Draft Initial Environmental Examination
(Main Report – Part 4 of 4)

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BAN: Spectra Solar Power Project

Prepared by ERM India Private Limited for Spectra Solar Park Limited and the Asian Development Bank.

6. STAKEHOLDER ENGAGEMENT

6.1 Introduction

This section identifies and profiles the key stakeholders for the SSPL solar project and assesses their potential concerns and levels of influence.

6.1.1 Stakeholder Consultation and disclosure requirement for the project

External financial institutions and government regulatory bodies have increasingly emphasised on the disclosure of project information and stakeholder consultations. A brief overview of the requirements of public disclosure and stakeholder consultation applicable to this project is provided below.

Table 6.1 Overview of Disclosure and Stakeholder Consultation Compliance Requirement

Institution/ Regulatory Body	Reference Regulation/ Standard	Requirements
ADB	SR-2: Involuntary Resettlement Safeguards Policy Principle 2.2	Carry out meaningful consultations with affected persons, host communities, and concerned nongovernment organizations. Inform all displaced persons of their entitlements and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of resettlement programs. Pay particular attention to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and Indigenous Peoples, and those without legal title to land, and ensure their participation in consultations. Establish a grievance redress mechanism to receive and facilitate resolution of the affected persons' concerns. Support the social and cultural institutions of displaced persons and their host population.

6.2 Stakeholder Categorisation

A stakeholder is "a person, group, or organization that has a direct or indirect stake in a project/ organization because it can affect or be affected by the Project/organization's actions, objectives, and policies". Stakeholders thus vary in terms of degree of interest, influence and control they have over the project. While those stakeholders who have a direct impact on or are directly impacted by the project are known as **Primary Stakeholders,** those who have an indirect impact or are indirectly impacted are known as **Secondary Stakeholders**.

Keeping in mind the nature of the project and its setting, the stakeholders have been identified and listed in the table given below.

Table 6.2 Stakeholder Group categorisation

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
Community	• Land Sellers • Sub-contractors • Local labourers	• Local community • Agricultural labourers • Vulnerable Community
Institutional Stakeholders	• Union Parishad • Project investors	
Government Bodies	• Regulatory Authorities; • District Administration	

6.3 Approach and Methodology for Stakeholder Analysis

The approach undertaken for information sharing and consultation involved the following key processes.

- Mapping and identification of key stakeholders such as primary (directly influenced by the Project) and secondary (indirectly influenced by the Project) stakeholders;
- Undertaking expert consultations, interviews and focussed group discussions (FGD) with the respective stakeholders;
- Assessing the influence and impact of the Project on these stakeholder groups;
- Summarizing key findings and observations from the consultations; and
- Preparing a future stakeholder engagement strategy for a more detailed assessments at a more detailed level taking into account the various Project lifecycle phases and their implications on the stakeholder .

6.4 Summary of Stakeholder Consultations

ERM undertook consultations/ meetings with identified stakeholders during site visit. The key points discussed with each of these stakeholders are provided in **Table 6.3**:

Figure 6.1 Stakeholder Consultation

	
Consultation with Farmers at Trilochanpatty village	**Consultation with Land owners**
	
Consultation with Villagers at Nayakandi village	**Consultation with Shopkeepers at Nali Bazar**

Table 6.3 Stakeholders and Key Points Discussed

S. No.	Stakeholder Category	Key Points Discussed	Outcomes in brief
1.1	Owners of land to be procured for SSPL Project	■ Issues/ grievances with respect to the land purchase process; ■ Community perception towards the project ■ Socio-economic condition of the people inhabiting the study area.	■ The land area of the project site remains inundated for almost six months every year. The surface of the land is hugely sandy and suitable for seasonal bean crops. ■ Land holders have received entire amount of compensation for the land sold through negotiated settlement. ■ Previously the land, which they sold was single cropped land. The land they (landowners) purchased with the compensation money, or the land they received as land for land compensation is multiple cropped (2-3 times cultivation is done) land. Mostly they cultivate paddy, Mustard, vegetables. The land owners have benefited in terms of land for land compensation. ■ People also additionally bought better quality of land with the compensation money. ■ Most of the land sellers invested the compensation amount in different savings plan at Banks, Post offices, etc. ■ Compensation money had also been saved or utilised for the higher education or marriage purposes of the children, as informed by land sellers. ■ Some land sellers invested the compensation amount for start-up of businesses like establishment of shop, purchase of pond for fishery, poultry business ■ It was informed that the land sellers have received the land price as per the market rate and they are satisfied with the land price received. ■ The land owners who bought another land with the compensation amount the registration cost of the land was paid by Spectra. ■ The site is located at a low lying area. Land owners in the neighbouring agricultural land parcels reported water logging and poor drainage. Site was part of natural drainage of the area, which has historical water logging issues, for 4 – 6 months in a year. Development of the solar park site (backfilling) is likely to increase water inundation in the neighbouring agricultural land parcels.
1.2	Local Community	■ Land holding pattern in the study area; ■ Impact of land purchase on livelihood; ■ Perception of agricultural labourers towards the project; ■ Current engagement scenario – alternate livelihood options;	■ Most of the agricultural land in the area is fertile and bi- cropped and have borewell irrigation facility ■ Mustard, Paddy, Beans, Raw Chili are the main agricultural produce of the area. ■ Hand pump is main source of drinking water in the area ■ Drinking water is highly contaminated with iron and arsenic.

S. No.	Stakeholder Category	Key Points Discussed	Outcomes in brief
		■ Basic amenities in the village – electricity, water supply etc.; ■ Profile of households by source of water; ■ Proposed schemes for water supply in the village; ■ Health scenario in the village and distances of Hospitals/ Clinics;	■ It was reported during the consultation that ground water is at a depth of around 60-70 ft. ■ Union Parishad has installed some hand pumps with more than 500 ft depth, which are arsenic free and the quality of water is good. ■ Every village has primary school and middle school. For higher education student from study area villages goes outside, to the adjacent villages within outside the Union. ■ Nearest health centre is located in Dhaturabari village and community clinic at Dakshin Shalja village, which is 3 km and 5 km away from project site, respectively. ■ For better medical facilities one has to visit the Upazila Hospital, Shivalaya which is 10 Kms from the village ■ People are very positive about the industrial development as it will create some livelihood opportunity and boost the local economy.
1.3	Agriculture labour/share cropper	■ Socio-economic condition ■ Current engagement scenario – alternate livelihood options	■ Six agricultural labourers have been identified. ■ They leased land (1-2 pakee) from land owner. (Pakee is a land area unit use in Bangladesh). ■ They pay BDT 1500 to 2000 per year to their landowner. ■ Mostly they cultivate Khesari grass (Lathyrus sativus or Indian pea) as fodder for cows.
1.4	Project Proponent	■ Location of the project ■ Requirement of water, manpower, power etc. during operation phase of the project ■ Land requirement for the project ■ Project status and timeline ■ Power evacuation ■ No of land owner ■ Status of land procurement ■ Land purchase process ■ Land Compensation ■ Circle price of land	■ Total number of land seller, who sold their land for the solar project is 161 ■ Land purchase was based on negotiated settlement and was based on willing buyer and willing seller. ■ The land rate was BDT 35,000 per decimal when they sold their land 3 years ago. Presently the land rate is BDT 45,000 and Circle rate is BDT 16,100. ■ The compensation was disbursed in two phases. 75% of the total amount was paid at the time of land deed agreement and 25% at the time of registration. ■ Negotiation of the compensation amount with land owners happened verbally. ■ The land owners who bought another land with the compensation amount the registration cost of the land was paid by Spectra. ■ Land compensation was already paid to every land owner ■ Arua Union Parishad assisted the land owners to identify and purchase better land parcels with their compensation money on request. ■ Power generated from the Project will be evacuated to proposed Barangail Grid Sub-Station. Before commissioning of Barangail, Manikganj 132/33 kV grid substation, power generated from Solar Power Plant will be evacuated

S. No.	Stakeholder Category	Key Points Discussed	Outcomes in brief
			through 33 kV double circuit line to bus-bar of Paturia 33/11 kV substation (by one circuit) and tapping another circuit with existing 33 kV line near Gheor 33/11 kV substation.
1.5	EPC contractor	■ Resource requirement (water, manpower, power, raw material etc.) during construction phase of the project. ■ Subcontractor to be involved for the project	■ EPC Contractor is Jiangsu Akcome Industrial Group Co., Ltd; ■ The major raw materials required for the construction phase are fencing material, construction materials like cement, sand, aggregate that is sourced from local areas. ■ One contractor (Khadija Enterprise) is presently working at the construction site for retaining wall. ■ It was informed that after the completion of site development work, Akcome will start the civil construction work for the power plant. ■ During the pick construction phase, it is reported, maximum 200 workers including the labourers will be working at the e site level.
1.6	BRAC, NGO	■ Running schemes ■ beneficiaries	■ Microloan support to women for entrepreneurship and income generation program

7. IMPACT ASSESSMENT AND MITIGATION MEASURES

7.1 Introduction

This section assesses the manner in which the Project will interact with elements of the physical, ecological, social, cultural or human environment to produce impacts to resources/receptors. This has been organized as per the various stages of the project lifecycle to understand the risks and impacts associated with each of these individual stages.

The environmental and social impacts due to the Project activities are considered in the two distinct stages of the Project life cycle: (a) construction of the Plant (Construction Phase); and (b) operation and maintenance of the Plant (Operation Phase).

Impacts are identified and predicted based on the analysis of the information collected from the following:

- Project information (as outlined in **Section 2**);
- Baseline information (as outlined in **Section 5**).

The identification of likely impacts during construction and operation phases has been carried out based on likely activities having their impact on environmental and socio-economic parameters, which are presented in **Section 4**. The details of the activities and their impacts have been worked out in the following sections.

7.2 Impact Assessment Methodology and Approach

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process (IAP). The principal impact assessment (IA) steps are summarized in **Section 1.5.4**.

7.2.1 Prediction of Impacts

Prediction of impacts is essentially an objective exercise to determine what could potentially happen to the environment as a consequence of the project and its associated activities. This is essentially a repeat of the process undertaken in scoping, whereby the potential interactions between the project and the baseline environment are identified. From these potential interactions, the potential impacts to the various resources/receptors are identified, and are elaborated to the extent possible. The diverse range of potential impacts considered in the IA process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques. The nature and types of impacts that has been addressed in this ESIA is defined in the **Box 7.1** below.

Box 7.1 Nature and types impacts considered for impact assessment

- **Negative**, when impact is considered to represent adverse change from the baseline or to have introduced a new undesirable factor; and
- **Positive or beneficial**, when impact is considered to represent improvement to baseline or to have introduced a new desirable 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 within the environment; and
- **Induced**, impacts that result from other activities (which are not part of the project) that happen as a consequence of the project

7.2.2 Evaluation of impacts

In assessing the significance of impact, the following impact characteristics are taken into consideration.

7.2.2.1 Determining magnitude of an impact

Magnitude, i.e. severity of an impact or degree of change caused by a project activity is a function of one or more of the following characteristics:

- Scale: Degree of damage that may be caused to the environmental components concerned.
- Extent: The extent refers to spatial or geographical extent of impact due to proposed project and related activities.
- Duration: The temporal scale of the impact in terms of how long it is expected to last.

Criteria have been defined for each of these key elements and classified based on the level of impacts (low, medium and high) on the environmental component, presented in **Table 7.1** below:

Table 7.1 Magnitude prediction criteria

Impact Elements	Criteria	Ranking
Scale	■ 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;	High
	■ 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.	Medium
	■ Effect is within the normal range of natural variation; ■ No perceptible or readily measurable change from baseline conditions;	Low
Extent	■ Study area and beyond study area	National
	■ Project site & study area (5.0 km from SSPL site)	Regional
	■ Project site & its immediate vicinity (0.5 km from SSPL site)	Local
Duration	■ Spread beyond the lifecycle of the project	Long term
	■ Spread across several phases of the project lifecycle	Medium term
	■ Only during particular activities or phase of the project lifecycle	Short term

Definitions of magnitude for physical, biological and human environmental resources or receptors are defined subsequently:

Table 7.2 Magnitude definitions for physical, biological & human resources/ receptors

Magnitude Definitions	Biophysical and Environmental Receptors	Socio-economic, Cultural and Community Health Receptors
Negligible	Immeasurable, undetectable or within the range of normal natural variation	Change remains within the range commonly experienced within the household or community.
Small	Slight changes in background levels well within accepted norms. Emissions/ Discharges are well within benchmark discharge limits. The effected environmental conditions are expected to be recovered within a few months	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of households and is of a short duration.

Magnitude Definitions	Biophysical and Environmental Receptors	Socio-economic, Cultural and Community Health Receptors
Medium	Temporary or localised change in physical or biological environment. The recovery of such changes returning to background levels thereafter and / or Occasional exceedance of benchmark emission/ discharge limits	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may be regional in scale.
Large	Change over a large area or ecological conditions that lasts over the course of several months with quality likely to cause secondary impacts; and / or routine exceedance of benchmark emission/ effluent discharge limits	Change dominates over baseline conditions. Affects the majority of the area or population in the Area of Influence and/or persists over many years. The impact may be experienced over a regional or national area.
Positive	In the case of positive impacts, no magnitude is assigned, unless there is ample data to support a more robust characterization. It is usually sufficient to indicate that the Project will result in a positive impact, without characterizing the exact degree of positive change likely to occur.	

Note: In the case of impacts resulting from unplanned events, the same resource/ receptor-specific approach to *concluding a magnitude designation was followed, but the 'likelihood' factor was considered, together with the other* impact characteristics, when assigning a magnitude designation.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. The magnitude combines the impact characteristics of Extent, Duration and Scale and is a multiplicative factor of these three criteria set. Based on the above understanding magnitude of impact is assessed as per the **Table 7.3**.

Table 7.3 Assessing Magnitude of Impact

Extent	Duration	Scale	Magnitude
Local	Short Term	Low	Negligible
Regional	Short Term	Low	Small
Local	Medium term	Low	Small
Local	Short Term	Medium	Small
National	Short Term	Low	Small
Local	Long term	Low	Small
Local	Short Term	High	Small
Regional	Medium term	Low	Small
Regional	Short Term	Medium	Small
Local	Medium term	Medium	Small
National	Medium term	Low	Medium
National	Short Term	Medium	Medium
Regional	Long term	Low	Medium
Regional	Short Term	High	Medium
Local	Long term	Medium	Medium
Local	Medium term	High	Medium
Regional	Medium term	Medium	Medium

Extent	Duration	Scale	Magnitude
National	Long term	Low	Medium
National	Short Term	High	Medium
Local	Long term	High	Medium
National	Medium term	Medium	Large
Regional	Long term	Medium	Large
Regional	Medium term	High	Large
National	Long term	Medium	Large
National	Medium term	High	Large
Regional	Long term	High	Large
National	Long term	High	Large

7.2.2.2 Determining Sensitivity/ Importance/ Vulnerability of Receptor

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for an impact is to define the sensitivity/ vulnerability/ importance of the impacted resources/ receptor. There are a range of factors to be taken into account when defining the sensitivity/ vulnerability/ importance of the resource/ receptor, which may be phisical, biological, cultural or human as per the following understanding:

- Where the resource is physical (for example, fresh water body) its quality, sensitivity to change and importance (on a local, regional, national importance) are considered.
- Where the resources/ receptor is biological or cultural (for example, wildlife habitat), its importance (for example local, regional or national importance) and its sensitivity to the specific type of impact are considered.
- Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered.

Definition as defined in **Table 7.4** has been adopted to determine sensitivity/ importance/ vulnerability of environmental resources or receptor.

Table 7.4 Sensitivity/Importance/ Vulnerability Criteria

Sensitivity Criteria	Contributing Criteria
High	■ Existing physical environment quality is already under stress; ■ Ecologically sensitive/ protected area, provides habitat for globally protected species; ■ Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the project. ■ Human receptors/ vulnerable community are located within the project footprint and directly affected by the project
Medium	■ Existing physical environment quality shows some sign of stress; which is sensitive to change in quality or physical disturbance; ■ Natural habitat provides habitat for wildlife, which are protected under National regulations; ■ Some, but few areas of vulnerability; still retaining an ability to at least in part adapt to change brought by the project. ■ Human receptors/ vulnerable community are located adjacent the project site and likely to be affected by the project
Low	■ Existing physical environment quality is good; ■ Modified habitat provides habitat for common species;

Sensitivity Criteria	Contributing Criteria
	■ Human receptors are located away and are not likely to be affected due to the project related activities

Definitions as to determine sensitivity/importance/ vulnerability of environmental resource or receptor are defined as follows:

Table 7.5 Definitions of Sensitivity/Importance /Vulnerability Biophysical and Human

Sensitivity	Biophysical and Environmental Receptors	Socio-economic, Cultural and Community Health Receptors
Low	Existing physical environment quality is good and the ecological resources that it supports are not sensitive to disturbance	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.
Medium	Existing physical environment quality shows some signs of stress and/ or supports ecological resources that could be sensitive to change in quality or physical disturbance.	Some, but few areas of vulnerability; still retaining an ability to at least in part adapt to change brought by the Project and opportunities associated with it.
High	Physical environment quality is already under stress and/ or the ecological resources it supports are very sensitive to change	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project and opportunities associated with it.

7.2.2.3 Evaluating Significance of Impacts

Once magnitude of impact and sensitivity/ vulnerability/ importance of resource/ receptor have been characterised, the significance was assigned for each impact. Impact significance is designated using the matrix shown in **Figure 7.1.**

Figure 7.1 Assessing Significance of Impact due to Proposed Project

		Sensitivity/Vulnerability/ Important Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix. **Table 7.6** provides a context for what the various impact significance ratings signify.

Table 7.6 Categorise of Impact Significance

Impact Category	Description of Impact Significance		
	Biophysical and Environmental Receptors	**Social and Cultural Receptors**	**Community Health**
Positive	Positive impacts provide resources or receptors, most often people, with positive benefits. The concepts of equity have been considered in assessing the overall positive nature of some impacts such as economic benefits, or opportunities for employment, improvement in infrastructure and overall development of region		
Negligible	An impact of negligible significance is one where a resource/ receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations	Inconvenience caused, but with no consequences to livelihoods, culture or quality of life.	Receptors may experience annoyance, minor irritation, or stress associated with change; minimal impact to perceived quality of life. Does not require treatment. No long-term consequences for the health of individuals and the community.
Minor	An impact of minor significance is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards/ guidelines	Impacts are short term and temporary and do not result in long term reductions in livelihood or quality of life.	Temporary reduction to health status of certain individuals that can be easily treated and does not result in long term consequences for community health. Impacts may lead to greater health inequalities in Project area.
Moderate	An impact of **moderate** significance has an impact magnitude that is within applicable standards/guidelines, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP).	Adverse impacts that notably affect livelihood or quality of life at household and community level. Impacts can mainly be reversed but some households may suffer long-term effects.	High risk of diseases or injuries as well as exposure to Project operational risks to the local community. May result in long term but reversible community health impacts.
Major	An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur	Diverse primary and secondary impacts that will be impossible to	Loss of life, severe injuries or chronic illness requiring hospitalization. Exposure to and

Impact Category	Description of Impact Significance		
	Biophysical and Environmental Receptors	**Social and Cultural Receptors**	**Community Health**
	to highly valued/sensitive resource/receptors. An aim of Impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied).	reverse or compensate for, possibly leading to long-term impoverishment, or societal breakdown.	incidence of diseases not commonly seen previously in the area. Likely to have long-term consequences for community health.

7.2.2.4 Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the IA Process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation and enhancement measures.

7.2.3 Identification of mitigation and enhancement measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this IA, ERM has adopted the following Mitigation Hierarchy:

- **Avoid at Source;** Reduce at Source: avoiding or reducing at source through the design of the project.
- **Abate on Site**: add something to the design to abate the impact.
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site.
- **Repair or Remedy:** some impacts involve unavoidable damage to a resource and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind, compensate through other means**: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate.

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

7.2.4 Management and monitoring

The final stage in the IA Process is definition of the management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted.

A Environmental Management Plan, which is a summary of all actions which the Project Proponent has committed to executing with respect to environmental/social/health performance for the Project, is also included as part of the ESIA report. The Environmental and Social Management Plan includes mitigation measures, compensatory measures and offsets and management and monitoring activities.

7.3 Assessment of environmental and social impacts

The construction activity of the solar power project already started. The current status of the project is as follows:

Site development

The entire project site was on low land. The site has been filled up with white sand from river. The estimated volume of fill material required for the site is approximately 50.4 million cubic feet to raise the site level about 2 to 2.5 m from original level. The filling activity was started from September 2018 and it was reported during the site visit that 94% filling activity was completed.

The total periphery of the site is approximately, 3.846 km. Construction of retaining wall (box cutting, cut of wall casting, base casting and wall casting) along the periphery was started from January 2019 and currently approximately 50% of the work has been completed.

The project had obtained permission from the Office of Deputy Commissioner for landfilling using Bulgate dredging sand (dated 30 April 2018).

EPC works

Spectra will engage the Jiangsu Akcome Industrial Group Co., Ltd as the EPC contactor for this project. The scope of work of the EPC shall involve the following:

- Erection of Solar PV Panels
- Erection of Inverters and SCADA Facility
- Construction of underground and/or overhead electrical collection lines to connect PV modules to the pooling substation
- Erection of other associated facilities (control room, office, etc.)

Construction of related structures will involve civil and steel work for installation of pooling stations, transformers, substation, and electric cables and signal wires. After site development activity civil work will be initiated.

Procurement and transportation of machineries and equipment

The machineries and equipment for the solar power project will be transported through the existing site access road network.

Construction material and waste storage area

The site has designated construction material storage facility and construction waste storage facility within the site. It was reported that during EPC works (installation of solar panel and associated facility) the project will provide a temporary laydown area (4.2 acres).

Construction of on-site and off-site work facilities

Construction of site office, labour accommodation and sanitation facility at site.

The potential impact on physical environment, biological environment and socio-economic environ has been assessed for remaining construction activity and operational phase of the project.

7.3.2 Land Use

7.3.2.1 Criteria

For the assessment of land use change, the sensitivity and magnitude criteria outlined in **Table 7.7** and **Table 7.8**, respectively have been used.

Table 7.7 Sensitivity Assessment Criteria for Land Use

Land Use Sensitivity	Criteria
Low	■ Land use not of relevant use by Community ■ Negligible visual change.
Medium	■ Land use of local use by communities e.g. grazing, agriculture, but no major dependence ■ Visual Change but common feature

Land Use Sensitivity	Criteria
High	■ Land use of regional importance. Change would impact Land use classification of the area. ■ Land use of major dependence of local people for agriculture, livestock grazing, settlement etc. ■ Visual Change aesthetically affecting locals.

Table 7.8 Criteria for Impact Magnitude for Assessment of Impact to Land Use

Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in land use characteristics. The change may be short term.
Small	Subtle changes in land use character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term to long term and is reversible.
Medium	A noticeable change in land use character, frequently perceived or continuous and over a wide area; or a clearly evident change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clearly evident, frequently perceived and continuous change in land use characteristics affecting an extensive area. The change may be long term and would not be reversible.

7.3.2.2 Source of Impact

- The solar power plant will be developed on 138.78 acres of low lying mono-crop agricultural land; additionally 1.0 acre of land for site access road and 0.3 acre of land for residential unit had been procured for the proposed project.
- For transmission line 10.67 acres (7.2 km long and 6 m width) right of use (ROU) has been taken.

7.3.2.3 Embedded/In-built Controls

- Construction activities will also be restricted within the land procured for the project.
- Existing roads will be used for access to the project site with the exception of a small connection (about 100 m) from the main access road to the plant site.

7.3.2.4 Significance of Impact

The study area consists largely of private agricultural land with surface water body and rivers. The land procured for the project site was low-lying agricultural land. The site and neighbouring agricultural land parcels reported water logging and poor drainage. Site was part of natural drainage of the area which is historically water logged for 4 – 6 months in a year. It was reported that only limited agricultural activity was carried out during post-monsoon season. There is no major dependency for grazing on the land procured for the project. Thus, receptor sensitivity is assessed as **medium** as per **Table 7.7.**

The establishment of the solar plant will convert low –lying mono single crop agricultural land (138.78 acres) to industrial use for long term (25 years). Further, the project will require new link road- about 1.0 acre (existing access road to project site) and residential unit (0.3 acres), which will cause permanent changes in land use. Thus, magnitude of the impact has been assessed to be **medium**.

The total land under ROU of 10.67 acres (7.2 km long and 6 m width). Out of 7.2 km transmission line, 3.5 km is the Government Land and remaining 3.7 km in private land. For use of ROU, SSPL has provided compensation for standing crop during construction of transmission line.

The overall impact significance will therefore be **moderate.**

Impact	Changes in Land use during construction and operation

Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Limited to project site and associated facilities				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered **moderate.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered **moderate**				

7.3.2.5 Additional Mitigation Measures

- Construction activities should be restricted to designated area.
- The land use in and around permanent project facilities should not be disturbed.

7.3.2.6 Residual Impact Significance

The residual impact significance will remain **moderate** as changes in land use will be for long term for majority of the project component (installation of PV modules, access roads, central monitoring station, switching yard).

7.3.3 Soil Quality & Sediment Quality

Criteria

For the assessment of soil and sediment quality, the sensitivity and magnitude criteria outlined in **Table 7.9** and **Table 7.10**, respectively have been used.

Table 7.9 Sensitivity assessment criteria for soil quality

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
Soil Quality related criteria as compaction, erosion and contamination	The extent to which the soil quality plays an ecosystem role in terms of supporting biodiversity. This includes its role as in supporting a lifecycle stage	The extent to which the soil quality provides a use (agricultural use, fishing) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation
Low	■ The soil quality does not support diverse habitat or populations and/or supports habitat or population of low quality. ■ Minor Visual Change.	■ The soil quality has little or no role in provisioning of services as agricultural uses for the local community. ■
Medium	■ The soil quality supports diverse habitat or population of flora and	■ The soil has local importance in terms of provisioning services as agricultural

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
	fauna and supports habitats commonly available in the Project AoI. ■ Visual Change but common feature in Project AoI.	services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality i.e. ready availability across the AoI.
High	■ The soil quality supports economically important or biologically unique species or provides essential habitat for such species. ■ Visual Change aesthetically affecting locals.	■ The soil is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional level for provisioning services. ■

Table 7.10 Criteria for impact magnitude for assessment of soil quality & landuse

Magnitude Criteria	Negligible	Small	medium	Large
Soil compaction and erosion	■ Qualitative-No perceptible or readily measurable change from baseline conditions ■ Scale-Localized area as Particular activity areas ■ Time-Short duration (few days) or one time as temporary	■ Perceptible change from baseline conditions but likely to easily revert back to earlier stage with mitigation ■ Scale- -Project site, activity areas and immediate vicinity not impacting any sensitive receptor ■ Sort term-Only during particular activities or phase of the project lifecycle as civil works or construction phase (few months)	■ Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and/or likely take time to revert back to earlier stage with mitigation ■ Scale- Project site, activity areas and immediate vicinity impacting sensitive receptor/s ■ Long term-Spread across several phases of the project lifecycle (few years) ■	■ Major (e.g. order of magnitude) change in comparison to baseline conditions and/or likely difficult or may not to revert back to earlier stage with mitigation ■ Scale- Regional or international; ■ Permanent change
Soil contamination	Well within Dutch standard[1]	Well within Dutch standard[2]	Exceeds Target Value but well within Interventional Value of Dutch Standard	Exceeds Interventional Value of Dutch Standard and needs intervention.

[1] Dutch Target and Intervention Values (Soil remediation Circular 2013), https://rwsenvironment.eu/subjects/soil/legislation-and/soil-remediation/
The assessment of potential impacts to soil and sediment has been considered as per the Dutch Standard as Bangladesh does not have any local standards for soil or sediment quality.
[2] Dutch Target and Intervention Values (Soil remediation Circular 2013), https://rwsenvironment.eu/subjects/soil/legislation-and/soil-remediation/

Sources of impact

Potential sources of impacts during different phases of project on soil and sediment quality include the following:

Construction Phase

- Transportation of construction material, equipment and personnel;
- Storage of construction materials including hazardous material;
- Civil work activities;
- Storage, handling and disposal of wastes generated from site clearance, site excavation and formation, civil works and activities of construction workers (general waste and sewage).

The proposed project will be constructed within the land procured by SSPL. The proposed site was developed by filling up of river sand/ earth to raise the site above highest recorded flood level. The entire land was low-lying agricultural land. The top has not stripped and stored for future use. The top soil already been affected.

The potential source of impact on soil quality could arise due to

- Spillage of fuel, lubricant and paints from storage site;
- Disposal of construction materials and MSW in non-designated areas.

Operational Phase

- Spillage of oil & lubricant from storage and handling site
- Improper storage and disposal of municipal solid waste and waste water from site office.

Decommissioning Phase

- Improper storage and disposal of decommissioning waste

Embedded control measures

The embedded control measures are as follows:

- Construction waste will be utilised for filling of site within the plant;
- Municipal solid waste generated from the construction site is being disposed in pits within the project site and same will be continued for remaining construction activities.
- Any bitumen waste will be stored separately in lined areas to be disposed-off to licensed contractors.

Receptors/ resource

The proposed project site and nearby area is also agricultural land. It is proposed that entire construction activity including laydown area will be within the procured land for proposed plant.

The analysis of soil sampling in the Project area indicates that the soils are mainly sandy (river silver sand used for filling activity). The land adjacent to the project site is fertile land, mostly single-cropped land. Heavy metal concentrations were also found well below the intervention values. Therefore, the sensitivity of soil resources was considered to be **low**.

Impact significance

Soil compaction

The Project site is filled up with river sand/ earth to raise the height of the entire site above the highest flood level recorded. Laydown area, fabrication yard and construction camp are also planned within the Project area and hence, soil compaction will be limited to these areas within the proposed project site.

Movement of heavy vehicles and heavy construction machinery will also cause soil compaction; however, the proposed project site located adjacent to the existing site approach road and same will be utilised for this plant. Soil compaction and possible damage to the soil structure due to heavy vehicular movement will only be limited to the laydown areas and Project site. Based on the impact magnitude assessment criteria as given in **Table 7.10** the impact significance was assessed as **negligible.**

Impact	Soil Compaction				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	National		
Impact Scale	Limited to Project Site, as well as areas identified for laydown and construction workers camp (within project site). Main access road already exist.				
Frequency	Primarily during Civil work				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Soil erosion

The project AOI is prone to soil erosion due to nature of soil (sandy & sandy loam) enhanced by heavy rains in the area. Average annual rainfall based on rainfall data recorded in Manikganj for is more than 2,376 mm. Of the annual rainfall, about 80% fall during five monsoon months (May to September) with June and July getting the maximum rains. As mentioned earlier, the project site is raised with fill materials. Soil erosion will typically be worse during the monsoon months during the initial site preparation and compaction works. Based on the impact magnitude assessment criteria as given in **Table 7.10** the impact significance was assessed as **minor.**

Impact	Soil Erosion				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project site and access road				
Frequency	Primarily during Civil work				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

	Significance of impact is considered **minor**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Negligible				

Soil and sediment contamination (spills and leaks)

Soil contamination during the construction phase may result from leaks and spills of oil, lubricants, fuel from heavy equipment or leakage from chemical/fuel storage. While the risk of accidental spillage of potentially hazardous substances is low, proper handling and disposal of contaminated materials will further reduce the risk if such event does take place. The following prevention and mitigation measures will be proposed in the Specification Manual for EPC Contractors:

- The Contractor will prepare unloading and loading protocols and train staff to prevent spills and leaks;
- The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels or chemicals;
- A site specific Emergency Response Plan will be prepared by the Contractor for soil clean-up and decontamination

Soil samples analysis indicates that the soil/fill material at the Project site is not contaminated. Spill control measures such as storage and handling of chemicals and fuels on impervious areas (such as concrete surfaces) will be implemented to minimize impacts in case of spills. Liquid effluents arising from construction activities will be treated to the standards specified in Schedule 9 and 10 of ECR, 1997 of the GOB; prior to discharge. Therefore, the likelihood of unplanned events (i.e. spills and leaks) leading to soil and sediment contamination is considered likely. Based on the impact magnitude assessment criteria as given in **Table 7.10** and impact significance has been considered as **minor.**

Impact	Soil contamination from spills and leaks				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project Site				
Frequency	Limited to construction Phase primarily during transportation, handling and storage of materials, waste and equipment installation				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Negligible				

Soil contamination from waste handling

Soil may become contaminated due to improper handling and storage of waste. The majority of the generated wastes will be non-hazardous. General construction waste will comprise of surplus or off-specification materials such as concrete, steel cuttings/filings, wooden planks, packaging paper or plastic, wood, plastic pipes, metals, etc. During the construction phase of the Project, solid waste generation will mainly be concrete waste and bitumen. It is estimated that approximately 100 – 150 m^3 of such waste will be produced. The inert wastes will be stored near the proposed project site and will be reused under floors or under road to increase the California Bearing Ratio (CBR)[1] value. Bitumen or any hazardous wastes will be disposed off to licensed contractors. Domestic wastes consisting of food waste, plastic, glass, aluminium cans and waste packages will also be generated by the construction workforce.

A small proportion of the waste generated during construction will be hazardous and may include:

- Used paint, engine oils, hydraulic fluids and waste fuel;
- Spent solvents from equipment cleaning activities; and
- Spent batteries or spent acid/alkali from the maintenance of machinery on site.

If improperly managed, hazardous waste may create impacts on land. With reference to similar projects, it is anticipated that the quantity of hazardous waste (mainly waste lubricant oil and waste paints/solvents) will be less than 100 litres per month. The construction contractor will handle, store and dispose of all waste in accordance with applicable GOB guidelines. Concrete waste of inert nature will be stored near the concrete batching plant and will be reused under floors or internal roads. Any bitumen waste will be stored separately in lined areas to be disposed-off to licensed contractors. There is a potential for direct, long-term negative impacts to soil quality from improper waste handling; however, with the implementation of the embedded control measures discussed above the impacts to soil quality as discussed in **Table 7.10** impact significance is assessed to be **negligible.**

Impact	Soil Contamination from Waste Handling				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project Site				
Frequency	Limited to construction Phase primarily during transportation, handling and storage of waste				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Mitigation Measures

Potential impacts to soil and sediment during the construction phase are attributed to soil compaction, erosion and soil contamination from spills and leaks and wastes.

The following measures will be implemented to mitigate potential soil compaction and erosion:

[1] The **California Bearing Ratio** (**CBR**) is a penetration test for evaluation of the mechanical strength of road subgrades and base courses.

- All areas of excavation shall be closed and compacted before the monsoon season to prevent soil erosion.
- Storm water shall be properly channelized to settling tanks for controlling soil erosion.
- Demarcating routes for movement of heavy vehicles;
- Building small bunds in areas with slope to prevent soil erosion.

The following measures will be implemented for the storage and handling of chemicals and to minimise impacts to soil/sediment:

- Fuel tanks and chemical storage areas will be sited on sealed areas and provided with locks to prevent unauthorized entry;
- Use of spill or drip trays to contain spills and leaks;
- Use of spill control kits to contain and clean small spills and leaks.
- The storage areas of oil, fuel and chemicals will be surrounded by bunds or other containment device to prevent spilled oil, fuel and chemicals from percolating into the ground or reaching the receiving waters;
- The Contractor will prepare unloading and loading protocols for the and train staff to prevent spills and leaks
- The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels or chemicals;
- A site specific Emergency Response Plan will be prepared by the Contractor for soil clean-up and decontamination; and
- The construction contractor will implement a training program to familiarise staff with emergency procedures and practices related to contamination events.

The measures in place to properly manage waste and thereby minimize any impacts to soil and sediment quality are:

- Design processes to prevent/minimise quantities of wastes generated and hazards associated with the waste generated;
- Training labourers for waste disposal in designated areas and use of sanitation facilities;
- Proper storage of the construction materials and wastes to minimise the potential damage or contamination of the materials; and
- Implementation of construction materials inventory management system to minimise over-supply of the construction materials, which may lead to disposal of the surplus materials at the end of the construction period.
- Segregation of hazardous and non-hazardous waste and provision of appropriate containers for the type of waste type (e.g. enclosed bins for putrescible materials to avoid attracting pests and vermin and to minimise odour nuisance);
- Storage of wastes in closed containers away from direct sunlight, wind and rain;
- Storage of waste systematically to allow inspection between containers to monitor leaks or spills;
- Ensuring that storage areas have impermeable floors and containment, of capacity to accommodate 110% of the volume of the largest waste container; and
- Disposal of waste by licensed contractors.

Residual impacts

With implementation of the precautionary and the mitigation measures mentioned for the storage and handling of chemicals and to avoid /minimise impacts to soil the residual impact would be **negligible**.

7.3.4 Physiography & Drainage

Criteria

For the purpose of assessment of impacts on topography and drainage of the area, sensitivity and magnitude criteria have been outlined in **Table 7.11** and **Table 7.12,** respectively.

Table 7.11 Sensitivity Assessment Criteria for Topography

Topography and Drainage Sensitivity	Criteria
Low	Flat topography
Medium	Undulating topography
High	Hilly area

Table 7.12 Criteria for Impact Magnitude for Assessment of Impacts on Topography & Drainage

Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in topographical characteristics. The change may be short term.
Small	A subtle change in topography character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term to long term and is reversible.
Medium	A noticeable change in topographic character, frequently perceived or continuous and over a wide area; or a clearly evident change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clearly evident, frequently perceived and continuous change in topographic characteristics affecting an extensive area. The change may be long term and would not be reversible.

Receptor Sensitivity

The project area exhibits mostly flat topography. Padma River passes close to the site (approximately 50 m) (refer **Section 5.2.2**). From discussion with local community it was understood that site (before site development) and the neighbouring agricultural land parcels reported water logging and poor drainage. Site was part of natural drainage of the area which is historically water logged for 4 – 6 months in a year. The receptor sensitivity has been assessed to be **medium**.

Impact Magnitude

The site was low laying area. The site was filled up with white river sand up to 2 to 2.5 m and a 100 m link road has been constructed. The side development work has altered the topography and potential to disturbed the natural drainage of the site. The impact magnitude has therefore been assessed as **medium.**

Source of Impact

The project site has been elevated to 2m to 2.5 m from its original level. The site linkage road (100m) has been constructed from existing site approach road to project site

Embedded/In-built Control

The EPC contractor will be instructed to avoid any unnecessary changes in the topography. Water bodies and micro drainage channel should be particularly avoided when constructing access roads or planning the transmission line pathway.

Significance of Impacts

The proposed project was low-lying area. The runoff the site and its adjacent agricultural land drains into Ichamati River through small drainage channel. The site and its surrounding agricultural field has been inundated for 5-6 months during monsoon period. High water level in Ichamati Rover is likely to cause backflow, inundation and waterlogging the site and surround area. The site filling activity may not disturb the natural drainage of the site but construction of site link road may disturb the drainage of south eastern side agricultural land. Significance of impact is assessed to be **moderate**.

Impact	Topography & drainage due to site development activity				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project Site and its surrounding area				
Frequency	Entire project life				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **moderate.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Minor				

Additional Mitigation Measures

- Disruption/alteration of micro-watershed drainage pattern should be minimized to the extent possible; and
- Appropriate number of cross drainage channels should be provided during access road construction to maintain flow in existing natural channels.

Residual Impact Significance

The residual impact significance will be reduced to **minor** after implementing above mentioned mitigation measures.

7.3.5 Ambient Air Quality

Criteria

The sensitivity criteria and impact magnitude criteria has been provided in **Table 7.13** and **Table 7.14** respectively.

Table 7.13 Sensitivity criteria for air quality

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	Ecological Receptors
Low	Locations where human exposure is transient	No
Medium	Few Receptors (settlements) within 500 m of the project site	Nationally designated sites.
High	Densely populated receptors(settlements) within 500 m of project site	Internationally designated sites.

Table 7.14 Criteria for Impact Magnitude for Assessment of Impact to Air Quality

Magnitude Criteria	Negligible	Small	Medium	Large
Air Quality	Soil type with large grain size (e.g. sand); and/or No emissions/dust generation due to Project across all phases	Soil type with large grain size (e.g. sand); and/or Limited emissions/dust generations for short duration	Moderately dusty soil type (e.g. silt); and/or Dust generation and emissions from Projects for long duration	Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); and Significant process emissions from Project for the entire Project cycle.

Receptor Sensitivity

The receptor sensitivity has been assessed as medium for human receptors and low for ecological receptors. The receptor sensitivity is therefore **medium** based on the criteria provided in **Table 7.13.**

Source of Impact

Construction Phase

Air quality impacts in the remaining construction phase activities will be largely due to the following sources:

- Fugitive dust emissions from piling work, handling of construction materials, emission due to movement of vehicles on site.
- Vehicular emissions due to increased traffic movement on site and on the approach roads;
- Exhaust emissions from construction machinery and other equipment such as pile drivers; and
- Emissions from diesel generators required to be run for construction power purposes.

Operational Phase

No major air quality impact is envisaged during the operation phase. Minor change in air quality could be resulted due to limited vehicular movement, and operation of back-up DG sets, as required.

Decommissioning Phase

Air quality impacts in the decommissioning phase will be largely due to the following sources:

- Fugitive dust emissions from demolition, handling of demolition materials and transportation of materials;
- Vehicular emissions due to increased traffic movement on site and on the approach roads;
- Exhaust emissions from demolition machinery and other equipment such as bulldozers, excavators etc.; and
- Emissions from diesel generators required to be run for demolition purposes

Embedded/In-built Controls

- Compaction of filled sand at site
- Dust suppression measures at site link road
- Vehicles, engines would be properly maintained.

Significance of Impact

Construction Phase

The fugitive dust related impacts will be minimal as the site development activity is almost completed proposed (filling activity and compaction). The pilling, civil construction activity and movement of vehicle and machinery in the site and handling of construction material would generate fugitive dust. The construction material will be stored in the covered storage area; generation of windblown dust is expected to be minimum.

The construction activity is only restricted during day time. The power requirement during construction phase is mainly for operation of machineries and power supply during night tome at labour camp. The source of power during construction phase is DG sets. The operation of DG sets will generate the PM, NO_2 and SO_2. The operation of diesel driven machineries, equipment and vehicles used for transport of construction materials and manpower will also generated pollutants like PM, NO_2 and SO_2.

The baseline air quality monitoring results shows that concentration of PM, SO_2 and NO_2 were well within the NAAQS indicating that the environment is not stressed (refer to **Section 5.2.8**). The generation of PM, SO_2 and NO_2 from the above mentioned activities are not expected to result in significant changes of baseline condition or exceedance of NAAQS. The duration of the remaining construction activity will be short term (5-6 months). The fugitive emissions are likely to be dispersed locally. The potential impact on air quality is assessed to be **minor.**

Decommission Phase

The major source of emissions in the decommissioning phase is the fugitive dust emissions from demolition activities. The demolition activities are likely to occur for a very small period of time (~3 months) and therefore the impact magnitude has been assessed as **small.** The impact significance for air quality in the decommissioning phase is assessed as **minor**. As discussed above, there will be some impacts due to plying of vehicles on the access roads which runs across settlement area. The impacts however, are not anticipated to be significant considering short duration of decommissioning phase of the project.

Impact	Ambient Air quality – Construction phase and Decommissioning Phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Additional Mitigation Measures

- Speed of vehicles on site should be limited to 10-15 km/hr.
- Prevent idling of vehicles and equipment.
- Dust suppression measures at active working area.
- Compaction of entire site to minimise windblown dust generation from site.

Residual Impact

The significance of residual impact will be **negligible** after implementing mitigation measures.

7.3.6 Ambient Noise Quality

Criteria

It is planned that the Project will meet the noise emission criteria specified in the GOB ECR, 1997 and the WB/IFC EHS Guidelines (refer to Table 3.7).

The above standards have been utilized to create a sensitivity criteria for ambient noise (**Table 7.15**) and criteria for impact magnitude for assessment of impact to ambient noise (**Table 7.16**).

Table 7.15 Sensitivity criteria for ambient noise

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	Ecological Receptors
Low	Industrial Use	Locally designated sites; and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team).
Medium	Residential and Recreational place	Nationally designated sites.
High	Educational/ Religious/ Medical Facilities	Internationally designated sites.

Table 7.16 Criteria for impact magnitude for assessment of impact to ambient noise

Magnitude Criteria	Negligible	Small	Medium	Large
Noise Quality	Predicted noise levels are at or less than 3 dB (A) above the relevant limits / thresholds. Short term exposure (Few hours in a day and not continuous)	Predicted noise levels are 3 to less than 5 dB (A) above the relevant limits / thresholds.	Predicted noise levels are between 5 and 10 dB (A) above the relevant limits / thresholds. Medium Term Exposure (1 to 6 months)	Predicted noise levels are more than 10 dB (A) above the relevant limits / thresholds. Long term exposure (> 6 months)

Receptors

Settlement of Tilochanpotti, Dorikandi and Teghuri settlements are most likely to be affected by increasing noise levels because of proximity to the project site access road. Also, settlement of Baruria, Lakshmipura and Nayakandi villages are likely to be impacted due to proximity to site. The receptor sensitivity is therefore considered as **medium**.

Source of Impact

The sources of noise in the construction phase include construction activities, operation of DG sets and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area.

Embedded/In-built control

Normal working hours of the contractor to be defined (preferable 8 am to 6 pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate significant noise.

Significance of Impact

The construction activities such as transportation of construction materials for civil works, machineries and equipment, operation of heavy equipment and construction machinery are likely to cause increase in the ambient noise levels.

The ambient noise level in and around the plant was well within the ambient noise standard. The noise generated from the above mentioned activities is likely to be attenuated within 500m from the construction site. This may cause discomfort the construction workers of site and nearby receptor – Tilochanpotti, Dorikandi and Teghuri villagers. The construction activity is a short term activity, i.e. 5-6 months. The potential impact on noise quality due to above mentioned construction activities is assessed to be **minor**.

Impact	Ambient Noise Levels – Construction				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large

Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **minor**.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Mitigation Measures

- Only well-maintained equipment should be operated on-site;
- If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible;
- Machinery and construction equipment that may be in intermittent use should be shut down or throttled down during non-work periods; and
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.

Residual Impacts

Significance of residual impact is assessed to be **negligible** considering above mentioned mitigation measures.

7.3.7 Water Resource & Quality

Criteria

For the assessment of water resources and quality, the sensitivity and magnitude criteria outlined in **Table 7.17** and **Table 7.18** have been used respectively.

Table 7.17: Sensitivity assessment criteria for water resources (surface water & ground water)

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
Water Resources - Surface water and ground water (quality/quantity related criteria)	The extent to which the water resource plays an ecosystem or amenity role in terms of supporting biodiversity either directly or indirectly, particularly with respect to dependent ecosystems.	The extent to which the water resource provides or could provide a use (drinking water, agricultural uses, washing and other domestic or industrial, use as waterways) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation.
Low	The water resource does not support diverse aquatic habitat or populations, or supports aquatic habitat or population that is of low quality.	The water resource has little or no role in terms of provisioning services as agricultural water source, other domestic uses as washing, bathing, industrial use and waterways for the local community.
		The groundwater resource is not currently abstracted and used in the vicinity of the Project, but is of sufficient quality and yield to

Sensitivity Criteria	Contributing Criteria	
	Environment	Social
		be used for that purpose in the future (and there is a reasonable potential for future use).
Medium	The water resource supports diverse populations of flora and / or fauna but available in the surface water bodies in the region.	The surface water resources have local importance in terms of provisioning services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality.
		The groundwater resource is an important water supply, and is currently used, but there is capacity and / or adequate opportunity for alternative sources of comparable quality.
High	The water resource supports economically important or biologically unique aquatic species or provides essential habitat for such species	The surface water resources are wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or transboundary watershed level for provisioning services
		The groundwater resource is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or national level for water supply or contribution to groundwater dependent ecosystems (e.g. transboundary rivers).

Table 7.18 Criteria for impact magnitude for assessment of impact to surface & ground water resources

Magnitude Criteria	Negligible	Small	Medium	Large
General Criteria	No perceptible or readily measurable change from baseline conditions.	Perceptible change from baseline conditions but likely to be within applicable norms and standards for mode of use.	Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and / or likely to approach and even occasionally exceed applicable norms and standards for mode of use.	Major changes in comparison to baseline conditions and / or likely to regularly or continually exceed applicable norms and standards for mode of use.
Water Quality	Discharges are expected to be well within statutory limits*	Discharges are expected to be within statutory limits*	Occasional breach(es) of statutory discharge limits (limited periods) expected*	Repeated breaches of statutory discharge limits (over extended periods) expected*
	Groundwater quality be well within ambient levels or allowable criteria** Abstractions from or discharge to	Groundwater quality be within ambient levels or allowable criteria** or may exceed for 1-2 parameters which is common occurrence	Groundwater quality exceeds ambient levels or allowable criteria** for key parameters.	Groundwater quality exceeds ambient levels or allowable criteria**. Abstractions or discharge to

Magnitude Criteria	Negligible	Small	Medium	Large
	aquifer(s) are unlikely to cause water quality issues.	due to geological regime of the area. Abstraction or discharge to aquifer(s) may cause small but local changes in water quality in the aquifer system. These can be considered potential short-term localized effects on groundwater quality which is likely to return to equilibrium conditions within a short (months) timeframe.	Abstraction or discharge to aquifer(s) are expected to cause potential localized effects on groundwater quality which are likely to be fairly long lasting and / or give rise to indirect ecological and / or socio-economic impacts.	aquifer(s) are expected to cause potentially severe effects on groundwater quality which are likely to be long-lasting (e.g. years or permanent) and / or give rise to indirect ecological and / or socio-economic impacts.
Water Quantity	There is likely to be negligible (less than 1% of lean season flow) or no consumption of surface water by the Project at any time	The Project will consume surface water, but the amounts abstracted are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)
	There is likely to be negligible or no abstraction, use of or discharge to the groundwater by the Project at any time.	The Project will consume groundwater or deliver discharge to groundwater, but the amounts abstracted / discharged are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).

*The quality assessment of potential impacts to surface water has considered according to Schedule 9 of ECR, 1997 of the GOB and the World Bank/IFC General EHS Guidelines.
**The quality of groundwater was compared with Schedule 3 (B) (Standards for drinking water) of ECR 1997 of the GOB.

Sources of impact

Construction Phase

The potential sources of impact to surface and ground water resources are:

- Filling and earth work at the Project site may increase the erosion, especially during rainfall, which may increase the suspended sediment concentrations and pollute water sources;
- Sewage generated from the construction workforce (toilets).
- Liquid effluents will be generated from washing of construction equipment and vehicles;
- Inappropriate storage of waste leading to water quality impacts from runoff entering the adjoining channel to the Project site or seepage to ground water.

Operational Phase

The potential sources of impact to surface and ground water resources during the operational phase include:

- The discharge of effluent and sewage from the office and canteen area that may have an impact on land or the quality of surface water; and
- The abstraction of ground water for the washing of solar panel and drinking purposes for the employees of the project.

Embedded control measures:

The project embedded control measures are as follows:

- Storage of chemical, fuel in paved storage area.
- Septic tank and soak pit will be provided in construction site for treatment of domestic wastewater.

Receptors

The major surface water body adjacent to the Project site is Ichamati River and Padma River. The primary receiving surface water body is Ichamati River, whereas ground water is the main source of domestic usage and irrigation requirements. Based on the sensitivity assessment criteria described in **Table 7.17,** both surface and ground water resource was found to be **medium**.

Impact significance

Wastewater discharge

Wastewater will be generated from washing of equipment and machinery and pilling activity on site. This wastewater may contain suspended solids and traces of hydrocarbon. The contractor will be responsible for ensuring that any wastewater discharged meets the standards stipulated in Schedule 10 of ECR, 1997 and the applicable World Bank/ IFC General EHS Guidelines prior to discharge of such wastewater. Sanitary facilities including toilets will be provided for the use of the construction workforce both on-site and at the workers' accommodation. Such sewage streams are likely to be high in organic matter, suspended solids, coliform and other pollutants. Single pit latrine facility has been provided at site and similar facility will be provided for civil construction phase. Potential impacts are expected to be short-term and localised in nature. Based on the above discussion and referring to the magnitude criteria in **Table 7.18**, the impact to surface water from wastewater discharges during construction is assessed to be **minor.**

Impact	Wastewater discharge		
Impact Nature	Negative	Positive	Neutral

Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to discharge outside the project boundary on canal				
Frequency	Limited to construction Phase –washing of machinery, equipment, use of sanitation facilities, cleaning of pipelines				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Groundwater contamination

Groundwater contamination during the construction phase may occur from unplanned events such as leaks and spills of oil, lubricants, fuel from heavy equipment, improper handling of sewage or chemical/fuel storage. The fill materials used for site development was river sand. The soil type of the adjacent land is mainly sandy loam to silty clay. This type of soil does allow percolation into the subsoil and subsequently the ground water. The spillage of chemical and fuel may easily contaminate the subsoil, however, may take longer time to reach up to the ground water aquifer. Considering the nature of soil, and single pit toilet facility is potential to contaminate the ground water. While there is a potential for long-term direct impacts to groundwater quality from construction, with the implementation of mitigation measures for proper handling of chemicals, waste and liquid effluents, impact to ground water would be limited. Based on the above discussion and referring to the magnitude criteria in **Table 7.18**, the impact to groundwater from spills and leaks is assessed to be **minor**.

Impact	Ground water contamination				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project site, ancillary areas				
Frequency	Limited to construction Phase and unplanned events as leaks, spills, sewage discharge				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major

Residual Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **negligible.**			

Additional mitigation measures

The following measures will be implemented to reduce impacts to surface water and groundwater:

- Oil leakage or spillage will be contained and cleaned up immediately. Waste oil will be collected and stored for recycling or disposal;
- Oil and grease separator shall be used for wastewater generated from cleaning activities;
- Any surplus wastewater from the concrete batching will be treated to comply with discharge standards before it is discharged to the canal;
- For treatment of sewage septic tank with soak pit or mobile ETP should be provided to treat the waste water from the construction site

Residual Impacts

Criterion	Rating pre mitigation	Rating post mitigation	Comment
Wastewater discharge			
Residual Impact	Minor	Negligible	With implementation of the precautionary and the mitigation measures mentioned for prevention of surface water contamination the residual impacts would be negligible.
Groundwater contamination			
Residual Impact	Minor	Negligible	With implementation of the precautionary and the mitigation measures mentioned for prevention of groundwater contamination the residual impacts would be negligible.

7.3.8 Road & Traffic

Source of Impact:

The source of impact is additional traffic load due to proposed construction activities vehicles for transport of solar panels, transformer and other machineries, equipment.

Assessment of Impact:

From the proposed project approximately, additional 10-15 trucks/trailers per day carrying construction material and plant and machineries will be using the Dhaka-Paturia highway and site access road.

Based on the traffic survey conducted (Refer **Section 5.2.10.2**), it is noted that Nali- Nayakandi Road is the main road for transportation of construction material and plant and machineries. The average peak hourly traffic on this route was 6.3 number of vehicles per hour and maximum traffic load was 17 vehicles per hour. The site access road has the carrying capacity of 35 tons vehicles. The road has two sharp turns. There are two schools, two Masjids and one market is located besides the road. Movement of heavy vehicles along the road has a potential to cause accidents or hazards

The increase of traffic during construction phase may not cause perceptible changes in the existing road traffic in site approach road. The increase of traffic load in the site access road may not cause major changes the traffic load. However, operation of heavy vehicles during school hours or market time may cause community health and safety issues. Use of vehicles more than 35 ton capacity may damage the

road and culvert. The potential impact on road and traffic due to operational traffic is assessed to be **moderate**.

Impact	Road and traffic impact due to construction activity			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **Moderate**			
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major
	Negligible			

Mitigation Measures

Precautions as mentioned will be taken for transportation of raw material and finished products:

- SSPL will prepare a traffic management plan,
- Traffic marshal will be deployed at important traffic junction and sensitive location,
- SSPL should avoid heavy vehicle traffic movement during school and market hours; preferably they can plan heavy vehicular traffic movement during night time
- No overloading is done will be ensured.

Residual impact

Considering the implementation of above mentioned mitigation measures, the residual impact disturbance/ discomfort to local people due to increase of traffic is assessed to be **minor.**

7.3.9 Biological Environment

ERM's Impact Assessment Standards defines sensitivity of ecological receptors by determining the significance of effects on species and habitats separately. The impact assessments were undertaken based on following impact assessment matrix as presented in Table 7.19 and Table 7.20 respectively

Table 7.19 Habitat-impact assessment criteria

Habitat Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Negligible	Habitats with negligible interest for biodiversity.	Not significant	Not significant	Not significant	Not significant
Low	Habitats with no, or only a local designation / recognition, habitats of significance for species listed as of Least Concern (LC) on IUCN Red List of Threatened Species, habitats which are common and widespread within the region, or with low conservation interest based on expert opinion.	Not significant	Not significant	Minor	Moderate
Medium	Habitats within nationally designated or recognised areas, habitats of significant importance to globally Vulnerable (VU) Near Threatened (NT), or Data Deficient (DD) species, habitats of significant importance for nationally restricted range species, habitats supporting nationally significant concentrations of migratory species and / or congregatory species, and low value habitats used by species of medium value.	Not significant	Minor	Moderate	Major
High	Habitats within internationally designated or recognised areas; habitats of significant importance to globally Critically Endangered (CR) or Endangered (EN) species, habitats of significant importance to endemic and/or globally restricted-range species, habitats supporting globally significant concentrations of migratory species and / or congregatory species, highly threatened and/or unique ecosystems, areas associated with key evolutionary species, and low or medium value habitats used by high value species.	Not significant	Moderate	Major	Critical
Negligible	Effect is within the normal range of natural variation				
Small	Affects only a small area of habitat, such that there is no loss of viability / function of the habitat				
Medium	Affects part of the habitat, but does not threaten the long-term viability / function of the habitat.				
Large	Affects the entire habitat, or a significant proportion of it, and the long-term viability / function of the habitat is threatened.				

Table 7.20 Species-impact assessment criteria

Baseline Species Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Negligible	Species with no specific value or importance attached to them.	Not significant	Not significant	Not significant	Not significant
Low	Species and sub-species of LC on the IUCN Red List, or not meeting criteria for medium or high value.	Not significant	Not significant	Minor	Moderate
Medium	Species on IUCN Red List as VU, NT, or DD, species protected under national legislation, nationally restricted range species, nationally important numbers of migratory, or congregatory species, species not meeting criteria for high value, and species vital to the survival of a medium value species.	Not significant	Minor	Moderate	Major
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (i.e. plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km2), internationally important numbers of migratory, or congregatory species, key evolutionary species, and species vital to the survival of a high value species.	Not significant	Moderate	Major	Critical
Negligible	Effect is within the normal range of variation for the population of the species.				
Small	Effect does not cause a substantial change in the population of the species, or other species dependent on it.				
Medium	Effect causes a substantial change in abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability / function of that population, or any population dependent on it.				
Large	Affects entire population, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).				

7.3.9.1 Impact on Terrestrial habitat

Source of impact

The proposed project site has no trees and site is already developed. The potential impact on terrestrial ecology may arise due to:

- Fugitive dust emission and deposition on plants;
- Noise & vibration.

Embedded control measures:

The control measures are as follows:

- Water sprinkling for dust suppression;
- Engineering control measures to minimise the noise level from construction machineries and equipment.

Impact assessment:

Fugitive emission:

The fugitive emissions are likely to be generated during construction phases. Due to relatively large particulate matter sizes associated with the fugitive emission from construction site and the relatively short release height of the pollutants, such negative impacts are usually confined in relatively small areas; estimated to be 100 to 200 m from construction activity site/s. The deposited particulate matter may block the plant leaf stomata hence inhibit gas exchange, or smother the plant leaf surfaces reducing photosynthesis levels. Within the 200 m from the proposed project site, there is plantation on the road site and canal side, which was carried out by the forest department. The scale of impact can be considered as **small**. Duration of impact will be short term. The impact on the terrestrial flora is assessed to be **minor**.

Noise & vibration:

The operation of construction machineries and vehicles will generate noise and vibration. The increased level of noise and vibration in and around proposed project site may cause disturbance to local faunal species. However, it is expected that the noise will be attenuated within the 500 m from the construction site. There is no significant faunal habitat within the 500 m from the proposed site. The potential impact on fauna including protected bird species is assessed to be **minor**.

Impact	Impact on Terrestrial Habitat due to construction activities			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **Minor**			

Mitigation measures

- Strict instruction should be given to the construction workers not to cut trees from the nearby areas for their fuel and timber use;
- Use of LPG/ Kerosene for cooking need to be provided/ encouraged in order to reduce the impacts on vegetation from the vicinity of the Project site.

Residual impacts

Criterion	Rating pre mitigation	Rating post mitigation	Comment
Impact on Terrestrial Habitat due to construction activities			
Residual Impact	Minor	Negligible to Minor	With implementation of the precautionary and the mitigation measures mentioned for prevention/reduction in noise generation at source impacts would be negligible to minor.

7.3.9.2 Impact on Aquatic Ecology

Source of Impact

The Padma and Ichamati River is an important habitat for fishes and other aquatic fauna. Therefore, impact on river water quality due to proposed construction activity may have direct and indirect impact on aquatic habitat including fishes. The river water quality may impact, due to an increase of sediment loads, pollutants like oil & grease, etc.

Impact Assessment:

Sedimentation: The sedimentation is likely to occur due to surface runoff from the construction site. The site has been developed with white river sand; again pilling activity is also required for setting up the solar panel. The surface runoff drainage system has not been constructed for the site. The surface runoff from the construction site may have adverse impact on receiving water body. The overall slope of the site and drainage pattern of the site reveals that, Ichamati River is the receiving water body.

Oil & Grease Contamination: During construction activities, construction machineries and vehicle will be utilised. For the operation of construction machineries and vehicle, oil (diesel) and lubricant will be utilised; accidental spillage and leakage of oil and lubricant is likely to get mixed up with runoff water. The discharge of oil and grease contaminated runoff water without treatment has likely impact on water quality of the receiving water body.

Organic Load: During construction activity, approximately 150-200 workforce (peak construction period) will be engaged. It is estimated that, 12 to 16 KLD wastewater will be generated from the construction site. It is proposed to treat the waste water through single chamber soak pit.

Discharge of surface runoff with high sediment load, spilled oil & lubricant and domestic wastewater at Ichamati River have the potential to affect the water quality of the river by increase in turbidity, organic content, etc. The increase of pollution (sediment, oil & grease, organic pollutant) has a direct impact on the physical and biological characteristics of the river basin. It may not cause significant increment in pollution load to the receiving water body and subsequently may not cause significant impact the local aquatic ecology. The potential impact on aquatic habitat including fishes due to above mentioned activity is assessed to be **minor**.

Impact	Impact on Aquatic Habitat due to construction activities		
Impact Nature	Negative	Positive	Neutral
Impact Type	Direct	Indirect	Induced
Impact Duration	Short Term	Medium Term	Long Term

Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **Minor**			

Mitigation Measures

- Construct drainage system with sedimentation tank with oil-water separator to treat the surface runoff from site;
- Oil leakage or spillage will be contained and cleaned up immediately. Waste oil will be collected and stored for recycling or disposal;
- Oil and grease separator shall be used for wastewater generated from cleaning activities;
- Any surplus wastewater from the concrete batching will be treated to comply with discharge standards before it is discharged to the canal.
- For treatment of sewage septic tank with soak pit or mobile toilets should be provided to treat the waste water from the construction site.

Residual impacts

Criterion	Rating pre mitigation	Rating post mitigation	Comment
Impact on Aquatic Habitat due to construction activities			
Residual Impact	Minor	Negligible to Minor	With implementation of the precautionary and the mitigation measures mentioned for prevention/ surface water pollution impacts would be negligible to minor.

7.3.10 Socio-economic Environment

The assessment of socio-economic impacts has been undertaken with respect to the receptors across natural capital, human capital, social capital, economic capital and physical capital to have a significant interaction with the activities linked to the project across its lifecycle.

These impacts have been identified through consultation with the project proponent, project affected persons (including land owners and land users), with government officials (Upazila level), Union Parishad level in the area/region and focus group discussions (FGDs) with community people.

For the assessment of social impacts, the sensitivity and magnitude criteria outlined in **Table 7.2** and **Table 7.4** respectively have been used. The social impacts associated with the pre-construction, construction, operations stages have been assessed qualitatively and in some cases quantitatively (subject to availability of data), using professional judgment based on past experience from similar projects.

7.3.10.1 Loss of Land

The project requires 140.740 acres (56.68 ha.) of land for the plant site and associated facilities. (138.78 acre for solar park, 1.0 acre for site approach road and 0.3 acre for residential unit). SSPL has procured land on the left bank of the mighty river Padma. Land development i.e. land filling has been completed

and levelling of soil and construction of boundary wall at plant site is going on. Land required for the project is directly purchased by the Spectra Solar Power (developer) from 161 land owners.

SSPL has indicated that Land has been purchased through willing seller - willing buyer approach. It was reported by the land owners, Upazila Chairman and the project proponent that the Land procurement was done based on negotiated settlement with the land owners, but the land rate considered was not less than prevailing government mouza rate. The site is located at a low lying area of river Padma. The land area of the project site remains inundated for almost six months every year. The surface of the land is hugely sandy and suitable for seasonal bean crops. However, it is to be noted that some of the affected land owners reported that most of the plots selected for the solar park were low lying sandy nature which had lower per decimal rates. The company purchased equal quantity of double cropped land at their convenience and exchanged the land with them.

In addition, 3.7 km of the transmission line is passing through private land. Transmission lines RoW compensations are given to 48 land owners for crop damages and devaluation of land due to restriction on land use. Compensation of BDT 25,000 paid to all the 48 land owners whose land parcel comes under the 6 meter (20 ft) RoW of the 7.2 km transmission line. Excluding this compensation paid for non-agricultural land BDT 40,000 per pole for erecting and for agricultural land BDT 25,000 per pole for erecting. These affected land owners have received one-time compensation.

Impact	Loss of Land				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	140.740 acres of land was required for the solar project that have been directly purchased by the Spectra Solar Power (developer) from 161 land owners at market price and for transmission lines RoW compensations are given to 48 land owners for crop damages and devaluation of land due to restriction on land use.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered minor as there is titled land availability in the vicinity.				

7.3.10.2 Reduction in Family Income

The land purchased for the solar power plant were low-lying, however, cultivation was done during the dry season that is in winter. Purchase of the land parcels has reduced their family income to some extent. Primary data revealed that 39.13 percent of the PAPs are directly involved with agricultural activities as their primary occupation. 10.41% of the PAPs are involved in number of occupation which involves agriculture allied activities, dairy, household industry, business trader, unskilled daily labour, service etc.). It is to be noted that this percentage of population also includes the Bargadars or share croppers. Although, the land procurement process has compensated the Bargadars for their losses, but with reduced land area their income has been affected. They had to move to adjacent locations or sometimes little far off from their place of habitation, to take land on lease and rent to do share cropping. The land owners who are into agriculture have been affected due to reduced income, however many of them have purchased plots (22.2 percent as per Socio Economic Survey) with the portion of the compensation amount.

The land owners will face temporary loss of income during the construction of the transmission lines for erecting transmission poles and the stringing of the transmission lines and subsequently due to operation and maintenance (O&M) of the TLs. The temporary access roads for carrying construction materials for

construction of TL can impact the environment through vegetation clearance and compaction of land, thus causing temporary disruption in land use by the land owner (temporary loss of land and temporary loss of income). Therefore, the impact on temporary loss of income caused due to construction of the TLs is addressed, however the restrictions on landuse causes devaluation.

Impact	Reduction in Family Income			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	There are approximately 161 land owners impacted by the 140.740 acres of land. Transmission lines RoW compensations are given to 48 land owners for crop damages and devaluation of land due to restriction on land use.			
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **moderate**. Some landowners have purchased land with the compensation amount and some have received land for land, where they can continue to do cultivation. The land parcels received in exchange of the earlier one is reported to be double cropped. Also it was reported that with the solar park coming up, the local economy will develop, as people may opt alternate means of livelihood.			

7.3.10.3 Local Economic Benefits

Employment Generation: Employment generation will be a significant contribution of the project, especially considering that the employment scenario in project area during the construction phase. The project is expected to employ at least about 200 un-skilled and semi-skilled labours during the construction phase. The Company has a policy to provide employment preference to the affected landowners. Based on the consultation with Spectra and affected land owners, it is revealed that some of them i.e. approximately 5% from affected landowners got job at the Project site. Most of them are engaged into non-technical jobs like security, cleaning or office assistant. Furthermore, it was reported that eligible, capable and qualified person or landowners will get preference in employment in the project in both construction and operational phase. The potential impacts due to the employment generation are considered to be positive.

Benefits of Local Enterprise: The construction phase influx is likely to provide a boost to the local economy. Influx and in-migration and the flurry of construction work is likely to raise wage levels and may also result into localized inflation of the prices for basic goods during a temporary period where demand of consumables may exceed supply. This also includes agricultural produce, demand for meat and poultry as well as fish. Thus large farmers will have a ready market to supply their produce.

Increments in cost of living: The presence of a salaried working class population will bring in greater cash income in project area. Hence, the spending capability of this population will be higher than the local population which depends on agriculture or household based small scale industries. The spending capacity, in turn will increase local consumption thereby increasing demand for a range of commodities in daily life. This often results in price rises for these regularly consumed items. Hence, the cost of living in the project area may experience an incremental rise.

Opportunity for local transporters: The project operation will require a number of transportation services including regular requirement for commuting short term visitors and industrial provisioning of a range of materials. Hence, this would create business opportunity for local transporters.

Impact Significance: Overall the local economic impacts are likely to be positive.

7.3.10.4 Occupational Health & safety

Source of Impact:

Occupational health and safety impacts during construction phase are anticipated primarily from operation of construction machineries/ equipment during site preparation and operation of labour camps for housing of onsite workers.

Embedded Control Measures:

The project embedded control measures are as follows:

- Provision of drinking water facility, sanitation and cooking facilities;
- Provision of proper PPEs for the contractor workers onsite

Assessment of Impact:

During construction phase impact on occupational health and safety of contractor workers is anticipated from exposure to high noise generated from operation of heavy machineries /equipment and fugitive dust generated from material stockpiles, earth works and vehicular emission. It is estimated that about 150-200 workers will be deployed by the contractor. Continuous exposure of workers to high noise levels and fugitive dust may lead to adverse health impacts viz. headache, asthma, allergy, hearing loss etc. However, considering the temporary nature of the construction phase activities, intermittent operation of machineries/equipment and provision of proper PPEs for the workers, it may not cause any significant impact.

The outstation project workforce will be housed in labour camp located in the site. It is proposed to provide the adequate facilities in the labour camp like housing facility with proper ventilation, electricity, separate kitchen, solid waste collection facility, drinking water facility, sanitation facility, etc. Inadequate facilities and unhygienic condition may have impact on occupational health of the labourers.

The impact on occupation health and safety due to above mentioned construction activities is assessed to be **minor**.

Impact	Impact on occupational health & safety due to construction activities			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **minor**			

Mitigation Measures:

The mitigation measures are as follows:

- Adequate provision of healthy living conditions will be ensured in the contractor labour camp;
- Exposure of workers operating near high noise generating sources will be reduced to the extent possible;

- Use of adequate personal protection equipment (PPEs);
- Health surveillance of contractor workforce will be conducted
- Occupational health and safety of contractor workforce will be assured through the formulation of an "Occupational Health & Safety Management Plan".

Residual Impact:

Considering the implementation of above mentioned mitigation measures, impact on occupational health and safety is assessed to be **negligible.**

7.3.11 Community Health & Safety

Source of Impact:

The community health and safety may arise due to changes in environmental quality, increased prevalence of disease and increase in traffic movement.

Embedded Controls:

The following control measures have been proposed:

- Proper collection, storage and disposal of MSW;
- Movement of heavy vehicles on approach road only during night time.

Assessment of Impact:

Dust and Noise Discomfort: Inhabitants residing close to access roads will be affected due to noise and dust generated from vehicular movement during construction phase. However, the access road is a paved road and the dust generation will be minimum.

Transmission of infectious diseases: Approximate 150-200 workers will be employed in the construction phase. Improper sanitation facility and disposal of municipal soil waste from the construction labour camp can cause vector borne diseases and other infectious diseases.

Traffic movement in site approach road: The construction activities are expected to increase traffic load in the site approach road which may create public safety issues for local residents and school children of nearby primary school. Potential impacts include pedestrian safety issues and safety aspects of slow moving vehicles. Considering project embedded control measures, the impact on community health & safety is assessed to be **moderate**.

Impact	Impact on community health & safety due to construction activities			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Short Term	Medium Term	Long Term	
Impact Extent	Local	Regional	National	
Impact Scale	Low	Medium	High	
Impact Magnitude	Positive	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **moderate**			

Mitigation measures:

The possible mitigation measures to address the aforesaid impacts include:

- Dust control measures will be taken along site approach road;
- Domestic waste generated from construction site will be disposed in the solid waste dumping site;
- Spread/transmission of communicable diseases from influx of contractor workforce will be mitigated;

Residual Impact:

Considering the implementation of above mentioned mitigation measures, impact on community health and safety is assessed to be **minor.**

8. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

This section presents the Environmental and Social Management Plan (ESMP) for the Project. The purpose of this ESMP is to specify the standards and controls required to manage and monitor environmental and social impacts during construction and operation phase. To achieve this, the ESMP identifies potential adverse impacts from the planned activities and outlines mitigation measures required to reduce the likely negative effects on the physical, natural and social environment.

8.1 SSPL's Organizational Structure

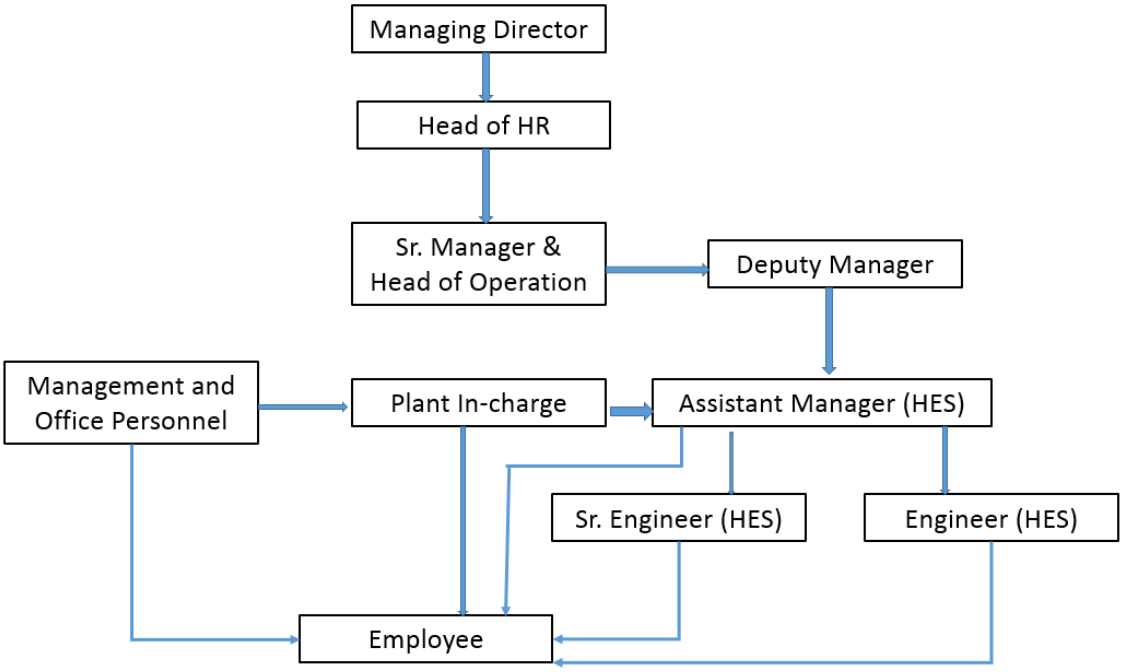
To ensure the efficacy of Environmental and social management plan, certain institutional mechanism with well-defined roles and responsibilities is essential for effective implementation of identified mitigation measures both during construction and operation phases.

8.1.1 SS*PL's Management*

SSPL will have ultimate responsibility for implementing the provisions of the ESMP during construction and operation phase of the project. This role will include the on-going management of environmental and social impacts, monitoring of contractor performance as well as development of mechanisms for dealing with environmental and social problems.

SSPL will also ensure that the activities of its contractors are conducted in accordance with good practice measures, implementation of which will be required through contractual documentation. Organization structure of SSPL is presented in **Figure 8.1**.

Figure 8.1 SSPL's Organization Structure



Source: SSPL

8.2 EPC Contractor – Akcome Industrial Group Co., Ltd

SSPL Infra has appointed Akcome Industrial Group Co., Ltd as EPC contractor for the project for construction phase.

8.2.1 EPC Contractor Management

The EPC contractor, i.e. Akcome Industrial Group Co., Ltd will have a dedicated HSE department for the projects. The HSE department take the overall responsibility for co-ordination of the actions required for environment and social management and mitigation and for monitoring the progress of the proposed ESMP for the project. However, ultimate responsibility for implementing the provisions of the ESMP will lie with SSPL.

8.2.2 Environment, Health and Safety Department (HSE) of EPC Contractor

In general, the HSE department shall perform the following activities:

- Preparation of required documents on environmental and social management;
- Ensuring availability of resources and appropriate institutional arrangements for implementation of ESMP;
- Implementation of the health and safety measures;
- Collection of the statistics of health of workers;
- Providing support during routine medical check-ups of workers;
- Awareness and implementing safety programmes;
- Providing job specific induction training;
- Compliance of regulatory requirements;
- Carrying out environmental audits;
- Identify unsafe acts & conditions and suggest remedies;
- Develop safety culture and comply with company's HSE policy & standards requirements;
- Encourage and enforce the use of PPE's;
- Educate all employees for the use of PPE's & safe practices;
- Direct, coordinate and orient the safety activities;
- Promulgate the spread of policy, objectives, rules and/or regulations;
- Perform a thorough investigation of all accidents and review the recommendations to avoid any repetition;
- Monitoring the progress of implementation of ESMP; and
- Reviewing and updating the ESMP as and when required for its effective implementation.

8.3 Inspection, Monitoring and Audit

Inspection and monitoring of the environmental impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, SSPL will ensure that the conditions stipulated in various permits are complied. The inspection and audits will be done by the project identified HSE staff in coordination with O & M contractors and any other external agencies identified. The entire process of inspections and audits should being documented. The inspection and audit findings are to be implemented by the site In-charge in their respective areas.

8.4 Reporting and Documentation

SSPL will develop and implement a programme of reporting through all stages of the project cycle. Delegated personnel shall require to fully complying with the reporting programme in terms of both timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental

check list, incident record register, environmental and social performance reports (weekly, monthly, quarterly, half yearly, yearly etc.).

8.4.1 Documentation

Documentation is an important step in implementing ESMP. SSPL will establish a documentation and record keeping system to ensure recording and updating of documents per the requirements specified in ESMP. The documents should be kept as hardcopies as well as in electronic format. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Master Environment Management System document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;
- Auditing reports; and
- Complaints register and issues attended/closed.

8.4.2 Internal Reporting and Communication

Inspection and audits finding along with their improvement program are to be regularly reported to the senior management for their consideration. The same are also to be communicated within the staff working on the project.

To maintain an open communication between the staff and management on HSE and social issues the followings are being used:

- Team Briefings,
- On-site work group meetings;
- Work Specific Instructions; and
- Meeting with stakeholders. Journey

8.4.3 External Reporting and Communication

HSE In-charge is the responsible person for ensuring that communication with regulatory agencies and stakeholders are maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records be maintained in a Complaint/Enquiry Register by the delegated staff of HSE. All communications made to regulatory agencies should also be reported to SSPL corporate HSE Head.

8.4.4 ESMP Review and Amendments

The ESMP act as an environment and social management tool which needs to be reviewed periodically to address changes in the organisation, process or regulatory requirements.

Following a review, HSE In-charge will be responsible for making the amendments in the ESMP and seeking approval from the senior management. The amended ESMP will be communicated to all the staff.

8.5 Training Programme and Capacity Building

Training is needed for effective implementation of ESMP. HSE Officer of EPC contractor, HSE In-charge of SSPL as well as SSPL Corporate HSE Head will ensure that Environmental health and safety induction training and job specific trainings are identified and given to the concerned personnel for construction activities and during operations of the solar farm.

Also general environmental awareness will be increased among the projects' teams to encourage the implementation of environmentally sound practices and compliance requirements of the project activities. This will help in minimising adverse environmental impacts, compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment will be imparted to the contractors and sub-contractors involved in the project.

8.6 Environmental and Social Management Plan

This section outlines the potential adverse impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the Projects.

The purpose of ESMP is to:

- Provide an institutional mechanism with well-defined roles and responsibilities for ensuring that measures identified in ESIA designed to mitigate potentially adverse impacts, are implemented;
- List all suggested mitigation measures and control technologies, safeguards identified through the ESIA process;
- Provide Project monitoring program for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and risk control systems in place; and
- Assist in ensuring compliance with all relevant legislations at local, state and national level for the Projects.

In order to minimize adverse impacts during different phases of project lifecycles, mitigation measures, monitoring plan and responsibilities for its implementation are given in **Table 8.1**

The responsibility for implementation of ESMP will primarily lies with EPC Contractor & O&M contractor HSE Department and HSE In-charge of SSPL will majorly plays a role of supervisor to oversee the project performance pertaining to environment, health, safety and social issues.

Table 8.1 Environmental and Social Management and Monitoring Plan

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
Land use									
• Construction of site link road • Construction of solar plant and associate facility • Construction residential unit	Permanent changes in land use	Construction	■ The land use in and around permanent project facilities should not be disturbed. ■ Construction activities should be restricted to designated area.	SSPL	Site inspection	Monthly monitoring	Site HSE Officer of EPC Contractor	HSE In-charge of SSPL	Report from HSE officer EPC Contractor to site HSE In-charge of SSPL
Topography and Drainage									
• Construction of site link roads; • Site development	Changes in Topography and Drainage	Construction	■ Disruption/alteration of micro-watershed drainage pattern should be minimized to the extent possible; and ■ Appropriate cross structure should be provided at site link road to maintain flow in existing natural channels	SSPL	Site inspection	Monthly monitoring	Site HSE Officer of SSPL	HSE In-charge of SSPLL	Report site HSE officer of to HSE In-charge of SSPL
Soil									
• Piling and excavation work.	Soil erosion	Construction	■ Piling and excavation work will not be carried out during the monsoon season to minimize erosion and run-off.	EPC contractor	Site inspection	Monthly monitoring	Site HSE Officer of EPC contractor	HSE In-charge of SSPL	Report from HSE officer of EPC contractor to site HSE In-charge of SSPL
• Storage and transport of construction materials; • Storage of oil and lubricants onsite; • Storage of hazardous waste onsite; • Storage of waste (MSW and construction/demolition) onsite from project site; and Sewage generated from the site office.	Soil contamination	Construction, Operation, Decommissioning	■ No unauthorized dumping of used oil and other hazardous waste should be undertaken at site. ■ Construction and Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility ■ Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface and in a secondary containment system ■ In case of accidental/ unintended spillage on small area, the contaminated soil should be immediately collected and stored as hazardous waste. ■ Designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured ■ All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels	EPC contractor, O&M contractor	Site inspection	Monthly monitoring	Site HSE Officer of contractor, O&M contractor	HSE In-charge of SSPL	Report from HSE officer of contractor, O&M contractor to site HSE In-charge of SSPL
Air Quality									
• Fugitive emissions from site development work, material handling etc.; • Fugitive emission from traffic movement; • Exhaust emission from operation of machineries like pile drivers, vehicles; • Point source emission from diesel generator.	Fugitive and pint source emission	Construction, Operation, Decommissioning	■ Speed of vehicles should be limited to 10-15 km/hr ■ DG sets should be placed within enclosures and have an adequate stack height; ■ Prevent idling of vehicles and equipment ■ Vehicle engines need to be properly maintained and should have a valid pollution control certificate to ensure minimization in vehicular emissions	EPC contractor, O&M contractor	Site inspection Review of PUC documents of vehicles	Monthly monitoring	Site HSE Officer of contractor, O&M contractor	HSE In-charge of SSPL	Report from HSE officer of contractor, O&M contractor to site HSE In-charge of SSPL
Water Environment									

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
Water required for construction phase and operation phase of the project	Depletion of water resource	Construction, Operation	■ NOC for abstraction of ground water for operational phase under Bangladesh Pani Bidhimala 2018 will be taken from Union Parishad	SSPL	Permission letter	At the start of operation	Site HSE Officer of SSPL	HSE In-charge of SSPL	Report from site HSE to corporate HSE
			■ Maintain logbook for water consumption; and	EPC Team, O&M Team	Water consumption log book	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of O&M contractor to site HSE In-charge of SSPL
			■ Prepare and implement water conservation scheme e.g., rainwater harvesting	SSPL & O&M Team	Site inspection	Monthly monitoring	Site HSE of O&M Team	HSE In-charge of SSPL	Report from HSE officer of O&M contractor to site HSE In-charge of SSPL
• Storage of hazardous substances onsite; and • Storage of hazardous waste onsite.	Water Contamination	Construction, Operation, Decommissioning	■ Prevent & mitigate spill of fuel within the storage area	EPC Team, O&M Team	Site inspection	Regular monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to site HSE In-charge of SSPL
			■ Regularly monitored the surface and ground water quality	S&WPL Team, O&M Team	Monitoring Report	Six monthly monitoring	Site HSE Officer of S&WPL, site HSE In-charge of O&M Team	HSE In-charge of TSEPL	Report from HSE officer of S&WPL/O&M contractor to site HSE In-charge of TSEPL
Noise quality									
• Construction and demolition activities; • Operation of DG sets; and • Vehicular movement	Increase in noise level	Construction and Decommissioning	■ Normal working hours of the contractor to be defined (preferable 8 am to 6pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise;	SSPL Team, O&M Team	Site inspection	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to site HSE In-charge of TSEPL
			■ Only well-maintained equipment should be operated on-site.	EPC Team, O&M Team	Site inspection	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
Operational Health and Safety									
• Working at heights; • Working with live electrical components; and • operation of cranes and other mechanical lifting equipment	Injury, near-misses and fatalities for labour contracted on site.	Construction, Operation, Decommissioning	■ All workers (regular and contracted) should be provided with training on Health and Safety policies in place with appropriate refresher courses throughout the life cycle of the Project	EPC Team, O&M Team	Training report	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
			■ Obtain and check safety method statements from contractors	EPC Team, O&M Team	Site inspection	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			■ Permitting system should be implemented to ensure that cranes and lifting equipment is operated by trained and authorized persons only	EPC Team, O&M Team	Permitting document	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
			■ Appropriate safety harnesses and lowering/raising tools should be used for working at heights	EPC Team, O&M Team	Site inspection	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
			■ A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations	EPC Team, O&M Team	Site specific Emergency Management Plan	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
			■ A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations. The nearest hospital, ambulance, fire station and police station should be identified in the implemented emergency management plan.	EPC Team, O&M Team	Site inspection	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
Ecology									
• Construction of sites and access roads	Impact on local flora and fauna	Construction	■ Unnecessary disturbance of neighbouring vegetation due to off-road vehicular movement, fuel wood procurement and destruction of floral resources should be prohibited; ■ Strict prohibition should be maintained on use of fuel wood and shrubs from nearby areas as kitchen fuel. ■ Construction activities to be avoided during rainy season as far as possible; ■ No water source/flow to be obstructed as a result of construction activities ■ Hazardous materials should not be stored near natural drainage channels; ■ Good housekeeping should be followed for construction activities, waste packaging material should be properly disposed; ■ Speed limit of vehicles plying on these routes should be kept to 10-15 km/hr to avoid road kill of mammals and reptiles; ■ Proper sanitation facilities should be provided at site offices; ■ Anti-poaching, trapping and hunting policy among employees and contractors should be strictly enforced.	EPC Team, O&M Team	• Site Inspection; • Training records; • Visual Assessment by experts	Monthly monitoring	Site HSE Officer of EPC, site HSE In-charge of O&M Team	HSE In-charge of SSPL	Report from HSE officer of EPC/O&M contractor to HSE officer of SSPL
Community Health and Safety									
	Increased Prevalence of Disease	Construction Phase	■ For the access road: Identify community health hazards and safety risks especially during night time along the construction stretch. Formulate mitigation strategies and implement them effectively. Specific issues that will pose safety risks to local community could be restricted carriage way width; allowing heavy machineries/heavy load traffic through normal village roads, material loading/ unloading sites, boulder dumps etc.; night time visibility especially if	SSPL through EPC contactor.	• Site Inspection; • Training records; • Visual Assessment	Monthly	EHS- EPC	HSE In-charge of SSPL	Monthly Progress Report

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			material/ waste dumps are maintained along traffic allowed carriageway; hazardous road surface conditions that is dusty or wet or pot holed; poor SWD arrangements etc.; ■ The project will communicate about the technical aspects of the construction and operations along with their community safety and nuisance implications; ■ SSPL shall ensure that the EPC and Electrical Contractors are committed to health and safety of workers as well as the community and their property and will community the precautions that will be taken; ■ Exposure visits of community representatives to construction sites to increase awareness on community H&S aspects; ■ Review the construction phase accident and incident records at least every month; ■ Training of contractors and their labourers on precautions to be taken to minimize nuisance for the local community; ■ Movement of vehicles: The access road to the site location passes through some villages. Plying of vehicles carrying equipment to the site particularly during day time could lead to unsafe situation for the local community; ■ Other safety measure like provision for night time visibility at accident prone areas, repair hazardous road surface conditions etc. should devised based on consultation with community representatives.; ■ There should be control on movement of migrant workers in local community. Site authority should provide all the basic facilities to migrant workers at site only; ■ The project should communicate with community about the technical aspects of the construction and operations along with their community safety and nuisance implications; ■ SSPL shall ensure that the EPC and Electrical contractors are committed to health and safety of workers as well as the community and their property ; ■ Training of contractors and their labourers on precautions to be taken to minimize nuisance for the local community.					
Migrant Labour									
	• Influx of Workers – Construction Phase • Stress on local infrastructure and resources	Construction Phase	■ SSPL and their EPC/Electrical contractor to implement a “Code of Conduct” for the construction phase which will take into account (a) predominantly rural community in the vicinity; (b) health & safety aspects; (c) restrictions on activities – Dos and Don’ts; (d) briefing on the local area/immediate vicinity etc. (e) zero tolerance of illegal activities by construction personnel including: unlicensed prostitution; illegal sale or purchase of alcohol; sale, purchase or consumption of drugs; illegal gambling or fighting which will be shared with all contractors for induction of their employees/ supervisors/workers; ■ Social interactions between migrant labour and the host community will be closely monitored by the	EPC Team,	Site inspection	Monthly monitoring	Site HSE Officer of EPC,	HSE In-charge of SSPL	Report from HSE officer of EPC contractor to HSE officer of SSPL

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			project. The community will be consulted at regular intervals and any complaints or concerns with respect to labour should be addressed without delay; ■ The project will conduct routine medical check-ups, health and safety training and sensitization programmes to raise awareness about STDs, and HIV amongst the labourers. These trainings will also have sessions on maintaining behaviour standards while moving in the community, knowing and respecting prevalent socio- cultural systems of host community etc. ■ The project will, where possible, maximise procurement of goods and supplies catering to the site office from the local markets. This will ensure that the project catalyses the local economy. ■ Monitor contractors for compliance on labour laws as well as PS2. ■ Training of all supervisors, workers and labourers on community health & safety aspects, Code of Conduct and any other local regulations; ■ Linkage of Communication, Disclosure and Grievance Redressal Mechanism to also cover labourers so that any concerns on working conditions and/or contractor mal-practices can be managed; ■ The project will keep the local administration and police informed about the details of outside labourers as also a list should be provided to the Panchayat /block office; ■ All key contractors should have 'certificate of registration in place' for the engagement of migrant workers through sub-contractors.						

9. GRIEVANCE REDRESS MECHANISM

Spectra Solar Power Limited has established a grievance redressal mechanism to receive and address specific concerns on environmental & social issues. The grievance redressal mechanism (GRM) has been developed to record and resolve grievances of affected communities and employees. This GRM provide understandable and transparent process in culturally appropriate and readily accessible manner to all segments of the affected communities, and at no cost without retribution.

A Grievance register is maintained at project site. But the disclosure for GRM should be done with the community, employees and various stakeholders. The disclosure will be done through website and other potential opportunity of communication with display of relevant information at the entry gate of the site and other working areas at the site. It can also be done especially to the external stakeholder at the various stages of project screening and impact assessment studies at the project level and to be continued during the operations stage. GRM of Spectra Solar Power is attached as **Appendix Q**.

The mechanism will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Multiple means of using this mechanism, including face-to-face meetings, written complaints, telephone conversations should be available. Confidentiality and privacy for complainants should be honoured where this is seen as necessary or important.

SSPL shall set-up a grievance redress committee that will address any complaints during operational period of the project.

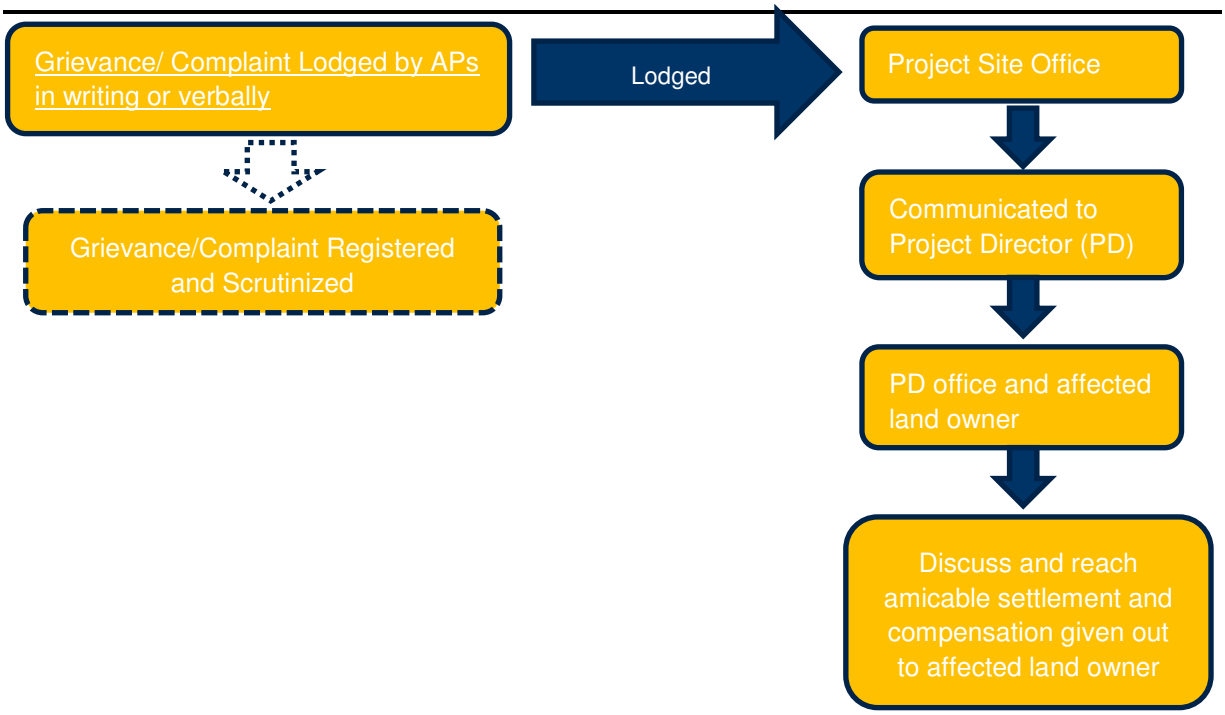
The representation in the committee makes project affected persons to have trust and build confidence in the system. The grievance redress committee reports its plan and activities to the Implementation committee. The following list presents members of the committee.

Table 9.1 Members of the Committee of Grievance Redress (GRC)

1. Union Parishad Chairman, Arua Union
2. Any key stakeholder from the community (a female member of the community, in case the aggrieved PAP is a female)
3. Project Director, SSPL
4. Site Construction Project Manager, SSPL

Grievance redress process is discussed in the flow chart below.

Figure 9.1 Flow Chart of GRM



GRC will maintain a complaints database, which will contain all the information on complaints or grievances received from the communities or other stakeholders. This would include: the type of complaint, location, time, actions to address these complaints, and final outcome.

The procedures to be followed and adopted by the grievance redress should be transparent and simple to understand or uniform process for registering complaints provide project affected persons with free access to the procedures. The response time between activating the procedure and reaching a resolution should be as short as possible. An effective monitoring system will inform project management about the frequency and nature of grievances. GRC will arrange half yearly meetings where the activities and the outcomes/measures taken according to the complaints database are to be monitored and reviewed by third party consultant to ensure the required transparency. In addition to the above, if there are any grievances related to social or environmental management issues in the project area, the GRC will record these grievances and suggestions and pass it on to the relevant consultant for necessary action and follow-up.

In case a dispute is not resolved by arbitrational tribunal, then if any of the party disagrees, the aggrieved party has the right to appeal to the ordinary courts of law.

A grievance form is presented below and hard copies of both English and Bangla will be made available at the SSPL site office.

Figure 9.2 Grievance Format

Name of the Village: _____ Name of Union: _____

Date: _____

The project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback. Mentioning the name and Contact details are essential as this would help us in getting in touch with you. Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name.

Thank you.
Project Director, SSPL

Date

Contact Information/Personal Details

Name

Address

Phone Number

Complaint/Suggestion/Comment/Question: Please provide the details (who, what, where and how) of your grievance below:

If included as attachment/note/letter, please tick here:

For Official Use Only

Registered by (Name of the Junior Engineer Registering Grievance)

Mode of Communication:

1. Letter
2. Verbal/Telephonic

Reviewed by (Name /Position of Official reviewing Grievance)

Action Taken

Whether Action Taken has been communicated to the Complainant: Yes/No

10. CONCLUSION AND RECOMMENDATIONS

The impact assessment has been conducted in compliance with administrative framework, identified herein, including relevant national legislative requirement, international conventions.

10.1 Impacts Requiring Detailed Assessment

The table below presents the outcomes of the comprehensive assessment of identified impacts as a result of the various phases of the Project. Significance of impact has been presented here without mitigation (with embedded controls) and with mitigation.

Table 10.1 Impact Assessment Summary

Impact Description	Impact nature	Significance of Impact	
		Before Mitigation	With Mitigation
Construction Phase			
Change in land use	Negative	Moderate	Moderate
Soil compaction	Negative	Negligible	Negligible
Soil erosion and compaction	Negative	Minor	Negligible
Soil & Sediment contamination	Negative	Minor	Negligible
Change in Topography and Drainage	Negative	Moderate	Minor
Road & Traffic	Negative	Moderate	Minor
Impact on ambient air quality	Negative	Minor	Negligible
Impact on noise quality	Negative	Minor	Negligible
Water resource & quality	Negative	Minor	Negligible
Terrestrial Ecology	Negative	Minor	Negligible
Aquatic ecology	Negative	Minor	Negligible
Loss of land	Negative	Minor	Minor
Reduce of family income	Negative	Minor	Minor
Impact on Local Employment	Positive		
Occupational Health and Safety	Negative	Minor	Negligible
Community Health and Safety	Negative	Moderate	Minor
Operation Phase			
Soil contamination due to waste generation, spillage and leakage	Negative	Minor	Negligible
Depletion of water resources	Negative	Minor	Negligible
Occupational Health and Safety	Negative	Minor	Negligible
Impact on Local Employment	Positive		
Decommissioning Phase			
Impact on soil environment	Negative	Minor	Negligible
Impact on ambient air quality	Negative	Minor	Negligible
Occupational Health and Safety	Negative	Minor	Negligible

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to the Project activities and also discusses implementation mechanisms.

10.2 Conclusion

It has been noted from **Table 10.1** that most of the impacts are of minor significance and can be addressed by using suggested mitigation measures. To conclude, implementation of ESMP will help SSPL to comply with national regulatory framework as well as to meet ADB SPS and IFC Performance Standard requirements.