
C.4	Compensating for any temporary or permanent damage to areas and infrastructure, any loss or inconvenience as result of the project during the construction stage (outside the corridor of impact assessed in SSDDR)		lumpsum	10,000	Borne by Contractor (included in contractor costs)
		Subtotal		3,00,000	
		Contingencies (5%)	5.0%	15,000	
	D. TOTAL			3,15,000	
	GRAND TOTAL (A+B+C+D)			5,73,099	

**Costs borne by the contractor will be included as a specific line item in the provisional sum of the tender document

9.11 EMP Tables

294. The tables are arranged in Part 2 of the IEE as follows:

- Table 1.1. EMP – Design and Pre-Construction
- Table 1.2. EMP – Activities Prior to Mobilization On-Site
- Table 1.3. EMP – Construction and Operation – New Solar Project (Solar PV Plant, New Substation, Upgrade Works, Access Road
- Table 1.4. EMP– Construction and Operation – New Transmission Line, Temporary Access Tracks
- Table 2.1. EMOP – Design and Pre-Construction
- Table 2.2. EMOP – Activities Prior to Mobilization on Site
- Table 2.3. EMOP – Construction and Operation – New Solar Project (Solar PV Plant, New Substation, Upgrade Works, Access Road
- Table 2.4. EMOP – Construction and Operation – New Transmission Line, Temporary Access Tracks

10 CONCLUSION

295. The project is confirmed as environment category B as per ADB SPS 2009; a draft IEE and EMP have been prepared. The project will comply with the national/state environmental safeguards requirements based on the recommendations of the SCEEP; the PIC will assist PMU and the SPV to prepare the required documentation at either preliminary design stage or detailed engineering design stage.

296. This project is expected to have significant environmental benefits. The operation of Phase I min. 200 MW solar PV plant will avoid approximately 272,000 tons of carbon dioxide-equivalent (tCO_{2e}) annually. When the anticipated 500 MW capacity (Phase I+ II) is achieved there will be approximately 680,000 tCO_{2e} annual emission savings or approximately 17 million tCO_{2e} over a 25-year project lifetime.

297. The proposed Phase I – minimum 200 MWac will involve permanent land take (500ha, subject to confirmation based on technology and the configuration) for the solar site. The current land available to the bidder for solar PV plant and new substation is approximately 600 ha. There is no land acquisition since the land belongs to the Government; this will be leased to the Private Partner through the SPV. There is no permanent acquisition associated with the 220 kV transmission line ROW except for the tower footings. Vegetation along the final transmission line ROW will be maintained for safety reasons and proper operation.

298. The potential adverse environment impacts associated with the project have been avoided or minimized through careful site selection of the solar site and preliminary route selection of the overhead 220 kV transmission line. More detailed assessment is proposed to inform the transmission line alignment and detailed design to minimise impacts on sensitive natural and human receptors. This project also gives special consideration to the ecological area of analysis in order to align with the IFC Performance Standards, in particular with the Performance Standard 6 or PS6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources and the updated Guidance Note (GN6, June 2009). The project area is classified as a critical habitat for smooth even-fingered gecko. The critical habitat status has been established as a precautionary approach following a discussion with ADB safeguards team on July 3 and 5, 2020. The preliminary design integrates biodiversity conservation measures that are include in the project BAP and BMEP (**Annexure 1 and 2**) and these will be further integrated in the final detailed engineering design. While climate change impacts are not anticipated to be significant over the design life of the solar PV plant (+25 years), the preliminary design integrates climate resilience measures such as consideration of wind speed and increases in temperature in project siting and structural design as well as consideration of extreme weather events. These will be further assessed and integrated in the final detailed engineering design.

299. Overall, the identified adverse impacts can be managed through effective implementation of the mitigation measures specified in the EMP, BAP and BMEP (including measures for achieving NNL for the smooth even-fingered gecko), appropriate social safeguard measures agreed in the project SSDDR and through inclusion of safeguards specification in tender documents for contractors and operation and maintenance SOMPs. There are no significant residual impacts anticipated; there will be impacts of moderate significance due to change in landscape/visual features (industrial solar site in rural setting) during project lifetime (25 years) while the remaining residual impacts are of low significance. Monitoring and evaluation parameters have been identified to check the effectiveness of EMP, BAP, BMEP measures and to ensure any unidentified impacts can be readily addressed. Project risks such as low institutional capacity of

the PMU and contractors/facility operators and their failure to implement the EMP, BAP, BEMP effectively during construction and operation stages, will be mitigated by providing periodic training on safeguards and appointment of full-time dedicated staff at PMU and SPV PIU.

300. The PMU will utilize existing GRM that is acceptable to ADB as soon as the project commences to deal with environment and social issues that may be raised by affected persons/APs and other concerned stakeholders during project implementation. The GRM will be coordinated by the PMU, implemented by SPV PIU and assisted by PIC. GRM will address concerns and complaints promptly via transparent process.

301. Meaningful consultations with local stakeholders were conducted in November and December 2019 and January 2020. Consultations with project-affected stakeholders will continue during detailed design and project implementation. Measures to address concerns raised during the consultations will be integrated in the detailed design and EMP. Overall, all stakeholders were made aware of the proposed project and were supportive due to expected benefits such as local employment and access to electricity.

Part 2 of 2
Initial Environmental Examination

Document Stage: Draft 2
September 2020

Uzbekistan: Sherabad Solar IPP Project

Prepared by the Ministry of Energy, Government of the Republic of
Uzbekistan for the Asian Development Bank

**Part I
ENVIRONMENTAL MANAGEMENT PLAN
(EMP)**

Table 1.1. EMP – Design and Pre-Construction Stage

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
Design Features for Environmental Impact Mitigation	<ul style="list-style-type: none"> Project vulnerability due to inadequate design features for effective environmental management; change in landscape 	<p>General</p> <ul style="list-style-type: none"> Finalize conceptual plan and optimize land area; clearance restricted to work sites Detailed design to also consider the geological conditions and seismicity as per national guidance on seismic design that calls for identification of a maximum credible earthquake scenario and associated ground acceleration parameters. Detailed design will include forecasting of water supply/demand for construction (and operation stage) to reduce competition in water usage by nearby domestic users Detailed design will include provisions for ensuring effective maintenance and protection of assets created Site design to conserve the irrigation channel outside the solar site boundary (west of the access branch road) in its current natural condition and establish a buffer of at 	PMU-SS SPV-SS PIC	PMU SPV PIU	SPV

¹ PIC = Project Implementation Consultant; PMU = Project Management Unit of NEGU; PMU-SS = PMU Safeguards Staff; ADB = Asian Development Bank; Contractors = SPV appointed Engineering, Procurement and Construction (EPC) contractors, any key sub-contractors and facility operators. Note: Safeguards implementation for solar PV plant(s) during operation stage will continue through the SPV and for transmission interconnection infrastructure directly through NEGU; C-ES = Contractor Environment and Social focal point person; C-HS = Contractor Health and Safety focal point person; C-BO = Contractor Biodiversity focal point person; C-GRM = Contractor Grievance Redress Mechanism focal point person.

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
		<p>least 25 to 50 m from the site perimeter and maintain the natural drainage pattern at the solar site</p> <ul style="list-style-type: none"> • Integrate recommendations from the ongoing Topographical/ Geotech-studies <p>Solar PV plant:</p> <ul style="list-style-type: none"> • Site design to ensure that Solar PV arrays arrangement considers the maximum possible distance from each other. The larger the distance, the less negative impact on reptile, mammals and birds and plants and water-birds are less likely to mistake such PV arrays for waterbodies and will reduce the birds' mortality rate. • Provide adequate fencing around solar PV plant <p>Substation:</p> <ul style="list-style-type: none"> • Select Air Insulated Substation (AIS) to avoid fugitive emissions of Sulfur Hexafluoride (SF6), a potent greenhouse gas (GHG) • Design the substation location to minimize shading by the transmission line on the solar PV plant • Design and maintain a permanent ('bundled') impermeable surface and dykes capable of carrying 110% volume of materials for accidental spills or leakage; including an adequate size storage area for new equipment and damaged / discarded equipment and repairs • Provision for an oil containment system provided at transformer pad of new substation • Provision for adequate perimeter fencing around the substation <p>Transmission Line.</p>			

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
		<ul style="list-style-type: none"> • ROW to be adjusted to minimize cutting of trees • Survey to check ROW where tower/pole footings require extra reinforcement • Avoid placement of tower footings in water sources/ water bodies • Maintain the sanitary protection zone (SPZ) as per national standards <p>Upgrade works</p> <ul style="list-style-type: none"> • Upgrade works of existing facility / Surkhan Substation (AIS) to avoid use of circuit breakers or equipment that has fugitive emissions of Sulfur Hexafluoride (SF6), a potent greenhouse gas (GHG) 			
Biodiversity	<ul style="list-style-type: none"> • Species vulnerability to anticipated change in habitat 	<ul style="list-style-type: none"> • Integrate biodiversity conservation measures in detailed design • Refer to Annexure 2 and 3 	PMU-SS SPV-SS PIC	PMU SPV PIU	SPV
EHS audit	<ul style="list-style-type: none"> • Lack of safeguard measures during extension works 	<ul style="list-style-type: none"> • PIC to undertake and complete EHS audit of Surkhan substation that will undergo upgrade/extension works • Include findings in the updated IEE and EMP 	PIC	PMU-SS	Included in the project cost
Training and Capacity Building	<ul style="list-style-type: none"> • Effects of unplanned activities 	<p>Conduct training and capacity building for PMU, SPV PIU and contractors, focus on:</p> <ul style="list-style-type: none"> • ADB SPS (2009) • BAP and BMEP 	PIC	PMU-SS	Included in the Project Costs

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
	<ul style="list-style-type: none"> • Smooth project implementation • Strengthening institutional capacity and increasing safeguards knowledge 	<ul style="list-style-type: none"> • Uzbekistan relevant EHS laws, regulations and policies² • IFC (WBG) EHS Guidelines³ • EMP, environmental monitoring and reporting • Requirements for information disclosure, participation and meaningful consultation, community awareness program • Project GRM⁴ • Project SSDDR⁵ • Training to be provided to the PMU, SPV PIU and contractors. 			
Environmental Surveys (baseline, during and after completion of the civil works)	<ul style="list-style-type: none"> • Project vulnerability due to surface water issues 	<p>Key baseline surveys to inform project detailed engineering design and domestic environmental assessment report⁶ as follows:</p> <ul style="list-style-type: none"> • Surface water quality monitoring once before start of civil works to establish the baseline; once during civil works and once after completion of civil works. Location: irrigation channel outside the solar project site perimeter⁷, any water sources downstream of the solar 	Contractor PIC	PMU-SS SPV PIU	Contractor Budget

² For details refer to project IEE Section 2 – Policy, Legal and Administrative Framework.

³ IFC (WBG) EHS Guidelines – International Financial Corporation (World Bank Group) Environmental, Health and Safety Guidelines; Web-link: [WBG EHS Guidelines](#).

⁴ GRM – Grievance Redress Mechanism; For details refer to project IEE Section 8 – Grievance Redress Mechanism.

⁵ SSDDR – Social Safeguards Due Diligence Report.

⁶ The NEGU will ensure that the SPV prepares and submits PZVOS, ZVOS or ZEP (Uzbekistan EIA/IEE) and obtains approval from Glavgosexpertiza prior to award of contract / commencement of any project activity.

⁷ Site specific ground water quality monitoring at the solar project site has been conducted once to establish baseline; see details in the FS (GFP Geotechnical Report, March 2020) and as summarized: a) groundwater depth is less than 8 meters; b) analysis of drill samples show a high aggressiveness of extracted water on concrete; c) corrosion behavior against steel is “medium”; d) due to high altitude location of project site, there is no risks anticipated due to flooding. No further monitoring is necessary since groundwater abstraction is not anticipated for the project.

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
		site and along transmission tower footings (Karasu river crossing, stream/canals etc.)			
	<ul style="list-style-type: none"> • Air quality issues and increase in fugitive dust 	<ul style="list-style-type: none"> • Air quality monitoring once before the start of civil works to establish the baseline; bi-monthly during the civil works and once after completion of the civil works. Location: solar project site and sensitive receptors along the final transmission line alignment 	Contractor PIC	PMU-SS SPV PIU	Contractor Budget
	<ul style="list-style-type: none"> • Increase in Noise and vibration levels 	<ul style="list-style-type: none"> • Noise/vibration level measurements once before the start of the civil works to establish the baseline; bi-monthly during the civil works (location: solar project site and at sensitive receptor sites along the final transmission line alignment), and once after completion of the civil works/upon commissioning of the substation (solar project site only) 	Contractor PIC	PMU-SS SPV PIU	Contractor Budget
Physical Cultural Resources (PCRs)	<ul style="list-style-type: none"> • Loss of places of worship, scared sites 	<ul style="list-style-type: none"> • PCR sites avoided • Consult with relevant stakeholders for sensitive periods for religious/spiritual activities • Establish and implement “Chance Find Procedures” 	Contractor PIC	PMU-SS SPV PIU	Contractor Budget
IEE and EMP updating	<ul style="list-style-type: none"> • Non-compliance with ADB SPS 2009 and the National regulatory framework 	<ul style="list-style-type: none"> • Update IEE and EMP based on the final project detailed engineering design • Submit revised documents to ADB/PMU for approval and disclosure on ADB's website, if updated. 	PIC	PMU-SS	Included in the Project Costs

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
Permits and Clearances	<ul style="list-style-type: none"> Potential delays in project implementation 	<ul style="list-style-type: none"> Obtain permits and clearances from relevant authority 	SPV-PIU	PMU-SS -	SPV budget
Project GRM	<ul style="list-style-type: none"> Smooth project implementation Illicit opinion and consensus Offer assistance to project affected stakeholders that maybe affected by <ul style="list-style-type: none"> Economic loss Increase in traffic, noise, vibration and dust levels, Interference to existing utilities such as existing irrigation canals, water 	<ul style="list-style-type: none"> Establish and operate an efficient and functional GRM/ GRC Resolve queries, conflicts and complaints, if any, in a timely manner. Issue public notices via PIBs⁸ to inform the public within the project area of influence of the GRM procedures and contact information 	SPV-PIU Contractor PIC	PMU-SS	NEGU Budget

⁸ PIB = Project Information Booklet

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
	pumps, groundwater wells, damaged roads, electricity outages				
Project SSDDR	<ul style="list-style-type: none"> • Economic loss of affected communities due to loss of land, structures, crops, trees, plantations and orchards 	<ul style="list-style-type: none"> • Undertake appropriate and timely compensation as described in project SSDDR such as compensation for loss of land, structures, crops, trees, plantations and orchards along transmission line alignment 	PIC PMU-SS	ADB	NEGU budget
Information Disclosure, Participation and Consultation	<ul style="list-style-type: none"> • Limited outreach and consultation 	<p>Conduct activities throughout project implementation on topics including but not limited to:</p> <ul style="list-style-type: none"> • Project design • Project implementation schedule • Key construction activities (in particular those that result in disturbance or nuisance) • Potential community health and safety issues and safety training for communities residing close to the transmission line • Species vulnerability – rescues and release procedures • Project GRM • Project REGDP 	SPV - PIU Contractor PMU-SS PIC	PMU	NEGU Budget

Project Activity	Potential Impacts/Issues	Mitigation Measures and Safeguards	Responsibility ¹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
DESIGN AND PRE-CONSTRUCTION STAGE					
		<ul style="list-style-type: none"> • A PIB in local language to be prepared and made publically available in project field construction offices, local Makhalla officers. 			

Table 1.2. EMP – Activities Prior to Mobilization On-Site

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ⁹		Source of Funds
			Implementation	Supervision	
ALL INFRASTRUCTURE					
ACTIVITIES PRIOR TO MOBILIZATION ON SITE					
Orientation for Project Staff, Contractors and Workers	<ul style="list-style-type: none"> • Awareness of project staff, contractors and Workers on the safeguard requirements and their responsibility • Enhance understanding of Contractor(s) of their responsibility in site SEMP/EMP implementation 	PIC to conduct briefing and orientation of contractor(s) on: <ul style="list-style-type: none"> – EMP, GRM, Information disclosure, participation and meaningful consultation, environmental monitoring and reporting requirements. – ADB and Uzbekistan labor standards – Developing and implementing site SEMP and SOMPs¹⁰ and monitoring environmental compliance to the EMP/SEMP¹¹. – Developing and maintaining appropriate site-specific maps¹² – Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor – Record and maintain briefing and orientation events log with duration and list of attendees. 	PIC	PMU-SS	Included in the Project Costs
	<ul style="list-style-type: none"> • Awareness of hired workers 	<ul style="list-style-type: none"> • SPV-SS Contractors to conduct briefing of workers on SEMP implementation, including use of PPE¹³, 	SPV-SS Contractor	SPV-PIU PIC	Contractor Budget

⁹ Contractors imply = SPV appointed Engineering, Procurement and Construction (EPC) contractors, any key sub-contractors and facility operators. Note: Safeguards implementation for solar PV plant(s) during operation stage will continue through the SPV and for transmission interconnection infrastructure directly through NEGU.

¹⁰ SEMP – Site Environmental Management Plan; SOMP – Standard Operation & Maintenance Plan.

¹¹ The PIC will develop checklists for use by the contractors in monitoring environmental compliance.

¹² Map will show each work site location including at minimum: Access routes, storage areas for waste, storage area for chemicals such as fuels, re-fueling locations for vehicles, stockpile storage areas (on & off site), first aid kit and equipment used in emergency response, location of construction / worker camps (if required).

¹³ PPE – Personal Protective Equipment - gloves, foot and eye protection, protective hearing devices (earplugs, muffs), hard hats, respirators, reflective jackets.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ⁹		Source of Funds
			Implementation	Supervision	
	<p>on the safeguard requirements and their responsibility</p> <ul style="list-style-type: none"> • Enhance understanding of workers of their responsibility in SEMP implementation 	<p>COVID-19 risk mitigation measures (refer to Part III of this EMP) and training in ERP¹⁴</p> <ul style="list-style-type: none"> • Briefing EHS¹⁵ and hygiene at work sites as well as socially transmittable disease such as HIV/AIDS / COVID-19 to prevent potential incidences • Record and maintain briefing and orientation events log with duration and list of attendees 			
Hiring of Workers	<ul style="list-style-type: none"> • Avoid conflict due to workers migration • Lack of local support to the project • Dispute over transparency of hiring 	<ul style="list-style-type: none"> • Contractor(s) required to use local labor for manual work and eligible local workforce for clerical and office jobs • Increase local employment opportunities 	SPV-SS Contractor	SPV- PIU PMU-SS PIC	Contractor Budget
Presence of Workers at Construction Sites	<ul style="list-style-type: none"> • Increase in demand for services such as food, temporary housing, etc. 	None required	-	-	-

¹⁴ ERP – Emergency Response Plan.

¹⁵ EHS – Environmental, Health and Safety.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ⁹		Source of Funds
			Implementation	Supervision	
	<ul style="list-style-type: none"> – Create opportunities for small-scale business to provide services such as – Food, temporary housing 				
Prepare and Develop package-specific site SEMP / SOMP ¹⁶	Avoid effects of EPC Contractor(s) / sub-contractors, facility operators unplanned activities Smooth work implementation	<ul style="list-style-type: none"> • Spills Response Plan • Spoils Disposal Plan • Dust Control and Management Plan • Construction Wastewater Management Plan • Construction Noise and Vibration Management Plan • Drainage and Storm-water Management Plan • Materials Management Plan (including warehouses/ storage) • Hazardous Materials Control Plan (including spills control and clean up) • Hazardous Waste Disposal Plan • Waste Management Plan • Site Rehabilitation and Clean Up Plan <hr/> <ul style="list-style-type: none"> • Community Health and Safety Plan • OHS Plan 	Contractors Facility Operators PIC	SPV- PIU	Contractors Budget

¹⁶ SOMP – Standard Operation & Maintenance Plan

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ⁹		Source of Funds
			Implementation	Supervision	
		<ul style="list-style-type: none"> • ERP¹⁷ • Traffic and Road Management Plan • Chance Find Procedures for PCRs¹⁸ 			
Biodiversity	Avoid impacts on ecological resources, species	<ul style="list-style-type: none"> • Establish measures as per BAP and BMEP 	Contractors PIC	PMU-SS SPV-PIU	Contractor Budget
Information Disclosure, Participation and Consultation	Lack of outreach and consultation	<ul style="list-style-type: none"> • Inform and consult with local residents (community awareness program) and authorities one month prior to commencement of civil works 	Contractors PIC	PMU-SS SPV-SS	Contractor Budget

¹⁷ ERP – Emergency Response Plan (ERP).

¹⁸ PCR – Physical Cultural Resources.

Table 1.3. EMP – Construction and Operation Stage – New Solar Project Site (Solar PV Plant, New Substation, Upgrade Works, Common Facilities, Access Roads

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
CONSTRUCTION STAGE					
Site Preparation and civil works	<ul style="list-style-type: none"> • Loss of habitat • Loss of crops and trees • Change in landscape • Use of pesticides and herbicides 	<ul style="list-style-type: none"> • Clear demarcation of work sites, no encroachment outside the demarcated zone • Schedule civil works in the dry season, day-time and avoid sensitive periods (for religious activities, breeding periods of fauna/aves, cropping / harvesting season), if possible • Access to grazing sites in the wider project area will be maintained • Construction (workers) camp set up at least 200 m from any other water source at site or in close proximity to the site including drainage /irrigation canals • Vegetation clearances will be strictly restricted to the work sites and for permanent access branch road; hedges and field margins will be retained • Use of herbicides / pesticides will be prohibited for vegetation clearing to prevent soil contamination • Any damage to areas and infrastructure outside the agreed work sites (Corridor of Impact assessed in SDDDR) will be restored to pre-construction 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

¹⁹ Contractors imply = SPV appointed Engineering, Procurement and Construction (EPC) contractors, any key sub-contractors and facility operators. Note: Safeguards implementation for solar PV plant(s) during operation stage will continue through the SPV and for transmission interconnection infrastructure directly through NEGU.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<p>conditions and will be subject to compensation at contractor cost and through written agreement with the land owner, as applicable</p> <ul style="list-style-type: none"> • Implement engineering and biological measures to prevent surface erosion such as provision of sowing soil-binding grass, as needed. • Restore loose soil from foundations through ramming, if required • Borrow pits for backfilling at solar PV and substation site and spoils disposal sites (if any), utilized as per pre-approved plans from the relevant authority • Disposal of spoils on farmland or within 200 m of any water source will be prohibited • Excess spoils will be backfilled onsite or spread onsite in a manner that it causes no disturbance to the natural drainage pattern, irrigation canal • Implement the following SEMP sub-plans <ul style="list-style-type: none"> ○ Spoils Disposal plan²⁰ ○ Drainage and Storm-water Management Plan ○ Site Rehabilitation and Clean-up Plan after completion of civil works to improve visual aesthetics and to restore work sites to pre-construction conditions as possible including landscaping along the fenced site perimeter, 			

²⁰ Excess spoil will be backfilled onsite or temporary/permanently disposed as per pre-approved plans by a relevant authority on clearly identified disposal sites on site specific map, with corresponding distance and number of trips made will be maintained (this will help avoid disposal of spoil on farm land or within 200 m of any water source). Vehicles will be covered during transportation to avoid spillage. Spoils disposal sites (if any) will be rehabilitated and re-seeded within 30 days after closure to prevent soil erosion and dust generation.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<p>maintain hedges and field margins to reduce visual and dust impact, re-seeding most or all of the site with native plant species (soil-binding grass) to stabilize the soil and restore habitat</p> <ul style="list-style-type: none"> • Site preparation for upgrade to existing substation, to take place within the existing fenced boundary/perimeter 			
	<ul style="list-style-type: none"> • Sources of materials 	<ul style="list-style-type: none"> • Maximize the re-use of earth-cut materials, spoils, and construction & demolition debris / wastes • Specify materials that are recycled, have recycled content or are from sustainable sources • In case required, use borrow pits licensed by the relevant authority, if the re-use options are not feasible 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	<ul style="list-style-type: none"> • Temporary / Permanent electricity supply for construction 	<ul style="list-style-type: none"> • All activities confined to work sites, erecting distribution poles, perimeter lights, placement of transformer, CNG, LPG, D gensets of appropriate capacity and stack height for dedicated supply 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	<ul style="list-style-type: none"> • Stockpiling of materials 	<ul style="list-style-type: none"> • Stockpiling of materials to be within work sites and to ensure that there is no obstruction to natural drainage pattern, efficient drainage is maintained • Stockpiles to be covered to reduce dust generation; in shaded and enclosed area at and away from water sources • Implement SEMP sub-plan: <ul style="list-style-type: none"> - Materials Management Plan (including warehouses/ storage) 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	<ul style="list-style-type: none"> • Increase in visual impact 	<ul style="list-style-type: none"> • Finalize conceptual and design plan and optimize land area; restrict construction activities to work sites • Installation of security lighting around solar site perimeter with movement sensor and as such the lighting would only come on when triggered. 			
	<ul style="list-style-type: none"> • Increase in erosion, spoils 	<ul style="list-style-type: none"> • Implement engineering and biological measures to prevent surface erosion such as sowing soil binding grass at the solar PV and substation work site after completion of civil works • Restore loose soil from foundations through ramming, if required • Proper land leveling and grading for stabilization and other erosion-prone working areas and permanent stabilization measures at least within 30 days of end of construction period • Excess spoils will be backfilled onsite or spread onsite in a manner that it causes no disturbance to existing irrigation channel or local drainage pattern • Restore vegetation cover on any backfilled areas to prevent soil erosion; If restoration is carried out during periods of hot or extreme weather, ensure adequate aftercare to maximize survival • Implement SEMP sub-plan: Spoils Disposal Plan • Spoils disposal sites (if any), identified and utilized as per pre-approved plans from the relevant authority • Vehicles covered during transportation to avoid spillage 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Rehabilitate and vegetate spent spoil disposal sites within 30 days after closure to prevent soil erosion and dust generation • Disposal of spoils on farmland or within 200 m of any water source will be prohibited 			
	Hazard related to ground subsidence caused by excessive groundwater pumping	<ul style="list-style-type: none"> • Avoidance of groundwater abstraction 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Increase in vehicular emissions due to movement of heavy equipment and construction vehicles	<ul style="list-style-type: none"> • Work sites to be enclosed/barricaded • Compliance with relevant national standards on air quality, noise and vibration and/or IFC (WBG) EHS Guidelines / German standards for vibration (refer to Part II of this EMP) • Conduct air quality and noise monitoring (see Environmental Surveys) • Air quality and noise/vibration level monitoring to be undertaken using handheld portable air and noise/vibration monitoring devices at select locations for Occupational Health and Safety Purposes • Place noise generating equipment e.g. gensets in an acoustic enclosure, other sound insulation • Periodic watering at construction sites, construction staging areas, unpaved areas, exposed dust prone 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Increase in noise, dust, and vibration due to transport of vehicles, construction works, levelling,				

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	grading and backfilling works	<p>construction stockpiles; Use of chemical dust suppressants prohibited</p> <ul style="list-style-type: none"> • Maintenance of project construction vehicles, equipment, machinery, etc. • Control vehicle speed to ≤ 8 km/h in unpaved areas including unpaved approach roads; Post the speed limit sign in the project work areas • Asphalt making process will be located at least 200 meters downwind from the construction (workers) camps or nearest dwellings in order to reduce the impact of fumes on humans • Install wheel washing equipment or conduct wheel washing manually at each exit of the construction sites and at asphalt/concrete mixing stations to prevent trucks from carrying muddy or dusty substances on public roads • Store dust-prone materials in areas with shelters on four sides and on top; If such materials have to be stored in open area, cover with strong tarpaulin • Vehicles with an open load-carrying case, which transport potentially dust-producing materials, shall have proper fitting sides and tail boards; Dust-prone materials shall not be loaded to a level higher than the side and tail boards, and shall always be covered with a strong tarpaulin • Construction vehicles and machinery will be maintained to a high standard to minimize emissions and noise. 			

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Construction vehicles transporting materials that generate dust will be covered with tarps • Drivers will be required to observe low speed wherever necessary and no blowing of horns. • Construction activities utilizing heavy machinery work will be restricted between 6 AM – 6 PM; night time works only after receiving due permission from relevant authority • Implement SEMP sub-plans: <ul style="list-style-type: none"> - Dust Control and Management Plan - Construction Noise and Vibration Management Plan - Traffic and Road Management Plan • Record and maintain log of monitoring/incidences of non-compliance and rectification. • Advance warning to communities will be provided with respect to the timing of noisy activities, night time works. 			
	<ul style="list-style-type: none"> • Pollution due to runoff from general construction activities • Siltation of water sources/ water bodies due to spillage of construction 	<ul style="list-style-type: none"> • Compliance with relevant national standards on water quality and/or IFC (WBG) EHS Guidelines (refer to Part II of this EMP) • Conduct water quality monitoring (see Environmental surveys) • Construction (workers) camps, stockpiles of materials, etc., to be located away from water bodies /water sources/drainage leading to water bodies/ water sources • No disposal of construction & demolition debris/ wastes into water bodies/water sources 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	<ul style="list-style-type: none"> debris/wastes /slurry • Generation of wastewater /sewage from construction (workers) camps 	<ul style="list-style-type: none"> • Collect wastewater from construction activities in sedimentation tanks, retention ponds, and filter tanks to remove silts and oil • Install and operate temporary silt traps along drainage and/or sedimentation tanks on construction sites to treat and process water and muddy runoff with high concentrations of suspended solids. If necessary, use flocculants such as polyacrylamide (PAM) to facilitate sedimentation • No vehicle/equipment/machinery maintenance activity close to water bodies/water sources/drainage • Implement SEMP subplan: <ul style="list-style-type: none"> - Construction Wastewater Management Plan 			
	<ul style="list-style-type: none"> • Pollution due to oil/ lubricant/fuel spillage 	<ul style="list-style-type: none"> • Temporary secured area set up for storage and handling of hazardous and polluting materials with a containment tray or provided with bunds • Design, as applicable, a permanent ('bunded') impermeable surface capable of carrying 110% volume of materials for accidental spills or leakage; site it at least 100 m away from water bodies/ water sources / drainage • Implement SEMP sub-plans: <ul style="list-style-type: none"> - Spills Response Plan <ul style="list-style-type: none"> ○ Provide with cleanup kits ○ Keep a stock of absorbent materials (e.g. sand, earth or commercial products) on site to deal with spillages and train staff in their use 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> ○ Protocol for immediate action utilizing absorbents (final disposal at an approved waste disposal facility) ● If refueling in the field is required, it shall be done from road-licensed fuel trucks away from water bodies/water sources/ 			
	Waste generation – all waste streams and Improper waste disposal	<ul style="list-style-type: none"> ● Compliance with relevant national standards on waste management and/or IFC (WBG) EHS Guidelines, refer to Part II of this EMP ● Provide multiple waste containers at construction (workers) camps ● Establish a covered onsite refuse, construction & demolition debris / waste sorting and recycling area away from existing drainage canals or water sources ● Transport of recyclable to NEGU depots, dedicated storage yards for resale or auction to authorized dealers ● Maximize the re-use of earth cut materials, spoils, and construction & demolition debris/ waste to minimize waste disposal ● For unused construction & demolition debris/ waste, licensed companies will be hired to collect, transport, and dispose of wastes at licensed dump facilities and/or used for site reclamation or backfilling ● Biodegradable waste such as clear vegetation may be provided to local communities for use ● No final waste disposal on site 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • On-site / off-site Waste burning will be prohibited • Implement the following SEMP that will apply the waste hierarchy to ensure efficient use and management of resources with priority to prevent waste at source as much as possible, reduce impact to human receptors and prevent contamination to land, surface and ground water sources: <ul style="list-style-type: none"> ○ Materials Management Plan ○ Waste Management Plan • Map with clearly identified waste disposal sites with corresponding distance and number of trips made will be maintained (this will help avoid disposal of construction debris on farm land or within 200 m of any water source) • Contractor(s) will be responsible for proper removal and disposal of any significant residual materials and wastes that remain on site after completion of civil works 			
	Inappropriate transportation, storage, use, disposal and spills	<ul style="list-style-type: none"> • Temporary secured area set up for storage and handling of hazardous and polluting materials • Design, as needed, a permanent ('bunded') impermeable surface capable of carrying 110% volume of materials for accidental spills or leakage • Oil containment system provided at transformer pad • Secured areas to be sited away from direct sunlight and 200 m from existing drainage/irrigation channels and/or any water source • Delivery and acceptance of all hazardous materials/ equipment will be accompanied by a Materials 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<p>Safety Data Sheets (MSDS) and/or be certified that it is polychlorinated biphenyl-free (PCB) free</p> <ul style="list-style-type: none"> • Licensed vendors/companies to collect transport and dispose used/unused hazardous materials/wastes • Vehicle/equipment maintenance and refueling to be done offsite or within designated service area on impermeable surfaces and away from water sources /water bodies • Compliance with relevant national standards on hazardous and polluting materials and/or IFC (WBG) EHS Guidelines (refer to Part II of this EMP) • Implement SEMP sub-plan: <ul style="list-style-type: none"> ○ Hazardous Materials Control Plan • Record of equipment and corresponding PCB free certificates will be maintained • Records of MSDS will be maintained • Record of incidents, spills/accidents/near-miss/fatalities will be maintained 			
	Exposure to hazards for workers working on asphalt mixing, concrete mixing, cement, etc.	<ul style="list-style-type: none"> • Asphalt making process will be located at least 200 meters downwind from the construction (workers) camps or nearest dwellings in order to reduce the impact of fumes on humans • Implement SEMP sub-plan– <ul style="list-style-type: none"> ○ Occupational Environment, Health and Safety (EHS) Plan and Emergency Response Plan (ERPs) at work sites ○ E.g. IFC (WB) EHS Guidelines on Occupational Environment, Health and Safety ○ Assess safety risks and safety protocols (such as 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> for electrical works, working at heights, etc.) and implement at work sites ○ Coordinate with nearest hospital for arrangement in case of accidents ○ Set up first aid kit within work sites ● Strictly enforce the use of PPE during construction such as goggles, gloves, noise reducing mufflers, head-lamps, high visibility safety vests with reflective striping for night-time works (if any), and respirators to construction workers doing asphalt concrete and cement concrete road paving to minimize skin exposure to and inhalation of fumes and dust ● Periodic training of workers for specific type of work engagement, e.g. hazardous materials handling, storage and disposal, OEHS, EPR ● Provide communication devices to designated site engineers/contractors ● Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor ● Maintain a record of health assessments/incidents, spills/accidents/near-miss/fatalities 			
	Fires, explosion and other accidents	<ul style="list-style-type: none"> ● Strictly enforce the use of PPE during construction ● Implement SEMP sub-plan: Occupational EHS Plan and ERP during construction ● Regular inspection of equipment / machineries for faults ● Log accidents 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	Provision of construction / workers accommodation	<ul style="list-style-type: none"> • Provide adequate workers accommodation in line with IFC (WBG) guidelines <u>IFC Guidance Note/Workers Accommodation</u> 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Unhygienic conditions at construction / workers camps	<ul style="list-style-type: none"> • Provide water and sanitation facilities (situated separately for men and women); regular cleaning and disinfection of camps • Provide temporary electricity connection • Provide portable water/storage tanks • Provide health checkup/access to medical care • Provide waste bins and collection, no final disposal onsite • Discharge construction/workers camp sewage/wastewater into onsite septic tanks 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Excessive disturbance to communities due to prolonged construction	<ul style="list-style-type: none"> • Meaningful consultations with communities to keep them informed of anticipated activities, in particular those that may result in disruption with respect to area access, utilities, and noisy or dust-generating activities that are likely to result in significant disturbance (Community Awareness Programs) • Access to adjacent properties, farmland, village roads or nearest alternative route provided • Distribute PIB in Russian/Uzbek and make it publically available in project field construction offices, Makhalla offices, NENs • Identify and adhere to strict construction schedule • Alert communities and residents if night time construction work shall occur nearby (no night time 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<p>construction within 200 m of the nearest household) and ensure alternative access is provided</p> <ul style="list-style-type: none"> • Ensure communities are aware of project GRM entry points • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor • Implement SEMP sub-plan: • Community Health and Safety Plan • Records of consultations will be maintained • Records of incidents/accidents/near-miss/fatalities associated with the project will be maintained • Records of issues/grievances raised with be maintained in accordance with project GRM 			
	Temporary traffic management	<ul style="list-style-type: none"> • Implement SEMP sub-plan: Traffic and Road Management Plan together with the local traffic police prior to any construction activities • Avoid high density areas for movement of construction vehicles, • Local communities to be made aware and signs to be erected in advance warning of planned detours, timing and duration • Access to village roads to be maintained or nearest alternative route to be provided • Proper traffic signs at the construction sites with information on nature and duration of work for public safety 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Schedule transport routes and activities during non-peak hours; in case of lane closures, deploy workers to direct traffic • Erect speed limit signs of 8 km/h on all unpaved approach roads and unpaved construction site areas as a means of controlling fugitive dust emission in unpaved areas • Any damage to existing roads due to the project to be borne by the Contractors • Records of incidents/accidents/near-miss/fatalities associated with the project will be maintained 			
	Access to construction sites	<ul style="list-style-type: none"> • Make all sites secure, and discourage access by members of the public through appropriate fencing, signage and/or security personnel, as appropriate • Provide sufficient lighting and danger signage • Records of incidents/accidents/near-miss/fatalities associated with the project will be maintained 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Utility services interruptions	<ul style="list-style-type: none"> • Any damage or hindrance/disadvantage to local communities, businesses, persons, etc., caused by the premature removal or insufficient replacement of public utilities is subject to full compensation, at the full liability of the contractor who caused the problem 	Contractors	PMU-SS SPV PIU	Contractor Budget
	Chance finds of PCRs	<p>Follow Chance Find Procedure as follows:</p> <ul style="list-style-type: none"> • Construction activities will be immediately suspended if any PCRs are encountered • Destroying, damaging, defacing, or concealing PCRs will be strictly prohibited 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • The provincial or main office of the relevant Ministry will be promptly informed and consulted • Construction activities will resume only after thorough investigation and with the permission of the relevant Ministry 			
OPERATION STAGE					
Orientation for Workers, Contractors / Sub-contractors, Facility Operators	<ul style="list-style-type: none"> • Awareness of workers on the environmental safeguard requirements and their responsibility • Enhance understanding of Facility Operator of their responsibility for EMP implementation /SOMP 	PIC to conduct briefing and orientation on: <ul style="list-style-type: none"> – EMP, GRM, Information disclosure and meaningful consultation – Environmental monitoring, recording keeping and reporting requirements in line with Environmental Performance indicators and EMP²¹. – BAP and BMEP – SOMP for key environmental component likely to be affected – Occupational EHS – Community Health and Safety – ERPs – Awareness of health & safety risks due to transmittable diseases (HIV/AIDs/COVID-19) – Record and maintain briefing and orientation events log with duration and list of attendees. 	PIC ²²	PMU	Included in project cost

²¹ The PIC will develop checklists for contractors use in monitoring environmental compliance.

²² PIC role in implementation activities during operation stage will be limited to its contract duration.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
Facility Operation and Maintenance Solar project site (Solar PV Plant, New Substation, Common Facilities Access Road and Upgrade works	Loss of habitat due to civil works	<ul style="list-style-type: none"> • Implement – Site Rehabilitation and Clean-up Plan • Restore and maintain landscaping along the fenced perimeter of the solar project site • Maintain hedges and trees at field margins • Employ manual vegetation maintenance methods such as grazing by local animals or manual trimming of grasses and plants within the solar project site and employ local labor as possible • Re-seed all or most of the site if required • Maintenance of vegetation along access branch road to the solar project site • No chemicals (herbicides/pesticides) will be used. • To avoid buildups of trimmed vegetation and branches, these will be allowed for collection by local people for firewood or facility operator will contact the relevant local authorities for collection, transport and disposal. 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Excess usage, potential contamination to water sources	<ul style="list-style-type: none"> • Maintain water retention pond/reservoir for use for PV cleaning • Periodic cleaning of pond/reservoir to remove debris • No use of chemicals / detergents for cleaning purposes of PV panels • Maintain and periodically clean reservoir / ponds 	Facility Operator PIC	PMU-SS SPV-PIU -	Facility operator budget
	Discharge of wastewater	<ul style="list-style-type: none"> • Provide and maintain permanent sanitary facilities to workers and safe drinking water • Provide and maintain a septic system for wastewater collection and disposal; tank system will be located 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		at least 200 m from any water sources, to avoid contamination.			
	Lack of proper handling, storage and disposal of solid waste	<ul style="list-style-type: none"> • Compliance with relevant national standards on waste management and/or IFC (WBG) EHS Guidelines (refer to Part II of this EMP) • Use of pre-defined areas with the solar site for temporary safe repository of solid waste, at least 100 m away from office buildings / control rooms etc. • Manage solid waste according to the following preference hierarchy, reuse, recycle, and disposal at designated sites • No final waste disposal on site / off-site unless in approved landfills • Regularly monitor area for pest incidences and reduce numbers as necessary • Implement SOMP for <ul style="list-style-type: none"> ○ Materials Management Plan ○ Waste Management Plan 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Lack of proper handling, storage and disposal of broken PV panels	<ul style="list-style-type: none"> • Utilize licensed vendors / suppliers for collection, transportation and disposal of broken PV panels 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Lack of proper handling, storage and disposal of	<ul style="list-style-type: none"> • Compliance with relevant national standards on hazardous and polluting materials and/or IFC (WBG) EHS Guidelines (refer to Part II of this EMP) • Maintain MSDS and PCB free certification 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	hazardous and polluting materials	<ul style="list-style-type: none"> • Maintain controlled area set up for hazardous materials away from drainage / irrigation channels, dykes or water sources • Utilize licensed vendors / companies for collection, transportation and disposal of used/ unused hazardous materials / wastes • Record of incidents, spills / accidents / near-miss / fatalities will be maintained • Implement SOMP for Hazardous Materials Control Plan • Only trained workers employed for handling and storage of hazardous materials and waste 			
Facility Operation and Maintenance Solar project site, Solar PV plant, New Substation, Common Facilities, Access Road and Upgrade Works (... Continued)	Exposure to hazards for workers working on solar PV plant / substations	<ul style="list-style-type: none"> • Implement – <ul style="list-style-type: none"> ○ Occupational Environment, Health and Safety (EHS) Plan and Emergency Response Plan (ERPs) at work sites ○ E.g. IFC (WB) EHS Guidelines on Occupational Environment, Health and Safety ○ Coordinate with nearest hospital for arrangement in case of accidents ○ Set up first aid kit within work sites • Compliance with relevant national electrical safety standards • Provide and maintain signage as per IEEE standards²³ at dangerous places for warning of electrical hazards 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget

²³ IEEE - Institute of Electrical and Electronics Engineers.

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Strictly enforce the use of PPE • Periodic training of workers for specific type of work engagement, e.g. with access to electrical and hazardous conditions; and certified to work on site • Equipment and tools will be inspected before use to ensure proper and safe operation • Appropriate grounding and deactivation of live power equipment during maintenance work or if working in close proximity to the equipment; provision of lighting arrestors as appropriate • Provide communication devices to designated site engineers/contractors • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor • Provide and maintain a record of health assessments • Maintain a record of incidents, spills/accidents/near-miss/fatalities 			
	Fires, explosion and other accidents	<ul style="list-style-type: none"> • Strictly enforce the use of PPE during operation and maintenance • Implement – Occupational EHS Plan and ERP • Regular inspection of equipment / machineries for faults • Log accidents 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Provision of workers accommodation	<ul style="list-style-type: none"> • Provide adequate workers accommodation in line with IFC (WBG) guidelines <u>IFC Guidance Note/ Workers Accommodation</u> 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	Disturbance to communities due to operation of solar PV plant /substation	<ul style="list-style-type: none"> • Meaningful consultations with communities to keep them informed of operational activities, in particular those that may result in disruption with respect to area access, utilities (Community Awareness Programs) • Distribute PIB in Russian / Uzbek and make it publically available in Makhalla offices, NENs • Ensure communities are aware of project GRM entry points • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19) • Implement SEMP sub-plan: <ul style="list-style-type: none"> ○ Community Health and Safety Plan • Records of consultations will be maintained • Records of incidents/accidents near-miss/fatalities associated with the project will be maintained • Records of issues / grievances raised with be maintained in accordance with project GRM 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Access to site	<ul style="list-style-type: none"> • Security and inspection personnel will be deployed to avoid vandalism of equipment and pilferage of lines/cables that may cause accident and/or electrocution. 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Risk of disturbance to ecological resources, related fatalities	<ul style="list-style-type: none"> • Integrate measures as per BAP and BMEP 	Facility Operator PIC	PMU-SS SPV-PIU	Facility operator budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	Impact on local biodiversity, species				
DECOMMISSIONING STAGE					
Preparation of the decommissioning Plan • Plan preparation will be at a minimum of 6 months prior to plant closure		<ul style="list-style-type: none"> • Develop a decommissioning and site reclamation plan • Compliance with relevant rules regulations, standards and best practices in force at that time • E.g. IFC EHS Guidelines on Construction and Decommissioning (and revisions at that time) 	Facility Operator	NEGU -	NEGU Budget
	Increase in surface erosion	<ul style="list-style-type: none"> • Use engineering practices to control surface erosion • Upon completion of decommissioning, contour any disturbed areas • Replant and re-vegetate area to minimize surface erosion and any corresponding localized flooding in and around site 	Facility Operator	NEGU -	NEGU Budget
	Impact to water quality and water flow	<ul style="list-style-type: none"> • Compliance with relevant national standards on water quality (and amendments in force at that time) • Include SOMP for temporary water quality control measures such as siltation fences • Provide appropriate and secure storage areas for chemicals, fuels and lubricants for machinery / equipment such as on impermeable surfaces • Strengthen drainage lines • Upon completion of decommissioning, stream will be returned to natural conditions 	Facility Operator	NEGU -	NEGU Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
	Impact to air quality	<ul style="list-style-type: none"> • Compliance with relevant national standards on air quality (and amendments in force at that time) • Include SOMP for temporary air quality control measures such as dust suppression and water application for fugitive dust control • Include SOMP for maintenance of equipment and machinery 	Facility Operator	NEGU -	NEGU Budget
	Noise and Vibration generation	<ul style="list-style-type: none"> • Compliance with relevant national standards on noise and vibration (and amendments in force at that time) • Identify sensitive receptors • Include SOMP for noise and vibration mitigation measures such as use of noise barriers or scheduling site activities to daytime hours only 	Facility Operator	NEGU -	NEGU Budget
	Waste generation – Solid waste – Construction waste – Hazardous materials Lack of proper handling, storage and disposal of waste	<ul style="list-style-type: none"> • Compliance with relevant national standards on waste management (and amendments in force at that time) • Include SOMP for recycling/sale of wastes such as concrete and masonry, steel, PV panels, power cable, pipes, pumps, • Include SOMP for safe disposal of non-recyclable/non-hazardous waste at permitted waste disposal sites/facilities • Include SOMP for handling hazardous materials such as lubricating oils, hydraulic fluids, coolants, solvents, and cleaning agents 	Facility Operator	NEGU -	NEGU Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Handling and storage of hazardous materials prior to safe transport via licensed operators/haulers will be implemented • Include SOMP for safe disposal of hazardous materials at a permitted disposal sites/facility 			
		<ul style="list-style-type: none"> • Decommissioning activities will depend on the proposed subsequent use of the site and anticipated site rehabilitation, regeneration of local biodiversity 	Facility Operator	NEGU -	NEGU Budget
	Potential occupational health and safety risks to workers	<ul style="list-style-type: none"> • Implement Occupational EHS Plan (and amendments in force at that time) • Compliance with IFC (WBG) EHS Guidelines for Occupational Health and Safety (2007) (and amendments in force at that time) • All workers will receive a health assessment by a competent medical practitioner and be deemed sufficiently healthy to undertake their job before commencing decommissioning operation activities at the Solar PV plant/substation • All workers with access to electrical and hazardous conditions will be appropriately trained and certified to work • All relevant national electrical safety standards will be strictly adhered to, and equipment will be properly grounded and equipped with lightning arresters as appropriate • Workers will be provided with appropriate PPE 	Facility Operator	NEGU -	NEGU Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • PPE will be inspected, maintained and replaced as necessary, with special attention paid to climbing harnesses and safety gear. • Equipment and tools will be inspected before use to ensure proper and safe operation • Appropriate grounding and deactivation of live power equipment prior to commencing work • Record of health assessments/incidents/accidents/near-miss/fatalities will be maintained 			
	Potential community health and safety risks to persons living in the wider Project area	<ul style="list-style-type: none"> • Implementation of Community Health and Safety Plan (and amendments in force at that time) • Compliance with IFC (WBG) EHS Guidelines of Community Health and Safety (and amendments in force at that time) • Conduction information disclosure, consultation and participation activities in cooperation with local authorities • Communicate potential safety risks and mitigation measures including ERP • Record of consultations will be maintained • Record of incidents / issued raised will be maintained 	Facility Operator	NEGU -	NEGU Budget
	<ul style="list-style-type: none"> – Traffic and road management – Interference with road crossings 	<ul style="list-style-type: none"> • Implement Traffic and Road Management Plan (and amendments in force at that time) • Planned transportation routes and schedule • Any traffic detours to have danger and clearly visible warning signs as well as flag persons 	Facility Operator	NEGU -	NEGU Budget

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility ¹⁹		Source of Funds
			Implementation	Supervision	
SOLAR PROJECT SITE - SOLAR PV PLANT, NEW SUBSTATION, UPGRADE WORKS, COMMON FACILITIES, ACCESS BRANCH ROAD					
		<ul style="list-style-type: none"> • Compliance with local speed limits and other road regulations • Impacts on roads (such as due to f loads in construction trucks/heavy equipment/machinery) to comply with vehicle capacities and local road regulations in force at that time • Any damage to roads to be borne by EPC Contractor(s) • Record of incidents/accidents/near-miss/fatalities/ road damage will be maintained 			

Table 1.4. EMP– Construction and Operation – New Transmission Line, Temporary Access Tracks

Project Activity	Potential Impacts / Issues	Mitigation Measures and Safeguards	Responsibility		Source of Funds
			Implementation	Supervision	
NEW TRANSMISSION LINE, TEMPORARY ACCESS TRACKS					
CONSTRUCTION STAGE					
Site Preparation Tower footings site excavation Clearance of ROW Erection of towers Stringing of conductors; Temporary Access Tracks	Loss of habitat Loss of crops and trees Use of pesticides /herbicides	<ul style="list-style-type: none"> • Clear demarcation of work sites, no encroachment outside the demarcated zone • Access to adjacent properties and farmland will be maintained, as necessary • Construction (workers) camp to be set up at least 200 m from any water source along the transmission line alignment • Vegetation clearances will be strictly restricted to transmission line ROW²⁴ and temporary access tracks, if required • Any damage to areas and infrastructure outside the agreed work sites (Corridor of Impact assessed in project SSDDR) will be restored to pre-construction conditions and will be subject to compensation at contractor cost and through written agreement with the land owner, as applicable • Trees below 3 m will not be cut along the ROW²⁵; tree looping/pruning will be done to maintain minimum sag • Schedule civil works in the dry season and avoid of other sensitive periods (for religious activities, 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

²⁴ ROW – right of way; safety zone - The area below, and around, transmission line in which activities and land use that are incompatible with the safe and efficient operation of the national electricity transmission network are avoided. The safety zone corridors do not restrict normal farming activities such as cropping, harvesting, grazing, plowing. Only incompatible activities e.g. milking sheds, residential dwellings and some major earthworks - primarily around the foundations of the transmission towers would be restricted.

²⁵ For any tree cutting above 3 m, prior permission shall be obtained from the local relevant authority.

		<p>breeding periods of fauna/ aves, cropping / harvesting season), if possible</p> <ul style="list-style-type: none"> • Use of herbicides / pesticides will be prohibited for vegetation clearing to prevent soil contamination • Bird / bat roosting sites will not be disturbed • Record of crops and trees loss along the transmission line ROW alignment will be maintained in accordance with project SSDDR, if applicable • During excavation of tower foundations, slopes will be maintained at safe angles to avoid risk of collapse • After completion of site preparation and civil works, implement Site Rehabilitation and Clean-up Plan to restore works site to pre-construction conditions including vegetation planting along the ROW to stabilize soil where it does not compromise the intended transmission function and restoring temporary land use (used for material storage) to pre-construction conditions 			
	Stockpiling of materials	<ul style="list-style-type: none"> • Stockpiling of materials to be at the construction (workers) camp and not along the transmission line except prior to installation • Storage of construction material confined to work sites in a way to ensure that there is no obstruction to natural drainage pattern, efficient drainage is maintained • Stockpiles to be covered to reduce dust generation; in shaded and enclosed area at and away from water sources • Implement SEMP sub-plan: • Materials Management Plan (including warehouses / storage) 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

	Increase in erosion, spoils	<ul style="list-style-type: none"> • Implement engineering and biological measures to prevent surface erosion such as sowing soil binding grass along the line ROW after completion of civil works • Proper land leveling and grading for stabilization and other erosion-prone working areas and permanent stabilization measures at least within 30 days of end of construction period • Excess spoil will be backfilled at or spread at the tower / pole footings in a manner that it causes no disturbance to nearby existing drainage / irrigation channels or local drainage pattern • Disposal of spoils on farmland or within 200 m of any water source will be prohibited • Restore vegetation cover on any backfilled areas to prevent soil erosion; If restoration is carried out during periods of hot or extreme weather, ensure adequate aftercare to maximize survival • Implement - Spoils Disposal Plan • (Disposal of spoils on farmland or within 200 m of any water source will be prohibited) 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Increase in vehicular emissions due to movement of heavy equipment and construction vehicles Impact on sensitive receptors	<ul style="list-style-type: none"> • Compliance with national laws and ambient air and quality and noise standards/ IFC (WBG) EHS Guidelines for Air Emissions and Ambient Air Quality, Noise, Electric Power Transmission and Transmission.²⁶ • Construction activities utilizing heavy machinery work will be restricted between 6 AM – 7 PM. 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

²⁶ The most stringent standards shall apply.

	<p>Increase in noise, dust, and vibration due to transport of vehicles, construction works and excavations</p>	<ul style="list-style-type: none"> • Apply dust suppression methods (water spraying) before movement of vehicles on site / open and exposed areas and access roads / tracks • Use of chemical dust suppressants prohibited • Provide barricade to temporarily enclose open areas • Conduct air quality and noise monitoring (see stipulated conditions under Environmental Monitoring Surveys) • Air quality and noise / vibration monitoring may be undertaken using handheld / portable air and noise monitoring devices at select locations for Occupational and Community Health and Safety purposes • Implement: Noise and Dust Control Plan Traffic and Road Management Plan • Record and maintain log of monitoring / incidences of non-compliance and rectification • Construction vehicles, equipment, machinery will be maintained to a high standard to minimize emissions and noise • Drivers will be required to observe low speed wherever necessary and no blowing of horns • Advance warning to communities will be provided with respect to the timing of noisy activities 			
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	<p>Generation of wastewater /sewage from construction workers Localized flooding Increase turbidity in surface water near construction sites</p>	<ul style="list-style-type: none"> • Compliance with National laws and standards on water pollution control / IFC (WBG) EHS Guidelines on Wastewater and Ambient Water Quality, Electric Power Transmission and Transmission.²⁷ • Implement Drainage and Storm-water Management Plan • Avoidance of waterways in site selection for transmission tower placement • Construct temporary detention and settling pits at each tower/pole foundation site, as needed, to store construction wastewater. Placement will be away from surface water bodies • Provide temporary sanitary facilities (e.g. portable toilets) to workers and safe drinking water • No washing or repair of equipment / machinery will take within 200 meters of any water source 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	<p>Waste generation (all waste streams) and Improper waste disposal</p>	<ul style="list-style-type: none"> • Compliance with National laws and regulations on waste management / IFC (WBG) EHS Guidelines on Waste Management, Electric Power Transmission and Transmission²⁸ , refer to Part II of this EMP • Provide multiple waste containers at construction (workers) camps • Waste burning will be prohibited • Transport of recyclables / scrap / discarded equipment to NEGU depots, dedicated storage yards for resale or auction to authorized dealers; for other wastes licensed companies will be hired to collect, transport and dispose of wastes at licensed dump facilities and/or used for site reclamation or backfilling 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

²⁷ The most stringent standards shall apply.

²⁸ The most stringent standards shall apply.

		<ul style="list-style-type: none"> • Store all refuse and construction & demolition debris / waste generated on defined temporary work sites and away from water sources • Biodegradable waste such as clear vegetation may be provided to local communities for use • No final waste disposal on site • Implement the following SEMP that will apply the waste hierarchy to ensure efficient use and management of resources with priority to prevent waste at source as much as possible, reduce impact to human receptors and prevent contamination to land, surface and ground water sources: <ul style="list-style-type: none"> ○ Materials Management Plan ○ Waste Management Plan • Map with clearly identified waste disposal sites with corresponding distance and number of trips made will be maintained (this will help avoid disposal of construction debris on farm land or within 200 m of any water source) • Contractor(s) will be responsible for proper removal and disposal of any significant residual materials and wastes that remain along the alignment site after completion of civil works 			
	Inappropriate transportation, storage, usage, disposal and spills	<ul style="list-style-type: none"> • Compliance with National laws and regulations on Hazardous Waste Management / IFC (WBG) EHS guidelines for Hazardous Materials Management, Waste Management, Electric Power Transmission and Transmission²⁹ • All equipment / materials used will be certified as PCBs free 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

²⁹ The most stringent standards shall apply

		<ul style="list-style-type: none"> • Controlled area set up for handling hazardous materials • Storage of hazardous material to be within secured areas on impermeable surfaces and dykes capable of carrying 110% volume of materials such as accidental spillage / leakage • Secured areas to be sited away from direct sunlight and 200 m from existing drainage /irrigation canals and /or any water source³⁰ • Licensed vendors/ companies to collect transport and dispose used / unused hazardous materials / wastes • Vehicle / equipment maintenance and refueling to be done offsite or within designated service area on impermeable surfaces and away from water sources • Record of equipment and corresponding PCB free certificates will be maintained • Records of MSDS will be maintained • List of licensed companies that collect, transport and dispose used/ unused hazardous materials / wastes will be maintained • Record of incidents, spills / accidents / near-miss / fatalities will be maintained • Implement Hazardous Materials Control Plan 			
	Exposure to hazards for workers working on asphalt mixing, concrete	<ul style="list-style-type: none"> • Implement SEMP sub-plan: <ul style="list-style-type: none"> ○ Occupational Environment, Health and Safety (EHS) Plan and Emergency Response Plan (ERPs) at work sites 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

³⁰ NEGU warehouses /depots to collect, transport and store used / unused hazardous materials / wastes and coordinate with local agency for final disposal. Records of used/un-used hazardous materials / waste collection for transport to and storage at NEGU warehouses /depots will be maintained.

	mixing, cement, etc.	<ul style="list-style-type: none"> • Assess safety risks and safety protocols (such as for electrical works, working at heights, etc.) and implement at work sites • Coordinate with nearest hospital for arrangement in case of accidents • Set up first aid kit within work sites • Compliance with Uzbekistan Occupational Safety and Health laws and regulations / IFC (WBG) EHS Guidelines on Occupational Health and Safety³¹ • Strictly enforce the use of PPE during construction such as goggles, gloves , noise reducing mufflers, head-lamps, high visibility safety vests with reflective striping for night-time works (if any), and respirators to construction workers doing concrete and cement concrete works to minimize skin exposure to and inhalation of fumes and dust • Periodic training of workers for specific type of work engagement, e.g. hazardous materials handling, storage and disposal, Occupational EHS, EPR • All work at height will be prohibited during night time, periods off fog and strong wind on the Beaufort Wind Scale³² • All workers climbing towers will have a Safety Certificate of Class 3³³ or above • All towers, steel structures and equipment will be properly earthed and equipped with lightening protection 			
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³¹ The most stringent standards shall apply.

³² The Beaufort Wind Scale is an empirical measure with 12 wind speed classes. Winds above Class V are higher than 10.8 m/sec

³³ Electric Safety Classification is regulated in Circular 31/2014/TT-BCT (2014). The Circular stipulates five Safety Classifications (1 to 5), with 5 being the highest. A Class 3 Safety Certificate designates a worker capable of working in the field, and is given to workers/technicians who: 1) pass 80% of the training; 2) have knowledge of the proper use of PPE; 3) master the method to extract an electrocuted victim from the power source; 4) can provide first aid to an electrocuted victim; 5) is able to determine unsafe practices; and 6) is able to supervise electric workers working at height and near electric equipment.

	<ul style="list-style-type: none"> • When testing electrical equipment, all unrelated works in the flagged zone – marked as danger zone- will be stopped and unrelated workers will leave the zone • Provide communication devices to designated site engineers / contractors • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor • Provide and maintain a record of health assessments (once every two months) • Maintain a record of incidents, spills/accidents/ near-miss/fatalities 			
Fires, explosion and other accidents	<ul style="list-style-type: none"> • Strictly enforce the use of PPE during construction • Implement SEMP sub-plan: Occupational EHS Plan and ERP during construction • Regular inspection of equipment/machineries for faults • Log accidents 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
Provision of construction / workers accommodation	<ul style="list-style-type: none"> • Provide adequate workers accommodation in line with IFC (WBG) guidelines <u>IFC Guidance Note/ Workers Accommodation</u> 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
Unhygienic conditions at construction / workers camps	<ul style="list-style-type: none"> • Provide water and sanitation facilities (situated separately for men and women); regular cleaning and disinfection of camps • Provide temporary electricity connection • Provide portable water / storage tanks • Provide health checkup / access to medical care • Provide waste bins and collection, no final disposal onsite • Discharge construction / workers camp sewage / wastewater into onsite septic tanks 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

	Excessive disturbance to communities due to prolonged construction	<ul style="list-style-type: none"> • Meaningful consultations with communities to keep them informed of anticipated activities, in particular those that may result in disruption with respect to area access, utilities, and noisy or dust-generating activities that are likely to result in significant disturbance (Community Awareness Programs) • Distribute PIB in Russian / Uzbek and make it publically available in project field construction offices, Makhalla offices, NENs • Identify and adhere to strict construction schedule • Alert communities and residents if night time construction work shall occur nearby (no night time construction within 200 m of the nearest household) and ensure alternative access is provided • Ensure communities are aware of project GRM entry points • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs / COVID-19), child labor, bonded labor or forced labor • Implement SEMP Sub-plan: <ul style="list-style-type: none"> ○ Community Health and Safety Plan • Records of consultations will be maintained • Records of incidents/accidents/near-miss/fatalities associated with the project will be maintained • Records of issues/grievances raised with be maintained in accordance with project GRM 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
	Temporary traffic management	<ul style="list-style-type: none"> • Implement SEMP sub-plan – Traffic and Road Management Plan together with the local traffic police prior to any construction activities • Avoid high density areas for movement of construction vehicles, 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

		<ul style="list-style-type: none"> • Local communities to be made aware and signs to be erected in advance warning of planned detours, timing and duration • Access to village roads to be maintained or nearest alternative route to be provided • Proper traffic signs at the work sites with information on nature and duration of work for public safety • Schedule transport routes and activities during non-peak hours; in case of lane closures, deploy workers to direct traffic • Erect speed limit signs of 8 km/h on all unpaved approach roads and unpaved construction site areas as a means of controlling fugitive dust emission in unpaved areas • Any damage to existing roads due to the project to be borne by the Contractors • Records of incidents/accidents/near-miss/fatalities associated with the project will be maintained • When stringing and stretching conductors across road, the following practices will be followed: <ul style="list-style-type: none"> • Workers/Communities will be briefed in advance to plan activities • Advance approval from the relevant Government Ministry will be sought • Traffic will be diverted as appropriate to ensure safety • Scaffolding will be used to support conductors and minimize traffic disruption 			
	Lack of access to tower excavated sites	<ul style="list-style-type: none"> • Provide barricade around open excavated tower foundations • Provide sufficient lights, clear warning signs and danger signals 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget

		<ul style="list-style-type: none"> • Assign security personnel to prevent accidents, trespassing, and pilferage • Warning signs and cones will be installed in and around the transmission tower site and along access tracks, with clearly marked danger zones • Safety flags and flag persons will be used, as needed • Record of incidents /accidents / near-miss/ fatalities associated with the project will be maintained • Records of issues raised will be maintained in accordance with project GRM 			
	Chance Finds of PCRs	<ul style="list-style-type: none"> • Follow Chance Find Procedure as follows: • Construction activities will be immediately suspended if any PCRs are encountered • Destroying, damaging, defacing, or concealing PCRs will be strictly prohibited • The regional or local office of the relevant Government Ministry will be promptly informed and consulted • Construction activities will resume only after thorough investigation and with the permission of the office 	Contractors PIC	PMU-SS SPV PIU	Contractor Budget
OPERATION STAGE					
Orientation for Project Staff Contractors, Workers and Facility contractors	Awareness on the environmental safeguard requirements and responsibilities,	<ul style="list-style-type: none"> • PIC to conduct briefing and orientation on: • EMP, GRM, Information disclosure and meaningful consultations • Environmental monitoring, recording keeping and reporting requirements in line with environmental performance indicators and EMP³⁴ • ADB and Uzbekistan labor standards 	PIC ³⁵	PMU	Included in project costs

³⁴ PIC will develop checklists for use in monitoring environmental compliance.

³⁵ PIC role in implementation activities during operation stage will be limited to its contract duration)

		<ul style="list-style-type: none"> • Implementing SOMPs • Create awareness of health & safety risks due to transmittable diseases (HIV/AIDs, COVID-19), child labor, bonded labor or forced labor (refer to Part III of this EMP) • BAP and BMEP • Record and maintain briefing and orientation events log with duration and list of attendees 			
Operation and Maintenance Transmission Line ROW	Loss of habitat due to civil works	<ul style="list-style-type: none"> • Restore and maintain landscaping along the ROW (under 3 m) • Employ manual vegetation maintenance methods such as grazing by local animals or manual trimming of grasses and plants within the ROW and employ local labor as possible • No chemicals (herbicides / pesticides) will be used • Restore and maintain land use to pre-construction conditions along the transmission line ROW • To avoid buildups of trimmed vegetation and branches, these will be allowed for collection by local people for firewood or facility contractor will contact the relevant local authorities for collection, transport and disposal 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Fugitive dust emissions from movement of equipment / machinery for repairs at transmission lines	<ul style="list-style-type: none"> • Compliance with local ambient air quality standards • Open and exposed areas to be sprayed with water as required, especially during the dry season 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget

	Discharge of wastewater	<ul style="list-style-type: none"> • Not anticipated during operation of the transmission line 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Lack of proper handling, storage and disposal	<ul style="list-style-type: none"> • Not anticipated during operation of the transmission line 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Lack of proper handling, storage and disposal	<ul style="list-style-type: none"> • Not anticipated during operation of the transmission line • Erection processes and operation will follow manufacturers' specifications 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget
	Potential occupational health and safety risks to workers	<ul style="list-style-type: none"> • Compliance to local Occupational Safety and Health laws and regulations, 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget

		<ul style="list-style-type: none"> • Compliance to relevant national electrical safety standard • Provide and maintain signage as per Institute of Electrical and Electronics Engineers standards at dangerous places for warning of electrical hazards • Provide and maintain health assessment by a competent medical practitioner for all workers • Provide periodic training to all workers with access to electrical and hazardous conditions and workers will be certified to work on site • Provide and maintain workers appropriate PPE • Equipment and tools will be inspected before use to ensure proper and safe operation • Appropriate grounding and deactivation of live power equipment during maintenance work or if working in close proximity to the equipment; provision of lightning arrestors as appropriate • Record of health assessments, incidents, accidents, near-miss, fatalities will be maintained • Electro-magnetic field (EMF) levels expected to be below the limits set by International Commission on Non-Ionizing Radiation Protection which is 4.17 kV/m for electric field and 833 miliGauss for magnetic field; periodic EMF monitoring using hand held devices as required • Implement SOMP for Occupational Health and Safety 			
Transmission line ROW	Potential community health and safety risks to persons living in the wider Project area	<ul style="list-style-type: none"> • Security and inspection personnel will be deployed to avoid vandalism of equipment and pilferage of lines/cables that may cause accident and/or electrocution • Conduct information disclosure, consultation and participation activities in cooperation with local authorities and in accordance with the Stakeholder Communication Strategy 	Facility operator PIC	PMU-SS SPV-PIU	Facility operator budget

		<ul style="list-style-type: none">• Communicate with communities on potential health and safety risks and mitigation measures including SPZ, ERP, project GRM• Record of consultations / incidents / issues will be maintained in accordance with the project GRM and Stakeholder Communication Strategy			
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**ENVIRONMENTAL MONITORING PLANS
(EMOP)**

Table 2.1. EMOP – Design and Pre-Construction Stage

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
Project Readiness Checks for Environmental Management	Site Selection / Route Selection	Project are of influence	Site Selection completed Route Selection completed	Once	PMU SPV	NEGU
	Climate risks / extreme weather events	Project area of influence	Integrate measures and recommendations for site / route selection and into detailed engineering design, refer to Part IV of this EMP	Once		
	Receptors, particularly a) households / structures/ schools, b) surface water bodies, c) groundwater wells, d) road and railway crossings, e) protected areas, forests, critical habitats and wetlands, if any, habitats of	Project area of Influence	Sensitive natural and human receptors identified and /or avoided <ul style="list-style-type: none"> • Ocular inspection • Transect survey • GIS Maps 	Once at the time of detailed walk over survey		

³⁶ PMU-SS – Project Implementation Unit of NEGU; ADB – Asian Development Bank; PIC – Project Implementation Consultant Services; Contractors imply - Engineering, Procurement, Construction (EPC) contractor, FACILITY OPERATOR contractors and Contractor designated EHS focal person (“C-ES”) and GRM focal person (C-GRM).

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
	conservation value, f) PCRs					
	Project implementation Set up	NEGU	Appointment of a Project Implementation Consultant (PIC) Services and Contracting of International and National Environment Specialists Appointment of dedicated SPV PIU staff for environment	Once	PMU SPV	PMU SPV
	Training and Capacity Building for PMU, SPV PIU and Contractors	To be determined	Training and Capacity Building details completed - Date, time, duration, length and attendees list	Once	PIC	PMU
	EHS audit	Surkhan substation	EHS audit report updated, corrective measures integrated into design and in project planning	Once	PIC	PMU
	Domestic environmental documentation	-	Domestic environmental documents submitted to SCEEP for review and approval	Once	SPV-PIU PIC	PMU
	Land Acquisition and Compensation, if applicable	Project area of influence	Timely and due compensation to project affected persons (APs) in line with project SSDDR	Completion prior to the start of civil works	PIC SPV-PIU PMU-SS	PMU

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
	Design features as environmental impact mitigation	Project area of influence	<ul style="list-style-type: none"> • AIS Substation selected • A permanent ('bunded') impermeable surface and dykes capable of carrying 110% volume of materials for accidental spills or leakage selected for construction • Provision for an oil containment system at transformer pad • Corrective actions for upgrade /extension works as per EHS audit findings planned and integrated into bids 	Once	PIC SPV-PIU PMU-SS	PMU
	Biodiversity	Ecological area of analysis	<ul style="list-style-type: none"> • Recommendations from BAP and BMEP integrated into final detailed design 	Once	PIC SPV-PIU PMU-SS	PMU
	COVID-19 risk assessment	Project area of influence	<ul style="list-style-type: none"> • Covid-19 risk mitigation measures integrated into project planning in line with Government guidelines and /or Part III of this EMP, whichever is more stringent 	Once	PIC SPV-PIU PMU-SS	PMU
	Environmental Baseline	Location: any water source downstream of	<ul style="list-style-type: none"> • Sampling and chemical analysis (surface water) 	Once prior to start of civil works	Contractor PIC	PMU-SS SPV-PIU

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
	Monitoring Surveys <ul style="list-style-type: none"> • Surface water quality • Air Quality • Noise and Vibration 	the new substation, irrigation channel and along the final transmission tower footings (e.g. river Karasu crossing)				
		Location: solar site, at sensitive receptor sites (e.g. households) in close proximity to the final transmission line route alignment	• Hand held/portable devices for air quality monitoring	Once prior to start of civil works	Contractor PIC	PMU-SS SPV-PIU
		Location: solar site and at sensitive receptor sites (e.g. households) along the final transmission line alignment	• Hand held/portable devices for noise/ vibration level measurements	Once prior to start of civil works	Contractor PIC	PMU-SS SPV-PIU

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
	Physical cultural resources (PCRs)	Project area of influence	<ul style="list-style-type: none"> • Identification of sensitive periods conducted • Ocular inspection/ Transect survey • Establish Chance Find Procedures 	Once	Contractor PIC	PMU-SS SPV-PIU
	Updating IEE and EMP	-	<ul style="list-style-type: none"> • Incorporate final project detailed engineering design in IEE and EMP • Approval from ADB/PMU and disclosure 	Once	PIC	PMU-SS
	Site specific checklist for contractors to use in environmental monitoring	-	<ul style="list-style-type: none"> • Approved Checklists 	Once	PIC	PMU-SS
	Safeguards requirements / project EMP in tenders, contracts and bidding documents	-	<ul style="list-style-type: none"> • Approved project EMP for Contractors • Contractor ES focal point person appointed (C-ES) • Contractor Health & Safety focal point person appointed (C-HS) • Contractor Biodiversity focal point person appointed (C-BO) 	Once	PIC PMU-SS	PMU

Project Activity	Parameter/ Indicator	Location	Method of Measurement	Frequency	Responsibility ³⁶	
					Implemented by	Supervised by
ALL INFRASTRUCTURE						
DESIGN AND PRE-CONSTRUCTION STAGE						
			• Contractor GRM focal person appointed (C-GRM)			
	Project Grievance Redress Mechanism (GRM)	Project area of influence	GRM / GRC set up	Once	PIC PMU-SS	PMU
	Information Disclosure, Participation and Consultation – Announcement to the communities of civil works schedule – Distribution of PIB ³⁷	Project area of influence	Consultation log book	One month prior to start of civil works	Contractor SPV-SS PMU-SS PIC	PMU SPV-PIU

³⁷ PIB – Project Information Booklet.

Table 2.2. EMOP – Activities Prior to Mobilization on Site

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
ALL INFRASTRUCTURE						
ACTIVITIES PRIOR TO MOBILIZATION ON SITE						
Prior to mobilization on site	Orientation of Project Staff, Contractors, Workers	Project area of influence	<ul style="list-style-type: none"> •Number of participants •Duration of briefing and orientation exercise 	Once	PIC	PMU
	Orientation of hired workers	Project area of influence	<ul style="list-style-type: none"> •Number of participants •Duration of briefing and orientation exercise 	Once	Contractors PIC	PMU
	Hiring of Project Staff and workers - Local recruitment	Project area of influence	<ul style="list-style-type: none"> •Number of local workers and staff recruited 	Weekly	Contractors PIC	PMU-
	SEMP / SOMP ³⁸	Project area of influence	<ul style="list-style-type: none"> •Approved SEMP /SOMP 	Once	PIC	PMU

³⁸ SEMP – Construction Environmental Management Plan; SOMP – Standard Operation & Maintenance Plan.

Table 2.3. EMOP – Construction and Operation – New Solar Project Site – Solar PV Plant, New Substation, Common Facilities, Access Road and Upgrade Works

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
SOLAR PROJET SITE, SOLAR PV PLANT, NEW SUBSTATION, COMMON FACILITIES, ACCESS ROAD AND UPGRADE WORKS						
CONSTRUCTION STAGE						
Site preparation and civil works	Loss of habitat	Solar project site, Solar PV plant / substation ³⁹ / access roads / road easements affected by delivery of equipment and construction material	Ocular inspection	Once before the start of site preparation and civil works, and once after completion of civil works	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Implementation of SOMP's e.g. for hazardous materials and register of activities involving hazardous materials Maintenance of MSDSs	Solar project site, Solar PV plant / substation/ access roads / road easement	log sheet	Monthly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Erosion, spoil control measures such	Solar project site, Solar PV plant / substation/ access	Ocular inspection	Weekly, and once after	Contractors PIC	PMU-SS SPV-PIU

³⁹ Upgrade works will be as per EMP and corrective actions as per findings of environmental audit.

	as silt traps, planting and/or sowing soil binding grass	roads / road easement affected by delivery of equipment and construction material		completion of spoil disposal		
Site preparation and civil works	Air Quality and fugitive dust Spraying of water to opened land areas and before movement of construction vehicles	Solar project site, Solar PV plant / substation/ access roads / road easement affected by delivery of equipment and construction material	<ul style="list-style-type: none"> • Hand held/ portable air monitoring devices • Compliance with national laws and regulations on ambient air quality • Ocular inspection/spot checks 	Monitoring Bi-monthly during civil works and once after completion of civil works Spraying of water every day at solar site / substation / along access roads during dry season and weekly during wet season Weekly ocular inspection	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Noise and vibration level	Solar project site, Solar PV plant / substation/ access roads / road easements affected by delivery of equipment	<ul style="list-style-type: none"> • Noise/vibration monitoring using hand held/portable devices 	Monitoring Bi-monthly during civil works and once after completion	Contractors PIC	PMU-SS SPV-PIU

		and construction material	<ul style="list-style-type: none"> • Compliance with national noise standards • Ocular inspection/ spot checks 	of civil works (only upon commissioning of the substations) Weekly ocular inspection		
Site preparation and civil works	Smoke belching construction vehicles (emissions)	Solar project site, Solar PV plant / substation/ access roads / road easement affected by delivery of equipment and construction material	Ocular inspection / spot checking	Daily ocular inspection	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Guaranteed noise level of equipment / machineries	Solar project site, Solar PV plant / substation/ access road	<ul style="list-style-type: none"> • Machinery and equipment specifications • Compliance to national noise standards 	Once	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Quality of transformer oil	Solar project site, Solar PV plant / substation/ access road	Material Safety Data Sheet (MSDSs) – compliance to IS: 1866: Code of Practice for Electrical Maintenance and Supervision of Mineral Insulating Oil in Equipment	Once	Contractors PIC	PMU-SS SPV-PIU

Site preparation and civil works	Waste management	Construction (workers) camps at work sites / Sorting and Recycling area Controlled area set up for hazardous Material storage area	Ocular inspection / spot checks	Weekly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	All equipment used is PCB free	Work sites / Solar project site, Solar PV plant / substation/ access road	Certification checks	Bi-annually	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Occupational Environment Health and Safety (OEHS) Training	To be determined	OHS training log book	Monthly during civil works	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Provision of sanitary facilities and wash areas, safe drinking water and garbage bins	Construction (workers) camps at work sites / Solar project site, Solar PV plant substation/ access road	Ocular inspection / spot checks	Once	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Danger and warning signs (traffic, electricity) for safety of workers and the community	Construction (workers) camps at work sites / Solar project site, Solar PV plant / substation/ access road Access roads / road easements affected by delivery of equipment and construction material	Ocular inspection / spot checks	Weekly	Contractors PIC	PMU-SS SPV-PIU

Site preparation and civil works	Information Disclosure, Participation and Consultation – Distribution of FAQs/ PIB – Community Awareness Program on safety issues / Training in ERPs Grievances received/ resolution, if any	Communities in and around Solar project site, Solar PV plant / substation	Consultation log book	Monthly during civil works	Contractors PIC	PMU-SS SPV-PIU
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Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
SOLAR PROJET SITE, SOLAR PV PLANT, NEW SUBSTATION, COMMON FACILITIES, ACCESS ROAD AND UPGRADE WORKS						
OPERATION STAGE						
Operation and Maintenance	Orientation of Project Staff, Contractors Workers	Work site Solar project site, Solar PV plant / substation	<ul style="list-style-type: none"> • Number of participants • Duration of briefing and orientation exercise 	Once	PIC ⁴⁰	PMU
	Maintenance of Sanitary facilities and wash areas, safe drinking	Work site Solar project site, Solar PV plant substation	Ocular inspection/ spot checks	Monthly	Facility operator PIC	Facility operator

⁴⁰PIC role in implementation activities during operation phase will be limited to its contract duration.

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
SOLAR PROJET SITE, SOLAR PV PLANT, NEW SUBSTATION, COMMON FACILITIES, ACCESS ROAD AND UPGRADE WORKS						
OPERATION STAGE						
	water and garbage bins					
	Maintenance of drainage lines	Solar project site, Solar PV plant / substation / access road	Operation & Maintenance log sheet	Monthly	Facility operator PIC	Facility operator
	Waste management collection, transport and disposal	Solar project site, Solar PV plant / substation/ access road	<ul style="list-style-type: none"> • Operation & Maintenance log sheet • Spot checks 	Monthly	Facility operator PIC	Facility operator
	Maintenance of SOMP's e.g. for hazardous materials and register of activities involving hazardous materials Maintenance of MSDSs	Solar project site, Solar PV plant / substation/ access road	<ul style="list-style-type: none"> • Operation & Maintenance log sheet 	Monthly	Facility operator PIC	Facility operator
	Failure of equipment	Solar project site, Solar PV plant / substation/ access road	Operation & Maintenance log sheet	Monthly	Facility operator PIC	Facility operator
	Occupational health, and safety	Solar project site, Solar PV plant / substation/ access road	<ul style="list-style-type: none"> • Number of incidents/ accidents/near-miss/ fatalities 	Semi-annually	Facility operator PIC	Facility operator

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
SOLAR PROJET SITE, SOLAR PV PLANT, NEW SUBSTATION, COMMON FACILITIES, ACCESS ROAD AND UPGRADE WORKS						
OPERATION STAGE						
	Community health and Safety – Community Awareness Program on safety issues / Training in ERPs – Grievances received / resolution, if any	Communities in and around Solar project site, Solar PV plant / substation/ access road to solar project site	• Consultation log book	Once at commencement of operation	Facility operator PIC	Facility operator
	Vegetation planting, maintenance of hedge growth and field margins	Solar project site, Solar PV plant / substation/ access road to solar project site	• Ocular inspection	Quarterly	Facility operator PIC	Facility operator
	Biodiversity conservation	In and around the solar project site	• As per BAP and BMEP	Monthly	Facility operator PIC	Facility operator
	EMF ⁴¹	Substation	• Hand held EMF field meters	Annually	Facility operator PIC	Facility operator

⁴¹ EMF Electro-magnetic field

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
SOLAR PROJET SITE, SOLAR PV PLANT, NEW SUBSTATION, COMMON FACILITIES, ACCESS ROAD AND UPGRADE WORKS						
OPERATION STAGE						
	Corrective actions as per EHS audit	Surkhan substation	•		Facility operator PIC	Facility operator

Table 2.4. EMOP – Construction and Operation – New Transmission Line, Temporary Access Tracks

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
NEW TRANSMISSION LINE, TEMPORARY ACCESS TRACKS						
CONSTRUCTION STAGE						
Site preparation and civil works	Loss of habitat	Transmission line alignment Temporary access tracks / road easements affected by delivery of equipment and construction material	Ocular inspection	Once before the start of site preparation and civil works, and once after completion of civil works	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Implementation of SEMP's e.g. for hazardous materials and register of activities involving hazardous materials Maintenance of MSDSs	Transmission line ROW, access roads/ road easements	log sheet	Monthly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Erosion, spoil control measures such as silt traps, planting and/or sowing soil binding grass	Transmission line alignment Temporary access tracks / road easements affected by delivery of equipment and construction material	Ocular inspection	Weekly, and once after completion of spoil disposal	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Air Quality and fugitive dust	Transmission line alignment	• Hand held/ portable air	Monitoring Bi-monthly during civil works and	Contractors PIC	PMU-SS SPV-PIU

	Spraying of water to opened land areas and before movement of construction vehicles	Temporary access tracks / road easements affected by delivery of equipment and construction material	<p>monitoring devices</p> <ul style="list-style-type: none"> • Ocular inspection/spot checks 	<p>once after completion of civil works</p> <p>Spraying water Every day along transmission line alignment during dry season and weekly during wet season</p>		
Site preparation and civil works	Noise and vibration level	Transmission line alignment/ Temporary access tracks / road easements affected by delivery of equipment and construction material	<ul style="list-style-type: none"> • Noise monitoring using hand held/portable devices • Ocular inspection/spot checks 	<p>Monitoring Bi-monthly during civil works</p> <p>Weekly ocular inspection</p>	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Smoke belching construction vehicles (emissions)	Transmission line alignment/ Temporary access tracks / road easements affected by delivery of equipment and construction material	Ocular inspection /spot checking	Weekly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Guaranteed noise level of equipment/ machineries	Transmission line alignment Temporary access tracks	<ul style="list-style-type: none"> • Machinery and equipment specifications • Compliance to national noise standards 	Once	Contractors PIC	PMU-SS SPV-PIU

Site preparation and civil works	Waste management	Transmission line alignment/ Construction (workers) camps, Sorting and Recycling area Controlled area set up for hazardous material storage area	Ocular inspection /spot checks	Weekly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	All equipment used is PCB free	Work sites / transmission line	Certification checks	Bi-annually	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Occupational Health and Safety (OHS) Training	To be determined	OHS training log book	Monthly during civil works	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Provision of sanitary facilities and wash areas, safe drinking water and garbage bins	Construction (workers) camps	Ocular inspection /spot checks	Once	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Danger and warning signs (traffic, electricity) for safety of workers and the community	Transmission line alignment / Access tracks / road easements affected by delivery of equipment and construction material	Ocular inspection /spot checks	Weekly	Contractors PIC	PMU-SS SPV-PIU
Site preparation and civil works	Information Disclosure, Participation and Consultation	Communities in and around transmission line ROW	Consultation log book	Once during civil works	Contractors PIC	PMU-SS SPV-PIU

	<ul style="list-style-type: none"> - Transmission of FAQs/ PIB - Community Awareness Program on safety issues / Training in ERPs <p>Grievances received / resolution, if any</p>					
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Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implemented By	Supervised by
NEW TRANSMISSION LINE, TEMPORARY ACCESS TRACKS						
OPERATION STAGE						
Operation and Maintenance	Orientation of Project Staff, Contractors, Workers	Project area of influence	<ul style="list-style-type: none"> • Number of participants • Duration of briefing and orientation exercise 	Once	PIC	PMU
	Failure of transmission towers /poles – line fault	Along the transmission line alignment	<ul style="list-style-type: none"> • Operation & Maintenance log sheet 	Monthly	Facility Operator PIC	Facility Operator
	Occupational health, and safety	Along the transmission line alignment	<ul style="list-style-type: none"> • Number of incidents/ accidents /near-miss/fatalities 	Semi-annually	Facility Operator PIC	Facility Operator
	Community health and Safety	Communities located along the transmission line alignment	<ul style="list-style-type: none"> • Consultation • log book 	Once at commencement of operation	Facility Operator PIC	Facility Operator

Project Activity	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implemented By	Supervised by
NEW TRANSMISSION LINE, TEMPORARY ACCESS TRACKS						
OPERATION STAGE						
	<ul style="list-style-type: none"> – Community Awareness Program on safety issues / Training in ERPs – Grievances received / resolution, if any 					
	EMF ⁴²	Along the transmission line alignment	• Hand held EMF field meters	Annually	Facility Operator PIC	Facility Operator
	Vegetation planting, re-seeding	Along the transmission line alignment / ROW	• Ocular inspection	Quarterly	Facility Operator PIC	Facility Operator
	Biodiversity conservation	Along the transmission alignment	• As per BAP	Monthly	Facility Operator PIC	Facility Operator
	Pilferage of cables	Along the transmission alignment	Ocular inspection • Operation & Maintenance log sheet	Quarterly	Facility Operator PIC	Facility Operator

⁴² EMF Electro-magnetic field

Part II
Applicable Environmental Quality Standards

(1) AIR QUALITY STANDARDS

1. Ambient Air Quality Standards, or Maximum Permissible Emissions (MPCs), established by SanPiN 0293-11 (May 16, 2011) is shown in Table 3.1. According to the United Nations Environment Program (UNEP), these standards are aligned with World Health Organization (WHO) standards.⁴³ The most stringent standards apply.

Table 3.1 (a). National Air Quality MPCs

Parameter	UZB Air Quality ⁴⁴ MPC ($\mu\text{g}/\text{m}^3$)	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)	Applicable Standards as per ADB SPS ⁴⁵ ($\mu\text{g}/\text{m}^3$)
Particulate Matter PM10	150 - 500 (30 min) 100 (24-hr) 80 (monthly) 50 (annual)	20 (annual) 50 (24-hr)	20 (annual) 50 (24-hr)
Particulate Matter PM2.5	150 - 500 (30 min) 100 (24-hr) 80 (monthly) 50 (annual)	10 (annual) 25 (24-hr)	10 (annual) 25 (24-hr)
Nitrogen Dioxide (NO ₂)	85 (30 min) 60 (24-hr) 50 (monthly) 50 (annual)	40 (annual) 200 (1-hr)	40 (annual) 200 (1-hr)
Nitrogen Oxide (NO)	60 (30 min) 250 (24-hr) 120 (monthly) 60 (annual)	-	
Sulphur Dioxide	500 (30 min) 200 (24-hr) 100 (monthly) 50 (annual)	500 (10 min) 20 (24-hr)	50 (annual) 20 (24-hr) 500 (10 min)
Carbon Monoxide (CO)	4,000 (24-hr) 3,500 (monthly) 3,000 (annual)	-	3000 (annual) 4000 (24-hr)

⁴³ These rules and regulations establish permissible noise parameters in residential, public buildings and residential buildings of populated areas created by external and internal sources, as well as general requirements for measurements, measurement methods and hygienic noise assessment at research sites.

⁴⁴ Note: Uzbekistan labels particulate emissions as dust.

⁴⁵ As per ADB SPS, the borrower / project proponent shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the implementing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

(2) NOISE STANDARDS

2. Noise standards established by SanPiN No. 0267-09, is used for residential / commercial areas in Uzbekistan.⁴⁶ Evaluation of the sound level at the calculation point is performed for the day and night period of the select day (from 7 to 23 hours and from 23 to 7 hours) and takes into account the maximum intensity of the sound (source) level during the half-hour period. Noise standards established by SanPiN No. 0120-01 (“Sanitary norms and rules to ensure acceptable noise levels in the workplace”), is used for health of staff in the workplace. The standards are shown in Table 3.2.

Table 3.2. Noise limits from SanPiN No. 0267-09 and SanPiN No. 0120-01

Receptor/ Source	UZB Noise Level Standards		WHO Guidelines Value For Noise Levels		Applicable Per ADB SPS ⁴⁷	
	(30 min LAeq in dBA)		(One Hour LAeq in dBA)		(dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	80 ⁴⁸	80	70	70	70	70
Commercial area	55	45	-	-	55	55
Residential Area	55	45	55	45	55	45
Silent Zone	-	-	-	-	-	-

* LAeq- equivalent average sound pressure level.

(3) VIBRATION

3. The German Standard DIN 4150-3 – Vibration in Buildings – Part 3: Effects on structures provides short term and long-term limits ⁴⁹ for vibration at the foundation for various structures. These standards are considered international best practice and will be followed as part of the project as shown in Table 3.3.

⁴⁷ As per ADB SPS, the borrower/project proponent shall achieve whichever of the noise standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the implementing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

⁴⁸ Performance of all types of work at permanent workplaces in industrial premises and at enterprises operated since March 12, 1985.

⁴⁹ Short-term vibrations are defined as those that do not occur often enough to cause structural fatigue and do not produce resonance in the structure being evaluated and long-term vibrations are all the other types of vibration. DIN 4150-3 notes that “experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible. Exceeding the value in the table does not necessarily lead to damage”.

Table 3.3. Guideline Values for Vibration Velocity to be Used When Evaluating the Effects of Short-term and Long-term Vibration on Structures

S. No	Type of structure	Guideline Values for Velocity (mm/s)				
		Short-term			Long-term	
		At foundation			Uppermost Floor	Uppermost Floor
		Less than 10 Hz	10 Hz to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	10
2	Residential dwellings and buildings of similar design and/or use	5 (105 dB)	5 to 15	15 to 20	15	5 (105 dB)
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3 (100.5 dB)	2 to 8	8 to 10	8	2.5 (99.0 dB)

Source: DIN 4150-3, Structural Vibration, Part 3: Effect of vibration on structures

(4) WATER QUALITY

4. Water quality standards given as MPC, is established by SanPiN No. 0172-06 and has two categories: a) first category is for centralized or non-centralized drinking water supply; b) second category is for cultural and everyday purposes of the population, recreation, and sports. There are no water quality standards for treated sanitary sewage discharges (from construction), therefore, the following standards in Table 3.4 shall apply:

Table 3.4. IFC (WBG) EHS Indicative Values for Treated Sanitary Sewage Discharges

Pollutant	Unit	National MPC	WBG Guideline Value for sanitary sewage discharge	Applicable Standards as per ADB SPS 2009
pH	pH	6.5-8.5	6-9	6-9
Biological Oxygen Demand (BOD)	MgO/l	Fisheries water bodies – 3 Cultural Household – 3-6	30	30

		Household Drinking – 3-7 Irrigation – 10		
Chemical Oxygen Demand (COD)	Mg/l	Fisheries water bodies – 15 Cultural Household – 40 Household Drinking – 30 Irrigation – 40	125	125
Total Nitrogen	Mg/l	Fisheries water bodies – 9.1 Cultural Household – 25 Household Drinking – 45 Irrigation – 25	10	10
Total Phosphorus	Mg/l	Fisheries water bodies – 15 Cultural Household – 40 Household Drinking – 30 Irrigation – 40	2	2
Oil and Grease	Mg/l	Fisheries water bodies – 0.05 Cultural Household – 0.3 Household Drinking – 0.1 Irrigation – 0.3	10	
Total Suspended Solids	Mg/l	Fisheries water bodies – 15 Cultural Household – 30 Household Drinking – 30 Irrigation – 50	50	
Total Coliform Bacteria	MPN ^A / 100 ml	-	400	

Other key regulations relating to water quality and use for the Project include: Hygiene requirements for the protection of surface waters in Ruz SanR&N No 0172-04 Main criteria for

hygienic assessment of the level water bodies contamination for health risks population in Uzbekistan (SanR&N No 0255-08).

(5) SOLID WASTE

5. The project will comply with the Law on Waste No.362-II (dated, April 5, 2002 and modified January 4, 2011) that regulates solid waste treatment procedures and defines the authority of various institutions involved in solid waste management. The law also provides rules for the transport of solid waste.

(6) HAZARDOUS WASTE

6. The project will comply with the provisions approved by the SCEEP, the Ministry of Health No. 2438 dated March 20, 2013, for hazardous waste specifically for placement of hazardous chemicals and hazardous materials in special landfills, their protection, transport and disposal.

7. Hazardous wastes that are transported must undergo environmental certification and be transported by special vehicles for disposal. The SCEEP and the Ministry of Health also provide approvals i.e. ‘proper performance of work’ for hazardous materials generated. The transportation and disposal of hazardous waste is under the purview of the State organization “Qishloqxujalikkimyo” (Agricultural Chemicals). Transportation of such materials should be carried out in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 35 dated February 16, 2011 “On rules of transportation of hazardous materials in the territory of Uzbekistan”.

(7) SANITARY PROTECTION ZONE

8. In order to protect the population from the effects of the electric field created by overhead power lines, sanitary protection zones (SPZ) are established as per SanPiN No. 0236. The SPZ is defined as the territory along the high-voltage line in which the electric field exceeds 1 kV / m.

9. For newly designed overhead lines as well as buildings and structures, the SPZ is established along the horizontal arrangement of high voltage wires and without means of reducing the electric field strength on both sides of the ROW center-line. The distances corresponding to the projection onto the ground of the outer phase wires in a direction perpendicular to the overhead line are as follows. Vertical height:

- 15 m – for overhead lines with a voltage of 220 kV
- 20 m – for overhead lines with a voltage of 330 kV
- 30 m – for overhead lines with a voltage of 500 kV
- 40 m – for overhead lines with a voltage of 750 kV
- 55 m – for overhead lines with a voltage of 1150 kV

Part III
Guidance on managing risk from COVID-19 on construction sites and in worker's accommodation

INTRODUCTION:

10. The COVID-19 outbreak represents significant health and safety risks that were not anticipated during the project appraisal stage and are not reflected in any projects safeguards documents, most importantly the Environmental Management Plan which includes Health and Safety.

11. In accordance with the ADB Safeguard Policy Statement, the Borrower is required to assess implications of unanticipated risks and impacts and to identify and implement necessary risk mitigation measures.

12. This guidance document sets out a series of recommended measures that can be implemented to manage the risk on construction sites from COVID-19. It also includes a specific set of measures for construction work camp management which relate to both the management of COVID-19 risk as well as general Health and Safety.

SOURCES OF INFORMATION:

13. Guidance is being updated regularly as knowledge of COVID-19 improves. This document is based on good international practice, using guidance from World Health Organization (WHO), International Labor Organization (ILO) and national guidance from the UK and Canada and a review of other national government public information on COVID-19.

QUARANTINE OR ISOLATION FOR COVID-19:

14. WHO⁵⁰ defines 'quarantine' as the separation of a person who is not ill but who may have been exposed to an infectious person, with the objective of monitoring their symptoms and ensuring the early detection of cases. 'Isolation' is the separation of a person who is showing symptoms or has confirmed COVID-19 to prevent the spread of infection or contamination.

15. Contractors must ensure the safe quarantine or isolation of workers and that this does not impact on their employment status.

⁵⁰ WHO (19 March 2020) Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19) https://apps.who.int/iris/bitstream/handle/10665/331497/WHO-2019-nCoV-IHR_Quarantine-2020.2-eng.pdf.

Construction Site Working Conditions Mitigation Measures for COVID-19	
1. Form a joint team to plan and organize return to work	<ul style="list-style-type: none"> • Develop or convene a joint occupational safety and health committee with members representing the employer and workers. • Train team members on the basic principles for the formulation and implementation of occupational safety and health preventive and control measures. • Develop and communicate a work plan on safe working for COVID-19. Such plan should be fully aligned with any government regulations and guidelines on COVID-19 prevention and control, or in the absence thereof, with international good practice guidelines as may be updated from time to time.
2. Risk assessment to decide when to work, who works and how	<ul style="list-style-type: none"> • Undertake a risk assessment to determine the preventive and control measures. • Ensure preventative measures are in place before resuming or beginning construction work.
3. Adopt engineering, organizational and administrative measures	<ul style="list-style-type: none"> • Avoid physical interaction and maintain physical distancing requirements as prescribed by national policy, or in the absence thereof, international good practice. • Ventilate enclosed workplaces including work camps and communal spaces. • Avoid concentration of workers - limit the capacity of common areas such as work camp dining rooms and changing rooms to allow the minimum separation of 2 meters and organize one-way systems. This includes sleeping areas which must be a minimum of 2 meters between beds. • Put in place training and information on COVID-19 and measures required for its management. • The construction site is to be segregated to the extent possible in zones or other methods to keep different crews physically separated at all time. • Stagger break and lunch schedules to minimize the number of people in close proximity to one another.
4. Regularly clean and disinfect	<ul style="list-style-type: none"> • Increase the frequency of cleaning and disinfection, in particular heavily trafficked areas and common areas, including work camps. • All door handles, railings, ladders, switches, controls, eating surfaces, shared tools and equipment, taps, toilets, and personal areas are wiped down at least twice a day with a disinfectant. • Discourage the sharing of items such as cups, glasses, plates, tools.
5. Promote personal hygiene	<ul style="list-style-type: none"> • Provide workers with the conditions and means necessary for frequent hand washing (soap, water or alcohol gel) with a posted hand washing protocol at site entries, exits, bathrooms, communal areas, offices, and any other areas with commonly touched surfaces. • Inform workers of the need to avoid physical contact when greeting, and avoid touching eyes, nose and mouth.

Construction Site Working Conditions Mitigation Measures for COVID-19	
	<ul style="list-style-type: none"> • Inform workers of the need to cover the mouth and nose with a disposable handkerchief when coughing or sneezing or the crook of their arm. • Dispose of tissues in a lined and covered waste bin and wash hands afterwards.
6. Provide personal protective equipment (PPE) and inform workers of its correct use	<ul style="list-style-type: none"> • Identify appropriate PPE related to the tasks and health and safety risks faced by workers according to the results of risk assessment and the level of risk, and provide it to workers free of charge and in sufficient number, along with instructions, procedures, training and supervision. • Non-medical face-coverings (such as homemade cloth masks) should be worn as mitigation for catching and transmitting the virus, but are not to be treated as substitutes for proper handwashing.
7. Health surveillance and insurance	<ul style="list-style-type: none"> • Before entering the site, staff and visitors must confirm that they are not currently exhibiting flu-like symptoms. • Monitor the health status of workers, develop protocols for cases of suspected and confirmed COVID-19. The protocol will state that: <ul style="list-style-type: none"> ○ workers with symptoms or confirmed cases must be isolated within the construction camp or stay at home for 7 days after symptoms started. ○ If symptoms persist after 7 days the person must isolate until the symptoms stop. ○ People who have been in close contact with the person with confirmed COVID-19 be quarantined for 14 days. • All workers in quarantine or isolation must be provided with adequate food, water, medical assistance and sanitation. • Identify workers who have had close contact with people infected with COVID-19 and follow national medical guidance. • Communicate confirmed cases of COVID-19 infection to the appropriate authorities. • All workers should be provided with health insurance that includes COVID-19 treatment
8. Consider other hazards, including psychosocial	<ul style="list-style-type: none"> • Promote a safe and healthy working environment free from violence and harassment. • Encourage health promotion and wellbeing in the workplace through enough rest, balance of physical and mental activity and adequate work-life balance. • Implement prevention and control measures for the use and storage of chemicals, particularly those used for disinfection during COVID-19.
9. Review emergency preparedness plans	<ul style="list-style-type: none"> • Develop an emergency plan adapted to COVID-19 and regularly review it.
10. Review and update preventive and control measures as the situation evolves	<ul style="list-style-type: none"> • Periodically monitor prevention and control measures to determine whether they have been adequate to avoid or minimize risk, and identify and implement corrective actions for continuous improvement.

Construction Site Working Conditions Mitigation Measures for COVID-19	
	<ul style="list-style-type: none"> • Establish and maintain records related to work-related injuries, illnesses and incidents, worker exposures, monitoring of the work environment and workers' health.
Source: Adapted from: ILO, ⁵¹ WHO, ⁵² ⁵³ , ⁵⁴ Canada Construction Association, ⁵⁵ and UK Government. ⁵⁶	

⁵¹ ILO (May 2020) Practical Guidance: Safe Return to Work. Ten Action Points.

⁵² WHO (19 March 2020) Getting your workplace ready for COVID-19.

⁵³ WHO (17 March 2020) Home care for patients with COVID-19 presenting with mild symptoms and management of their contacts.

⁵⁴ WHO (16 April 2020) considerations in adjusting public health and social measures in the context of COVID-19.

⁵⁵ Canada Construction Association (April 2020, version 4) COVID-19 Standardized protocols for all Canadian construction sites.

⁵⁶ www.gov.uk (19 May 2020) Working safely during coronavirus COVID-19: Construction and other outdoor work.

**Worker Camp Siting and Management
Mitigation Measures for Health and Safety and COVID-19**

1. Siting	<ul style="list-style-type: none"> • Not in area liable to flooding, landslide or other natural disaster • Not in area affected by construction dust, noise, sewage or other pollution • Not in a residential area
2. Minimum housing standards	<ul style="list-style-type: none"> • a separate bed for each worker • beds should not be arranged in tiers of more than two; • separate accommodation of the sexes or to accommodate couples • adequate natural light during the daytime and adequate artificial light • adequate ventilation to ensure sufficient movement of air • adequate supply of safe potable water • adequate sanitary facilities (see below); • adequate drainage • adequate furniture for each worker to secure his or her belongings, such as a locker. • common dining rooms, canteens or mess rooms, located away from the sleeping areas • appropriately situated and furnished laundry facilities • reasonable access to plug sockets for charging telephones and other devices • rest and recreation rooms and health facilities, where not available in the community.
3. Minimum accommodation sizes	<p>Sleeping space</p> <ul style="list-style-type: none"> • inside dimensions over 198 centimetres by 80 centimetres; <p>Sleeping room:</p> <ul style="list-style-type: none"> • headroom of over 203 centimetres allowing full free movement • Beds minimum 2m apart for COVID-19 risk management
4. Sanitation Facilities	<ul style="list-style-type: none"> • One toilet, one tap / basin, one toilet for every 6 people • Convenient location to accommodation • Provision of soap • Separate facilities for men and women • Ventilation to open air • Fresh cold running water • Clean and hygienic • Septic tank / sewage treatment facility, or pit latrines located at least 200m from surface waters, and in areas of suitable soil profiles and above the groundwater levels
5. Health and Safety within worker accommodation	<ul style="list-style-type: none"> • Separate area for sick workers to prevent transmission of disease • Smoke detector in sleeping area

	<ul style="list-style-type: none"> • Fire safety throughout accommodation such as fire extinguishers, fire alarms, fire blankets • Worker training in fire prevention and procedures • Fire exit sign, adequate means of escape and clearly maintained exit • Security lighting within camp and for sanitation block and lighting for route from sleeping area to sanitation block. • Electrical cables to be in safe condition, elevated and not in areas liable to flood
6. Inspection	<ul style="list-style-type: none"> • 2 weekly inspection to inspect for cleanliness, state of repair of building, accommodation and fire equipment. • Record inspection results and retain for review
Source: Adapted from ILO Workers' Housing Factsheet No.6. ⁵⁷	

⁵⁷ ILO (2009) Workers' housing. ILO Helpdesk Factsheet No. 6.

Part IV

Recommended Measures for Climate Resilience and Extreme Weather Events Integration in to project detailed design

Wildfire / Mudflows
Solar Site and Substation.
<ul style="list-style-type: none"> ○ Where avoidance of wildfire / mudflow prone areas is not possible, the solar site and substation should conform to applicable wildfire land use planning regulations, building regulations and undertake preparation (warning and evacuation) and prevention activities should be conducted regularly (e.g. fuel reduction programs in seasons where risk of wild fire is high; cutting gaps in vegetation to act as fire breaks)
Transmission line.
<ul style="list-style-type: none"> ○ Where avoidance of wildfire / mudflow prone areas is not possible, reinforce existing transmission structure ○ Consider a resilient high capacity overhead for towers
Extreme Snow fall (intensity and frequency)
Solar PV and Substation.
<ul style="list-style-type: none"> ○ Assure free space (panels and mounting) so snow can slide off panel. ○ Design elevated site above projected snow levels, improved protection measures for equipment mounted at ground level, including water reservoir / strengthening natural drainage design that accounts for precipitation / snowfall projections in the area ○ Mitigate excessive erosion, sediment transport, e.g. develop and implement Site Restoration and Clean-up Plan including re-vegetation of the solar site
Transmission Line
<ul style="list-style-type: none"> ○ Avoid the construction of new tower footings in or near irrigation canals / dykes and avoid placement of towers in water sources ○ Consider a resilient high capacity overhead transmission towers ○ ROW to consider suitable slope and soil type

<ul style="list-style-type: none"> ○ Include lightening protection (earth wires, spark gaps) in the transmission infrastructure ○ Protect masts, antennae, switch boxes, aerials, overhead wires, and cables from precipitation (snow); wind; unstable ground conditions (subsidence); and changes in aridity
<ul style="list-style-type: none"> ○ Mitigate excessive erosion, sediment transport, e.g. develop and implement Site Restoration and Clean-up Plans including re-vegetation of sites along ROW
Access branch road / drainage.
<ul style="list-style-type: none"> ○ Build all weather road pavement and raise embankment height of access branch road; build / strengthen drainage at new solar site as well as regular O&M
Temperature Increase / Extreme Heat Wave
<ul style="list-style-type: none"> ○ Specify more passive airflow beneath mounting structures (reducing panel temperature and increasing power output ○ Specify more effective cooling for substations and transformers
Water Scarcity
<ul style="list-style-type: none"> ○ Design water retention reservoir for controlled inflow and overflow and use for operation and maintenance (e.g. landscaping, washing of PV panels, etc.)⁵⁸
Wind Speed
<ul style="list-style-type: none"> ○ Design structures to withstand higher winds ○ Dry areas, consider panel rinsing system to remove dust and grit. ○ Consider a resilient high capacity overhead transmission towers

⁵⁸ The volume of reservoir/pond depends on the solar PV plant size, to be ascertained during detailed design stage.