



# Environmental and Social Impact Assessment Report

Technaf Solartech Energy Limited, Teknaf, Cox's Bazar

Prepared by



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## **LIST OF ABBREVIATIONS**

BBS	– Bangladesh Bureau of Statistics
BMD	– Bangladesh Meteorological Department
BWDB	– Bangladesh Water Development Board
DoE	– Department of Environment
DoF	– Department of Fisheries
ECA	– Environmental Conservation Act
ECC	– Environmental Clearance Certificate
ESIA	– Environmental and Social Impact Assessment
ESMP	– Environmental and Social Management Plan
EU	– European Unions
HAT	– Highest Astronomical Tide
IEE	– Initial Environmental Examinations
IFC	– International Finance Corporation
L/C	– Letter of credit
MEAs	– Multilateral Environmental Agreements
MoEF	– Ministry of Environment and Forest
MoPEMR	– Ministry of Power, Energy and Mineral Resources
MW	– Mega Watt
NGO	– Nongovernmental Organization
NOC	– No Objection Certificate
O&M	– Operation and Maintenance
OM	– Operations Manual
PAP	– Project Affected Person
PCM	– Public Consultation Meeting
RF	– Resettlement Framework
SESIA	– Summary Initial Environmental Examinations
SO	– Safety Officer

SRDI	– Soil Resources Development Institute
TSEL	– Technaf Solartech Energy Limited
ToR	– Terms of Reference
UNCED	– United Nations Conference on Environment and Development
UNDP	– United Nations Development Programme
USEPA	– United States Environmental Protection Agency
WB	– World Bank

**Units**

dB	– Decibel
PPM	– Parts Per Million
Hr	– Hour
Kg	– Kilogram
Km	– Kilometer
KW	– Kilowatt
M	– Meter
Mg	– Milligram
Ton/year	– Ton per Year
MT/year	– Metric Ton per Year

# Volume-I



## **0. EXECUTIVE SUMMARY**

### **0.1 Introduction**

Power generation and supply is one of the vital issues in Bangladesh to enhance its ongoing development efforts. Having 149.8 million people, electricity demand is increasing day by day but the generation of electricity is not increasing as expected. The industrial production which is the driven force of economy is being hampered due to inadequate power supply. Thus foreign and local investment are being discouraged and impeded. The Sixth Five Year Plan contains information on demand-supply gap for electricity, source of electricity supply, use of different types of energy, electricity generation program and strategy for power generation.

The Renewable Energy Policy envisions that 5% of total energy production will have to be achieved by 2015 and 10% by 2020. To achieve this target, GOB is looking for various options preferably Renewable Energy resources. Government has already launched ‘500MW Solar Power Mission’ to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the immense opportunities, Technaf Solartech Energy Limited (TSEL) has established a solar based power plant at Alikhali, South Nhill, Cox’s Bazar with 20 MW capacities as a 20 years facility to BPDB.

The project is not Greenfield and is already in operation. The project was financed by different lenders. TSEL now is applying for funding from Investment Promotion and Financing Facility (IPFF-II) of Bangladesh Bank. ESIA has been prepared based on the guidelines provided by IPFF-II of Bangladesh Bank.

The project is categorized as “Category B” according to World Bank Policy on Environmental and Social Categorization, “Low Risk” according to E&S Risks Rating as per Bangladesh Bank IPFF-II Guidelines and “Orange B” according to Environment Conservation Rules 1997.

An Environmental and Social Audit was conducted by third party- Bangladesh Centre for Advanced Studies (BCAS) on January 2020 covering the reporting period of May 2019 to October 2019. The primary objective of this audit was to assess the compliance status of the Project and its various components with respect to the agreed ESAP, Operations Phase Environmental & Social Management & Monitoring Plan (ESMMP) of the ESIA, and applicable Performance Standards of World Bank. Out of 19 ESAP items, 7 items have been observed that need further improvement to comply efficiently. Besides, BCAS Team has identified 19 out of 54 World Bank PS items in which TSEL should start working on improvement. Since, this was the first environmental and social audit for TSEL, attempts were made to observe as many items as possible in an overall or gross perspective. BCAS Audit Team will endeavor to observe various environmental, social, health and safety issues in further detail during the future audits. Detailed audit report is in [Annex 20](#).

## 0.2 Background of the proposed project

### 0.2.1 Project Justification and Purpose

The demand-supply gap in the power sector of the country is significantly high and has been widening over time due to all the more ever-increasing demands are put on. Besides the existing agricultural and still coming up household sector, the demand being put on by the industrial sector is virtually unlimited. Such a situation compels coming up new projects to have their own power system. The existing power scenario of the country, thus, presents the above demand situation as high compounded by the fact that less than 40% of the county's population remains unconnected with electricity and an even higher percentage of rural areas of the country.

Bangladesh's total installed electricity generation capacity (including captive power) was 15,379 MW as of February 2017. As of 2014, only 62% of the population had access to electricity with a per capita availability of 321 kWh per annum. GOB is looking for various options preferably Renewable Energy resources. Under the existing generation scenario of Bangladesh, Renewable Energy has a very small share to the total generation. The share of Renewable Energy exceeds more than 1% till now. The present government is placing priority on developing Renewable Energy resources to improve energy security and to establish a sustainable energy regime alongside of conventional energy sources.

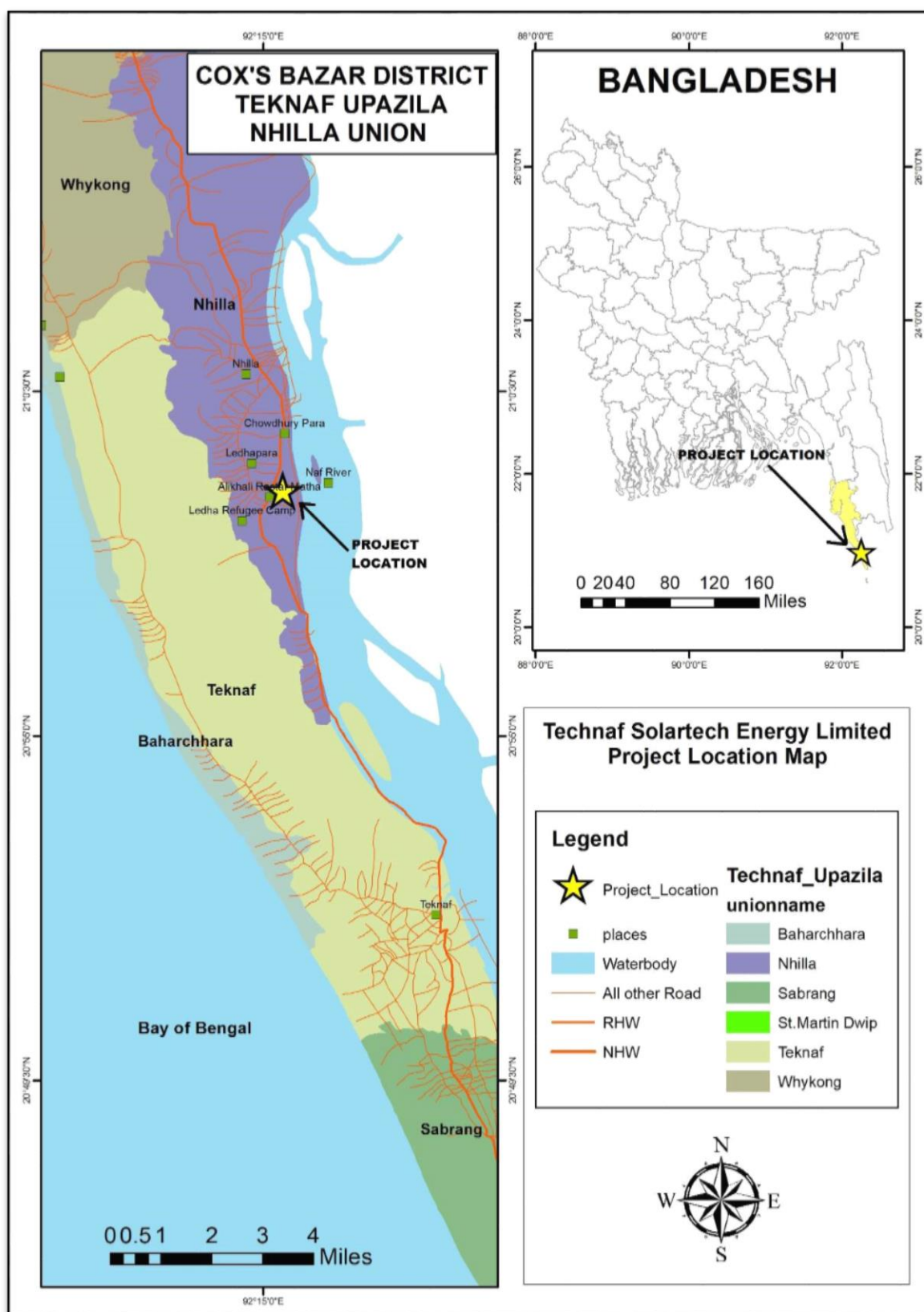
### 0.2.2 Project Location

The site of the project is located at South Nhillia Alikhali village of 2 no. Nhillia Union, Teknaf Upazila of Cox's Bazar district. The geographical location of project site in respective of coordinates is shown below:

SW Corner	20°58'47.92"N,	92°15'7.16"E
SE Corner	20°58'40.34"N,	92°15'29.02"E
NW Corner	20°59'12.33"N,	92°15'16.55"E
NE Corner	20°59'9.36"N,	92°15'25.90"E

The latitudes and longitudes of the project site are given above. The boundaries of the plant location are: salt cultivation land on the north, north-west, east and south side of the project site, few low land parcels have been found on the north-east, south-east and south-west boundaries, a salt factory and a brick field are situated along the south-west boundary of the project site, River Naf flows along the eastern side of the project site. A bituminous carpeting road has passed through the western boundary of the project site.

It is further to be noted that most of the land of this project was previously used for salt cultivation, for which the landowners dug a private canal to bring saline water inside their lands. The canal inside the project boundary is completely owned by the concerned landowners – the canal is not on any khas land. TSEL has decided to conserve the canal.



Map 1: Location Map of the Solar Power Plant Project

### 0.2.3 Project Cost

Power plant set up is a matter of cost and this total project investment associated with IPFF-II is BDT 3,016.59 Million. Major cost elements are land lease and site development, factory building construction, procurement of machineries and equipment, mechanical and electrical works. Detailed breakdown is shown in [Table 2.6](#).

### 0.2.4 Project Description and Associated Activities

The project sponsor took lease of the land for the purpose of installation of the plant measuring about 116 acres of land at the project site. Number of manpower required during the construction period will be approximately at the peak which will gradually reduce as the civil construction phase comes to an end. The manpower requirement during the operation phase of the project will be approximately 108 including administrative and security personnel. Land use type within 1km radius of the project area, for environmental and socio-economic study in compliance with the regulations, is a mix of agricultural lands, salt fields, homesteads and fallow lands. Table 0.1 below depict the key project Information:

**Table 0.1: Key Project Information**

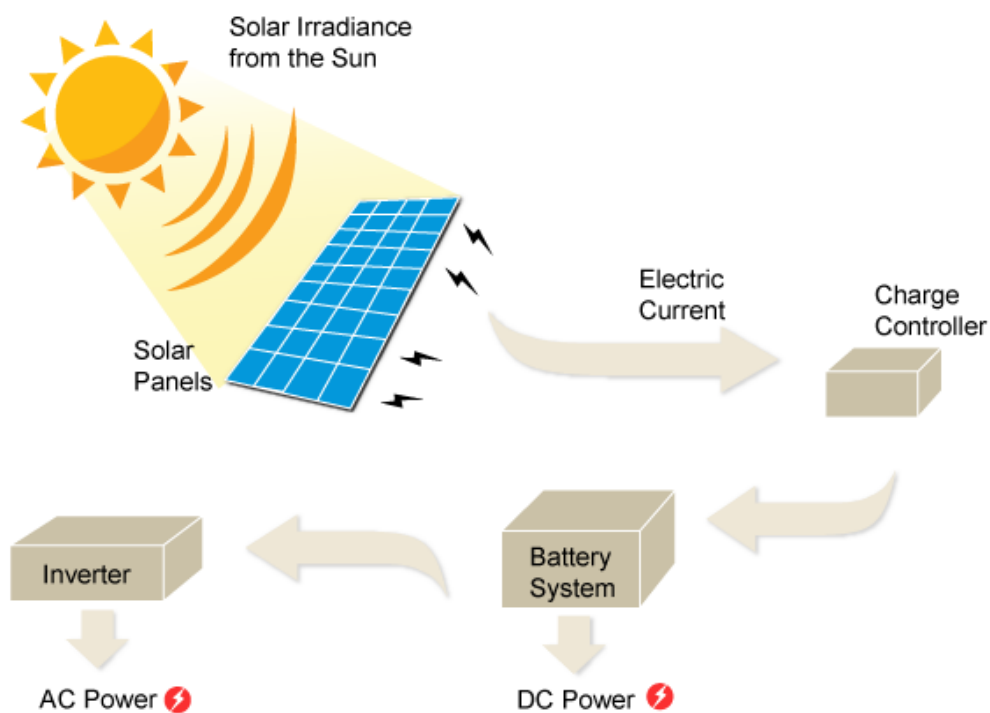
<b>Project Company</b>	Technaf Solartech Energy Limited (TSEL)
<b>Type of Business</b>	Electricity generation and distribution to gridline
<b>Corporate Office Address</b>	Technaf Solartech Energy Limited, 2nd Floor, Colloid Center, 206/A, Tejgaon Industrial Area, Dhaka 1208.
<b>Plant Type and Capacity</b>	20 MW electricity generation
<b>Location</b>	Village: South Nhillia Alikhali, Union: 2 No. Nhillia, Upazila: Teknaf, Zilla: Cox's Bazar
<b>Plant installation area</b>	116 acres of Land
<b>Electricity coverage area</b>	Transmission to the National Grid
<b>No. of beneficiaries</b>	All over Bangladesh
<b>Major Equipment</b>	Solar modules (Poly crystalline Silicon), grid-tie string inverters.
<b>Installation and Supervision</b>	Installation by TSEL and and Supervision by Sgurr Energy India Pvt. Ltd
<b>Operation and Maintenance</b>	TSEL

More details regarding the project is described in [Chapter 2.3](#).

### Power Generation through Solar Modules

Solar panels, also known as modules, contain photovoltaic cells made from silicon that transform incoming sunlight into electricity rather than heat. (" Photovoltaic" means electricity from light — photo = light, voltaic = electricity.) Solar photovoltaic cells consist

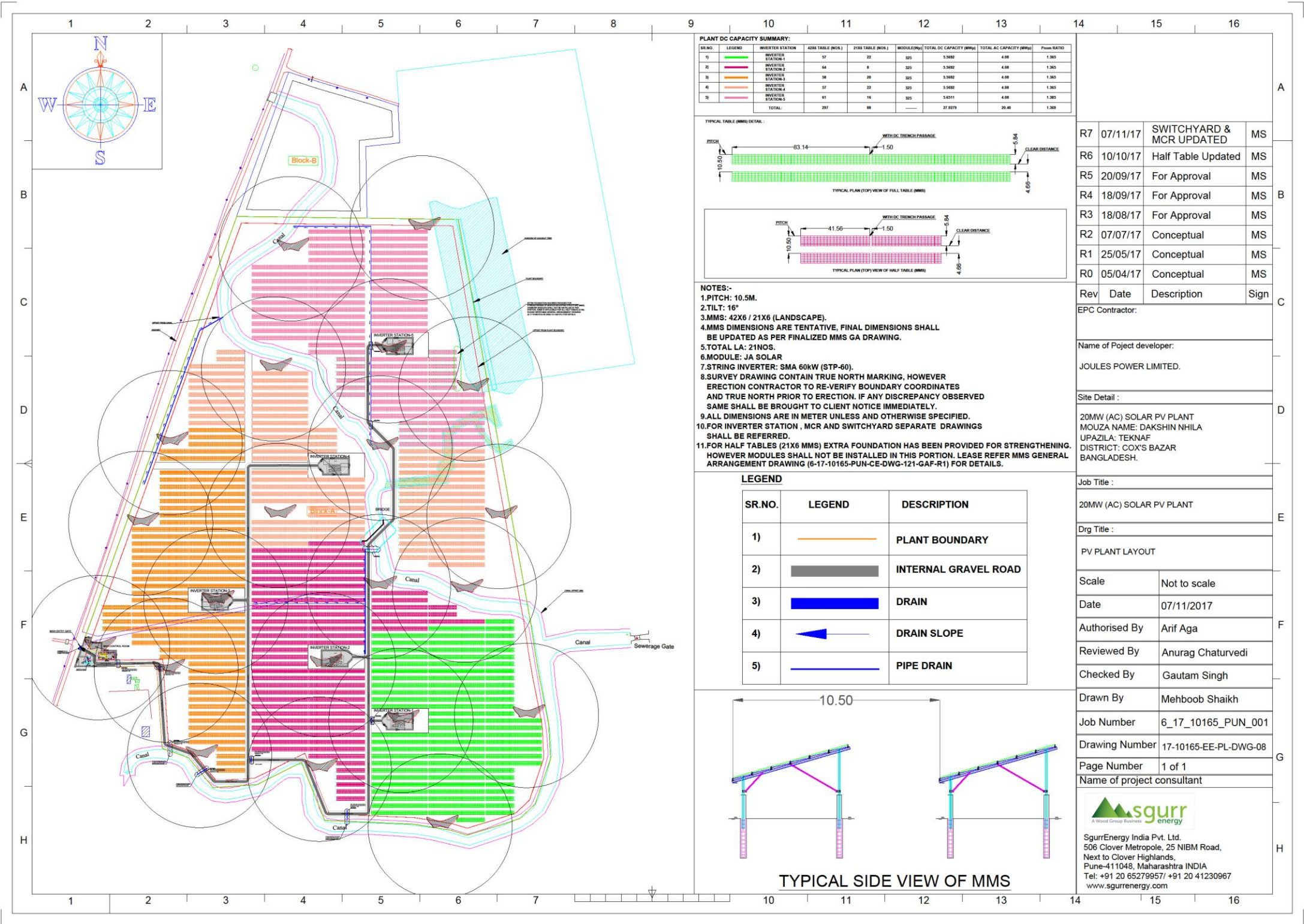
of a positive and a negative film of silicon placed under a thin slice of glass. As the photons of the sunlight beat down upon these cells, they knock the electrons off the silicon. The negatively-charged free electrons are preferentially attracted to one side of the silicon cell, which creates an electric voltage that can be collected and channeled. This current is gathered by wiring the individual solar panels together in series to form a solar photovoltaic array. Depending on the size of the installation, multiple strings of solar photovoltaic array cables terminate in one electrical box, called a fused array combiner. Contained within the combiner box are fuses designed to protect the individual module cables, as well as the connections that deliver power to the inverter. The electricity produced at this stage is DC (direct current) and must be converted to AC (alternating current) suitable for use.



**Figure 1: Flow diagram for power generation through solar modules**

The inverter is typically located in an accessible location, as close as practical to the modules. Since inverters make a slight noise, this should be taken into consideration when selecting the location. The inverter turns the DC electricity generated by the solar panels into 120-volt AC that can be put to immediate use by connecting the inverter directly to a dedicated circuit breaker in the electrical panel. The inverter, electricity production meter, and electricity net meter are connected so that power produced by solar electric system will first be consumed by the electrical loads currently in operation. The balance of power produced by solar electric system passes through electrical panel and out onto the electric grid.





Map 2: Project Layout Plan

### 0.3 Environmental Policy, Legislative and Institutional Framework

The applicable reference framework has been followed for the study is as follows:

- Department of Environment (DoE), Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, *ESIA Guidelines for Mix Zone Industrial and residential*, June 1997.
- Environmental and Social Performance Standards refer to the “World Bank Performance Standards”, which are IFC Performance Standards on Environmental and Social Sustainability adopted as the “World Bank Performance Standards” in 2013 pursuant WB Operational Policy 4.03.
- World Bank Group Environmental, Health, and Safety (EHS) Guidelines and ESRM Guidelines issued by BB in February 2017 will be also in effect during IPFF II implementation.

As per Environment Conservation Rules '1997 (amended 2017) this type of industry has been categorized as “Orange B”. An Initial Environmental Examination (IEE) was carried out for this power plant as per regulation of Department of Environment under Ministry of Environment and Forest for getting site clearance. And the Site Clearance is issued on 17/09/2017. An Environmental Impact Assessment (ESIA) is a formal requirement for the power plant according to the Bangladesh Environment Conservation Act'1995 (Amended 2010) and the Environment Conservation Rules '1997 (Amended 2002).

**Table 0.2: Triggering of the WBG Performance Standards (PS)**

Sl.	PS and Title	Construction Phase		Operation Phase	
		Triggered	Not Triggered	Triggered	Not Triggered
1.	PS1: Assessment and Management of Environmental and Social Risks and Impacts	√		√	
2.	PS2: Labor and Working Conditions	√			√
3.	PS3: Resource Efficiency and Pollution Prevention	√		√	
4.	PS4: Community Health, Safety, and Security	√			√
5.	PS5: Land Acquisition and Involuntary Resettlement		√		√
6.	PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	√			√
7.	PS7: Indigenous Peoples		√		√
8.	PS8: Cultural Heritage		√		√

## **0.4 Approach and Methodology**

Based on the above Scope of Work, the study built upon the baseline survey carried out by BCAS as Environment and Social Consultant for the Environmental and Social Impact Assessment (ESIA) during March 2017 to September 2017. The initial ESIA was carried out to comply with the TOR provided by TSEL to the consultants to comply with the conditions of the DOE ECA 1995 and ECR 1997 for the Site Clearance by DoE and approval of ESIA by the DOE.

This ESIA has been carried out as a follow up study of IEE and is based on the primary data generated during the period from March 2017 to September 2017. Primary environmental and social data were obtained from various sources and field visits. Several field visits had been undertaken to the project location with a view to update the findings of the baseline study carried out by BCAS. During the study period the following steps were followed:

1. Baseline Survey/monitoring data acquisition of the baseline both environmental and social to carry out the ESIA;
2. Understanding the technical aspects of the power plant through primary field data, secondary literature and stakeholder consultations;
3. Identification of potential environmental impacts and evaluating the consequences through using a checklist method has been carried out;
4. Identification of impacts was undertaken using Checklist Matrix and Issues forecasting tabular methods;
5. Discuss with the people living in the plant area about the mitigation measures suggested in the ESIA through stakeholder's consultations and general public consultation;
6. Development of an Environmental and Social Management Plan (ESMP) for possible mitigation/ enhancing measures, respectively, for negative and beneficial impacts;
7. Suggestion of mitigation measures for residual impacts;
8. Completion of a comprehensive social impact assessment through primary data collection;
9. Primary data collection from 30% of the total households within 1 km radius of the project area included in the baseline study carried out by BCAS. The criteria for choosing 30% of households within 1 km radius of the project site was judgmental based on the expected picture required for the specific study. Additionally, the area is in a mixed rural cum industrial zone. A power plant and few brick fields are situated within close vicinity of the power plant. In choosing the households only the nearby rural households were chosen, as they are going to be affected mostly during construction and operation. A number of Focus Group Discussions (FGDs) with the different categories of stakeholders were held including women;

Detailed environmental and socio-economic baseline survey was undertaken throughout the high impact zone (0.4km radius), and low impact zone (0.6km radius) of the project air-shed. The basis was that the impact of the project was not expected to exceed the considered radius both from the environmental and social economic impacts due to the project. This is evident from the findings in the anticipated environmental impacts of this study which shows that



they are well within the DOE standards. During the mapping exercise, in-depth consultations with local stakeholders were carried out to aid accurate identification of suitable plots. Use of maps and also utilization of the historic maps was undertaken for identifying the plots and ground level. Field verification was undertaken by the team leader after the field data collection. Updated GIS version was applied to finalize the land use map.

List of studies and work streams required in compliance with the applicable laws and regulations as below:

**Table 0.3: List of studies and work streams**

Study Topics	Application WBG PS, ESHG or other national/ international guidelines	Reference Chapter/ Annex
Project Justification and Purpose, Project Location, Project Description and Associated Activities	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 2</a> <a href="#">Annex 1, 2, 3, 4, 5 and 6</a>
Environmental Policy, Legislative And Institutional Framework	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 3</a> <a href="#">Annex 7 and 8</a>
Project Categorization	World Bank Environmental and Social Safeguard Policy; Bangladesh Bank IPFF-II ESPP Guidelines; Environment Conservation Rules 1997	<a href="#">Chapter 3.5</a> <a href="#">Chapter 3.6</a> <a href="#">Chapter 3.7</a>
Triggering of WB Performance Standards	PS1-8	<a href="#">Chapter 3.8</a>
Stakeholder Consultation, KII, FGD and public consultation	PS1: Assessment and Management of Environmental and Social Risks and Impacts PS4: Community Health, Safety, and Security	<a href="#">Chapter 4.5</a> <a href="#">Annex 9</a>
Environmental And Social Baseline Study	PS1: Assessment and Management of Environmental and Social Risks and Impacts PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<a href="#">Chapter 5</a> <a href="#">Annex 10, 11, 12, 13 and 15</a>
Analysis Of Alternatives		<a href="#">Chapter 6</a>

Risk Analysis and Identification	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 7</a>
Impact Identification And Evaluation	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 8</a>
GHG Emission	PS3: Resource Efficiency and Pollution Prevention	<a href="#">Chapter 8.5.3</a> <a href="#">Annex 14</a>
Mitigation Measures	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 9</a>
Environmental And Social Management Program (ESMP)	PS1: Assessment and Management of Environmental and Social Risks and Impacts PS2: Labor and Working Conditions to be done PS3: Resource Efficiency and Pollution Prevention	<a href="#">Chapter 10</a>
Monitoring, Evaluation And Reporting		<a href="#">Chapter 11</a>
Labor Assessment	PS2: Labor and Working Conditions	<a href="#">Chapter 11.6</a> <a href="#">Annex 16</a> <a href="#">Annex 19</a>
Environmental and Social Audit	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 11.7</a> <a href="#">Annex 17</a>
Environmental and Social Commitment Plan (ESCP)	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 11.8</a> <a href="#">Annex 18</a>

An extensive stakeholder's consultation process was undertaken through FGDs, KIIs and one large general consultation meeting. In general there were no negative notions about the project in the area. However, there were certain queries about the opportunity they will get in the future in the project. The consultants and technical management of TSEL explained the mitigation measures that are being taken to mitigate the problem.

There was no resettlement issue as the land for the project was leased from the willing owners. There was no resettlement or livelihood restoration requires as the land for the leased from willing owners. There were no agricultural workers or sharecroppers in the land leased



by TSEL.

## **0.5 Environmental and Social Baseline Study**

The ESIA primarily comprises of a detailed baseline analysis through measurements of different environmental parameters like air quality, noise level and the quality of ground and surface water in the vicinity of the project site. Based on the baseline data the impact the project's impact has been analyzed through predictive models. Identification of the potential impacts has been made and the mitigation measures have been suggested which if undertaken will meet the regulatory standards of the DOE as per Environmental Conservation Rules of 1997 and later amendments. The anticipated impacts have been analyzed for the pre-construction phase, construction phase and operation phase.

### **0.5.1 Baseline Environmental Condition**

As the project is Solar PV Project, the impact during construction of is expected to be minimal as a Greenfield Project plant. Particulate matter in the form of dust would be the predominant pollutant affecting the air quality during the construction phase. Dust will be generated mainly during excavation, back filling and hauling operations along with transportation activities. The main source of gaseous emission during the construction phase is movement of equipment and vehicles at site. Equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO<sub>2</sub>, NO<sub>x</sub>, and particulate matter (PM). The impact is reversible, marginal and temporary in nature.

No ground water due to plant operation will be drawn during operation phase but there will be usage of ground water for cleaning it and its amount is very low. So lowering of groundwater table will not be an issue. There shall be minimal discharge of wastewater from cleaning of Solar PV modules. The wastewater emanating from cleaning operations shall be recycled for plantation and greenbelt development around the plant.

No overburden on the local transportation system is envisaged due to the Project. During construction activities, there will be a sizeable influx of population and labor colony is being constructed with basic amenities for the laborers working on the project. The peak labor population shall be 300 but on an average. This will have an effect on social fabrics of the areas surrounding the project.

### **0.5.2 Baseline Socio-Economic Condition**

This study has identified social impacts of the project on the local community. Alikhali village under 7 and 8 Wards of Nhilla Union have been surveyed and the extant of impacts have been confirmed in the village. During the field assessment and stakeholder meetings, documents of relevance to this study were collected and data from the same was utilized in developing this social baseline. Bangladesh Population Census 2011 Data for Cox's Bazar District were collected and reviewed during this site assessment.

As per the survey data it can be observed that almost 28.22% of the respondents are students followed by housewife (22.28%), businessman (11.88%), farmer (8.42%), labor (7.92%),

service holder (4.46%) and others (1.49%) in the study area. There is only 1% who are not engaged in any works as they are unemployed. But almost 14.36% people are not applicable for any occupation as they are too old or too young to work. Among the 7.92% labor there are rickshaw-puller, construction worker, agricultural labor, and electrician etc.

Gender analysis of this study has depicted the conventional patriarchic scenario of rural Bangladesn. Women are found lagging behind in education and job opportunities. Majority of the women respondents are housewives or involved in household activities.

## **0.6 Analysis of Alternatives**

### **0.6.1 No project Alternative**

There is no alternative option of the project as Bangladesh is striving towards increasing the share of renewable energy in the electricity production with specific long term targets.

### **0.6.2 Analysis of technology alternatives**

For a solar ppwer plant having 20 MW capacities, the use of PV modules is more viable to other available technologies.

### **0.6.3 Analysis of site alternatives**

There is general shortage of land available without resettlement issues and existing land use for income generation through agriculture, etc. Moreover, it is difficult to come to a long term lease arrangement for projects. The land has to be completely purchased which could make the project financially less viable. Additionally, the project location was mainly barren with no income generation activities and the land owners were willing to go into long term lease arrangement with the project sponsers. Considering the above, the project site chosen was the only viable alternative.

## **0.7 Risk Analysis and Identification**

Risk analysis and identification has been carried out for the pre-construction, construction and operation phase of the project. The analysis shows that during pre-construction and construction phases the risks are medium. For the operation phase, the risks are low. The phase wise risks are explained in the [Chapter 7](#).

## **0.8 Impact Identification and Evaluation**

The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of Solar PV power. It will certainly meet the ever increasing Demand of Power and to bridge the Gap between Demand and Supply of Power.

### **0.8.1 Impacts during Pre-Construction & Construction Phase**

The environmental impact during construction phase is localized and of short term magnitude. However, as this project land shall be govt. barren land, the change in land use will be minimum. Impact is primarily related to the civil works and some intensive impact

due to erection of the equipment. The Details of the activities and probable impact are brought out in the [Table 8.1](#) of Vol. II.

### **0.8.2 Impact during Operation Phase**

Various activities of operation and maintenance phase and their probable impacts on various sectors of environment are presented in the [Table 8.2](#) of Vol. II

## **0.9 Mitigation Measures**

The impacts of the project have been analyzed and the corresponding mitigation measures were identified for pre-construction, construction and operation phase. During the pre-construction and construction phase, it has been identified that there will be medium to minimum impact on the environment mainly due to emission of dust and emissions from transportation and construction equipment for which appropriate mitigation measures have been suggested in [Chapter 9](#). During operation phase the impact on environment is minimal. Importance should be given for E-waste management such as hazardous waste storage, transportation, treatment and disposal.

## **0.10 Environmental and Social Management Program**

TSEL is committed to constructing and operating the power plant in an environmentally responsible manner and in compliance with relevant environmental laws, regulations, and guidelines in force in the country and also those prescribed by lending agencies, including the World Bank and other financing agencies. TSEL will implement an Environmental and Social Management System (ESMS), including an environmental policy that states the principles and intentions of the enterprise in relation to its overall environmental performance. Such principles and intentions will be communicated to each employee as well as the nature of their individual environmental responsibilities. Where appropriate, staff training will be undertaken to ensure their continued environmental performance. In addition, TSEL will aim to obtain International Organization for Standardization (ISO) 14001 accreditation for the ESMS within the first three years of operation. TSEL is also committed to the creation and implementation of programs to reduce the probability of occurrence of adverse impacts upon the environment. As required, contingency plans will be developed for mitigating potential adverse incidents. TSEL will expect the same level of environmental performance from its agents, suppliers, and contractors and will stipulate this in any legally binding agreements it enters with these parties. TSEL will also ensure that appropriate corporate resources, personnel and reporting and accountability systems, are in place for the successful implementation of the ESMP. They will, on a continuing basis, review the objectives of the ESMP as well as the company's success in achieving them. Where objectives are not being achieved, corrective action will be taken. The ESMP objectives will also be modified over the life of the TSEL as appropriate, to reflect changing environmental laws, regulations, standards, and technologies.

The potential significant environmental impacts and mitigation measures during construction and operation phases are summarized in [Table 10.1](#) of Vol II.

### 0.11 Monitoring, Evaluation and Reporting

For ensuring the construction and operation of the power plant according to the required compliance, there should be designated entity/institution or unit. The institution will be fully responsible to maintain the safeguard compliances. TSEL has realized the importance of establishing a separate entity for environmental monitoring and management. So, to maintain the environmental and social compliances, TSEL has planned to establish an individual compliance unit operating under the guidance of Head of Operation. They are planning to name the unit as Environmental and Social Monitoring Unit (ESMU). The duties of the ESMU will include to:

- Ensure environmental and social safeguard compliances;
- Coordinate environmental monitoring process;
- Act as liaison with the public, local organizations and government;
- Ensure and supervise record keeping, data storage for follow-up actions;
- Monitor hazardous materials storage and handling;
- Promote environmental awareness and safety measures; and
- Prepare environmental management and periodic monitoring reports as required by DOE.

Important training under the spectrum of ESMU needs to include:

- Training on firefighting;
- Training on environmental regulations and standards;
- Staff training on environmental monitoring;
- Training on environmental health and safety measure.

As a part of environmental and social compliances, TSEL will engage third party consultant for conducting quarterly Environment, Health, Safety & Social Compliance Monitoring/Auditing and the monitoring/audit report of the Project should be submitted to the financier/lender. It will describe in detail about the status of implementation of Environmental and Social Management Program (ESMP) as described in [Section 10.4](#) of this report. This will also take into account compliance with national and lender required/international legal requirements in line with Environment, Health, Safety & Social Compliances. Financier/Lender will monitor the EHS compliance as and when required. The schedule of reporting the monitoring arrangement has been presented in the following Table 0.4.

**Table 0.4: Reporting schedule**

Reporting entity	Frequency of Report	Entity to whom the report will be submitted
Third Party Consultant	Quarterly EHS & Social Compliance Report during construction phase	To the Financier/ Lender through TSEL
Third Party Consultant	Quarterly EHS & Social Compliance Report during for the 1 <sup>st</sup> 2 years of operation phase	To the Financier/ Lender through TSEL

## 0.12 Conclusion

The ESIA study of **Technaf Solartech Energy Limited** at Alikhali, South Nhill, Cox's Bazar has been concluded that the all environmental, metrological, geographical, biological aspects are well suited for the project. By adopting all documents of project such as layout, total land, proposed activities (during construction and operational stage), project cost, utilities requirement, transportation mode the team found out the possible impact of project on surrounding environment, socioeconomic condition of project area.

World Bank categorization, Bangladesh Bank IPFF-II Guidelines and DoE categorization have been followed to justify the project. The analysis is given below:

- World Bank Policy on Environmental and Social Categorization:**

The TSEL sub-project is a utility scale (28 MWP) solar PV power plant project and the project activities have potential limited adverse environmental or social risks and/or impacts on a number of issues; which are site-specific and largely reversible. These impacts can be avoided or mitigated by adhering to applicable standards, procedures, guidelines and design criteria as described in the relevant WBG and international good practice documents. The TSEL subproject may therefore be classified in the Category 'B' according to WB OP 4.03.
- E&S Risks Rating as per Bangladesh Bank IPFF-II Guidelines:**

During the operation phase the risks falls under "Low Risk" since the project activities will have minimal environment and social impacts.
- DoE Categorization:**

As per SRO No. 349- act/2017 (24 December 2017) issued by the DOE on the categorization to the Environment Conservation Rules 1997, Solar Power Plants (above 1 MW) falls under category "Orange B". The DOE approved this project under this category.

The project activities in pre-construction, construction and operation phase may trigger World Bank Performance Standards (PSs) such as PS1, PS2 and PS3. Other Performance standards such as PS4, PS5, PS6, PS7 and PS8 so not get affected by the project activities. Observing all legal issues related to the project, the team gave a set of management plan to minimize the negative impacts and enhance the positive impacts. The management plan/mitigation measures have been given to run the plant environment friendly way without damaging ambience. Finally, it has been stated that ESIA team try to follow strictly the ESIA Guideline for industry of Department of Environment.

The recommendations of ESIA team are followed:

- The plant will have a number of impacts on the environment so special care should be taken for complying with the ESMP outlined in this report. The occupational health safety documentation should be put in place.
- Accidental disaster, and Emergency response plan should be in plan and monitored regularly.
- Good O&M practices and management plans have been formulated for managing the environmental issues and probable impacts due to residual pollution and accidental situation in an efficient way. The O&M manuals should be prepared for different phases of the project. The authority will give proper attention to the training need for good O&M practices to the persons working in it.
- Implementation of the mitigation measures suggested in the ESIA report will certainly eliminate the undesirable pollution problems.
- The authority will also arrange adequate budgetary allocation for materialization of formulated environmental management plan.

# Volume-II

# Main Report

## **1 NON-TECHNICAL SUMMARY**

Government of Bangladesh has set up the goal of providing electricity to all by 2020 and to ensure reliable and quality supply of electricity at a reasonable and affordable price. In line with the Renewable Energy policy 2009, the government is committed to facilitate both public and private sector investment in renewable energy projects to substitute indigenous non-renewable energy supplies and scale up contributions of existing renewable energy based electricity productions. The Renewable Energy Policy envisions that 5% of total energy production will have to be achieved by 2015 and 10% by 2020. To achieve this target, GOB is looking for various options preferably Renewable Energy resources. The present government is placing priority on developing Renewable Energy resources to improve energy security and to establish a sustainable energy regime alongside of conventional energy sources. Government has already launched ‘500MW Solar Power Mission’ to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the immense opportunities, Technaf Solartech Energy Limited (TSEL) is striving to establish a solar based power plant at Alikhali, South Nhillia, Cox’s Bazar with 20 MW capacities as a 20 years facility to BPDB.

Bangladesh Environmental Conservation Rules (ECR, 1997) and other International Policies require that the environmental and social impacts of development projects are identified and assessed as part of the planning and design process. Based on the magnitude of potential adverse impacts, mitigation measures are to be planned before starting the implementation of the project. This is done through the environmental assessment process, which has become an integral part of lending operations and project development and implementation worldwide.

The area falling within 5 km distance from the site has been considered as the study area for conducting detailed studies. The ESIA study is presented in this report which is divided into 11 chapters for better understanding. The report structure is as follows:

- |            |  |
|------------|--|
| Chapter 1: | <b>Chapter 1: “Non-Technical Summary”</b> discusses about primary introduction of the project and the basic ESIA report structure  |
| Chapter 2: | <b>Chapter 2: “Background”</b> discusses about the information of the project, its justification and purposes, project site and area of influence and project context (geographic, ecological, social, health and temporal) as well as additional / associated project components, such as transmission lines, access roads and water supply).   |
| Chapter 3: | <b>Chapter 3: “Environmental Policy, Legislative And Institutional Framework”</b> describes the national policy, legal and administrative framework and also the obligations to international environmental and social treaties, agreements and conventions, the international standards applied to the project, other priorities and objectives for E&S performance identified by the buyer / project sponsor. It also explains the |



	environmental and social requirements of the project investors.
Chapter 4:	<b>Chapter 4: “Approach and Methodology”</b> sets out the approach and methodology used in the ESIA and how the data and information collected has been incorporated in the findings and recommendations.
Chapter 5:	<b>Chapter 5: “Environmental And Social Baseline Study”</b> defines the study area delineated for the boundaries of the baseline study. It also describes relevant physical, biological, socioeconomic, health and labor conditions, including any changes anticipated before the project start.
Chapter 6:	<b>Chapter 6: “Analysis of Alternatives”</b> identifies and provides justification for the best design option.
Chapter 7:	<b>Chapter 7: “Risk Analysis and Identification”</b> identifies the associated risks in the pre-costruction, construction and operational phase of the project.
Chapter 8:	<b>Chapter 8: “Impact Identification And Evaluation”</b> assesses the project’s likely positive and negative impacts, in quantitative terms to the extent possible.
Chapter 9:	<b>Chapter 9: “Mitigation/Optimization Measures And Residual Impacts”</b> provides the set of mitigation and management measures to be taken during implementation of the project to avoid, reduce, mitigate or remedy for adverse social and environmental impacts.
Chapter 10:	<b>Chapter 10: “Environmental And Social Management Program”</b> organizes the mitigation and optimization measures into a program of overall activities.
Chapter 11:	<b>Chapter 11: “Monitoring, Evaluation And Reporting”</b> outlines the monitoring, evaluation and reporting measures to be put in place to assess the effectiveness of the mitigation measures.
Chapter 12	<b>Chapter 12: “Conclusion And Recommendations”</b> presents a clear statement of the conclusions and recommendations on actions to be taken to ensure that environmental issues are adequately addressed in subsequent project preparation, implementation, monitoring and evaluation phases.
Annexures	<b>Annexures</b> contains some standalone documents as well as some related discussion on topics mentioned in the report.

## **2 BACKGROUND**

### **2.1 Project Justification and Purpose**

Technaf Solartech Energy Limited (TSEL) is in the process to establish and operate a grid-tied solar power plant at Alikhali, South Nhillia, Teknaf, Cox's Bazar beside Arakan Road, around 0.5 km from the bank of Naf River, 2 km from Teknaf PBS-2, 33/11 kV sub-station at Ledha, Teknaf. The total area of the project site is about 116 acres. Because TSEL has been approved to implement and operate a 20 MW Solar Power Plant for supplying power to Bangladesh Power Development Board (BPDB) on an off-take basis for a contracted period of 20 years. TSEL has been qualified for the bid on an unsolicited basis. The required commercial operation date for the project is 12 months from date of signing of project agreements i.e., Power Purchase Agreement and Implementation Agreement. For financing TSEL is expected to source fund from financial institutions having strong commitment on sustainable development.

The demand-supply gap in the power sector of the country is significantly high and has been widening over time due to all the more ever-increasing demands are put on. Besides the existing agricultural and still coming up household sector, the demand being put on by the industrial sector is virtually unlimited. Such a situation compels coming up new projects to have their own power system. The existing power scenario of the country, thus, presents the above demand situation as high compounded by the fact that less than 40% of the country's population remains unconnected with electricity and an even higher percentage of rural areas of the country.

Bangladesh has made remarkable growth in electricity generation over the last five years. Power Sector Master Plan 2010 (PSMP-2010) has been undertaken to accommodate the government's vision 2020. According to PSMP study, the electricity demand would be 34,000MW by the year 2030. The aggregated investments for the development of the generation, transmission and related facilities are found to be at Taka 4.8 trillion (US\$ 69.5 billion). The annual average of the investment amounts to Tk. 241 billion (US\$ 3.5 billion). The government of Bangladesh had announced a renewable Energy Policy and also a plan to increase its share in power generation from the-then level of one percent to five percent by 2015 and 10 percent in 2020. And that means the country's power production from renewable energy was planned to go up to 650 MW in 2016 when the total power production was expected to be 13,000 MW.

Bangladesh's total installed electricity generation capacity (including captive power) was 15,379 MW as of February 2017. As of 2014, only 62% of the population had access to electricity with a per capita availability of 321 kWh per annum. GOB is looking for various options preferably Renewable Energy resources. Under the existing generation scenario of Bangladesh, Renewable Energy has a very small share to the total generation. The share of

Renewable Energy exceeds more than 1% till now. The present government is placing priority on developing Renewable Energy resources to improve energy security and to establish a sustainable energy regime alongside of conventional energy sources. Government has already launched ‘500MW Solar Power Mission’ to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the immense opportunities, Technaf Solartech Energy Limited (TSEL) is striving to establish a solar based power plant at Alikhali, South Nhilla, Cox’s Bazar with 20 MW capacities as a 20 years facility to BPDB.

## 2.2 Project Location

The site of the project is located at South Nhilla Alikhali village of 2 no. Nhilla Union, Teknaf Upazila of Cox’s Bazar district. The geographical location of project site in respective of coordinates is shown in Table 2.1 below:

**Table 2.1: Location of Plant Site in GPS (Diagonal points)**

Point	Coordinate
Inside the Plant	20°58'57.02"N, 92°15'19.79"E
SW Corner	20°58'47.92"N, 92°15'7.16"E
SE Corner	20°58'40.34"N, 92°15'29.02"E
NW Corner	20°59'12.33"N, 92°15'16.55"E
NE Corner	20°59'9.36"N, 92°15'25.90"E

The latitudes and longitudes of the project site are given above. The boundaries of the plant location are: salt cultivation land on the north, north-west, east and south side of the project site, few low land parcels have been found on the north-east, south-east and south-west boundaries, a salt factory and a brick field are situated along the south-west boundary of the project site, River Naf flows along the eastern side of the project site. A bituminous carpeting road has passed through the western boundary of the project site. The Project Location and four side scenarios are also shown in [Annex 2](#).

The Land lease activities of TSEL were started from January, 2017 and about 116.87 acres of land was taken lease for the period of 24 years at Alikhali, South Nhilla, Teknaf, Cox’s Bazar. The whole land was taken as lease from willing land owners at a negotiated rate. The Land Details with Owners’ Name, Dag and Khatian Numbers are shown in [Annex 3](#).

It is further to be noted that most of the land of this project was previously used for salt cultivation, for which the landowners dug a private canal to bring saline water inside their lands. The canal inside the project boundary is completely owned by the concerned landowners – the canal is not on any khas land. TSEL has decided to conserve the canal.

## 2.3 Project Description and Associated Activities

The project sponsor took lease of the land for the purpose of installation of the plant measuring about 116 acres of land at the project site. Number of manpower required during the construction period will be approximately at the peak which will gradually reduce as the civil construction phase comes to an end. The manpower requirement during the operation phase of the project will be approximately 108 including administrative and security personnel. Land use type within 1km radius of the project area, for environmental and socio-economic study in compliance with the regulations, is a mix of agricultural lands, salt fields, homesteads and fallow lands. Table 2.2 below depict the key project Information:

**Table 2.2: Key Project Information**

<b>Project Company</b>	Technaf Solartech Energy Limited (TSEL)
<b>Type of Business</b>	Electricity generation and distribution to gridline
<b>Corporate Office Address</b>	Technaf Solartech Energy Limited, 2nd Floor, Colloid Center, 206/A, Tejgaon Industrial Area, Dhaka 1208.
<b>Plant Type and Capacity</b>	20 MW electricity generation
<b>Location</b>	Village: South Nhilla Alikhali, Union: 2 No. Nhilla, Upazila: Teknaf, Zilla: Cox's Bazar
<b>Plant installation area</b>	116 acres of Land
<b>Electricity coverage area</b>	Transmission to the National Grid
<b>No. of beneficiaries</b>	All over Bangladesh
<b>Major Equipment</b>	Solar modules (Poly crystalline silicon), grid-tie string inverters.
<b>Installation and Supervision</b>	Installation by TSEL and Supervision by Sgurr Energy India Pvt. Ltd
<b>Operation and Maintenance</b>	TSEL

### 2.3.1 Major Land Use

About 1 km radius of the plant has been surveyed. Administratively, the air shed spreads over 2 No. Nhilla Union of Teknaf Upazila (shown in [Annex 2](#)).

In order to carry out the socio-economic impact at 1 km radius from the project location has been surveyed initially for the full socio-economic impact of the project in the preparation of the ESIA after the site clearance. Administratively, the socio-economic impact zone of 1 km spreads within 2 No. Nhilla Union of Teknaf Upazila.

As the area is under 2 No. Nhilla Union Parishad, most of the land is under salt field. Besides, within 1 km radius from the project area, considerable coverage has fallen inside Naf River. Other land use categories within 1 km radius from the project site includes residential

settlements, mixed use lands, brick field industry, institutional setup (college), roads, low land and water body.

Various categories of land use within 1 km radius in the project area are presented in the following Table (Table 2.3):

**Table 2.3: Current Land Use Pattern within 1 km Radius of the Project Area**

Land Use	Area (sq. km)	Area (sq. m)	Percentage
Agricultural	0.2535	253454.16	8.07%
Fisheries	0.3447	344745.91	10.97%
Industrial	0.0633	63300.16	2.01%
Institutional	0.0057	5707.37	0.18%
Mixed	0.0250	25049.73	0.80%
Residential	0.3191	319083.31	10.16%
Road	0.0252	25203.90	0.80%
Salt Field	1.0837	1083656.08	34.49%
Water Body	0.8716	871594.87	27.74%
Wetland	0.1498	149797.63	4.77%
<b>Total</b>	<b>3.1416</b>	<b>3141593.12</b>	<b>100.00%</b>

**Source:** Field Survey data July, 2017

Settlement in the project area includes the homestead, vegetation with local, indigenous fruits bearing trees. Different occupation groups like farmers, sharecroppers, day laborers, businesses men, service holders, rickshaw/van pullers, transport workers are living in the area.

### 2.3.2 Accessibility

The site of the Solar Power Plant is situated in the South Nhilla Alikhali Village at 2 No. Nhilla Union under the jurisdiction of Teknaf Upazila. The distance between Dhaka and the plant are about 445 km by road. Although River Naf is flowing across the east side of the plant, the river acts as boarder between Bangladesh and Myanmar, and hence, river way communication is neither suitable nor feasible. Cox's Bazar to Teknaf Highway passes in North-South direction along the western boundary of the project site. Therefore to reach at the plant site, roadway communication is the most suitable means of access. Volumes of heavy goods can also be transported through roadway accessibility. Means of access and road network around the project site (5 km radius) are presented in [Annex 2](#).

Details of areas surrounding the project site are as under:

The project site is situated in the South Nhilla Alikhali village of Teknaf upazila:

North side: Road, salt field, low land, institutional are (college)

South side: Salt Field, low land, settlements, canal, pisciculture, mixed land use

West side: Road, agricultural land, salt field, settlement and industry (brick field)

East side : Pisciculture, low land and river

### 2.3.3 The Air Shed of the Project Area and Land Uses

In order to carry out the socio-economic impact at 1 km radius from the project location has been surveyed initially for the full socio-economic impact of the project in the preparation of the ESIA after the site clearance. Administratively, the air shed of 1 km spreads within 2 No. Nhilla Union of Teknaf Upazila.

The 5 kilometre air shed has been considered to assess the impacts of air pollutants and biodiversity. The 5-kilometre radius air shed has been shown in [Annex 2](#) with the land use within 5 km radius from the project site. Table 2.4 depicts the land use categories for the 5 kilometre air shed of the project site.

**Table 2.4: Present Land Use Pattern for 5 km Impact Zone of the Project**

Land Use	Area (sq. km)	Percentage
Agricultural	10.35	13.18%
Char Land	1.02	1.30%
Forest	0.78	1.00%
Hill	19.85	25.27%
Industrial	0.16	0.20%
Institutional	0.01	0.01%
Mixed Use	0.02	0.03%
Residential	6.08	7.75%
Road	0.20	0.25%
Salt Field	4.72	6.01%
Waterbody	15.00	19.10%
Wetland	1.27	1.62%
<i>Myanmar</i>	<i>19.08</i>	<i>24.29%</i>
<b>Total</b>	<b>78.54</b>	<b>100.00%</b>

### **2.3.4 Project Facilities and Design**

**Environmental considerations:** All power plant design, regardless of the type of power plant, must be in accordance with the rules and regulations which have been established by the relevant national authority. TSEL is committed to comply with all applicable national and international standards. Moreover, the ambient condition of the site is suitable for the power plant project.

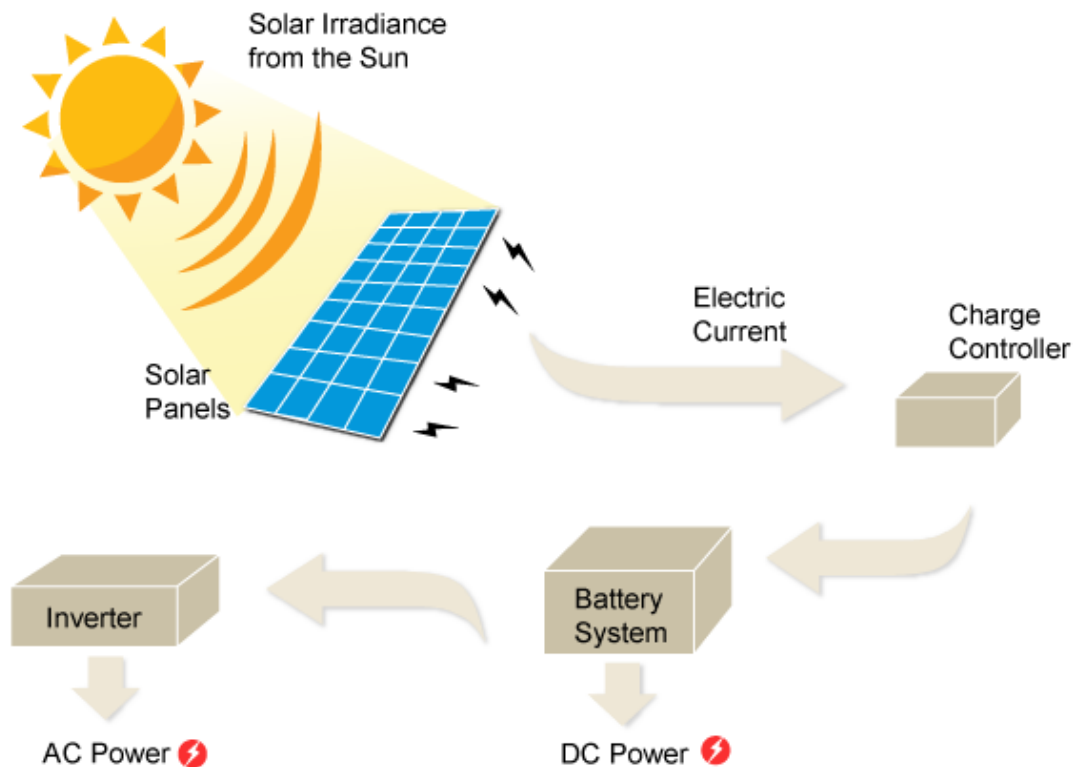
**Water supply:** Water supply should be adequate to meet present and future plant requirements. The supply may be available from an underground or it may be necessary to utilize surface and sub-surface sources. The project sponsors will construct 5 deep tube wells for ensuring adequate water supply for ensuring effective cleaning of the solar panels, daily usage and keeping plausible option firefighting capability.

**Wastewater Disposal System:** There will be no generation of liquid effluent from the project except for sewage waste water which will be bled into septic tanks. There will be no battery disposed into the water bodies and hence no acid leakage from batteries which could contaminate water bodies.

**Transmission and Interconnection:** Grid connected inverters will convert the DC output from solar panels to grid quality AC electricity. During daytime, the solar PV modules are the main sources of power generation. PV modules of 28 MW installation capacity will be connected to inverters, which will convert DC power to AC power at 400V and step up from 0.4 KV to 33 KV and will supply to the national grid transmission line.

### **2.3.5 Power Generation through Solar Modules**

Solar panels, also known as modules, contain photovoltaic cells made from silicon that transform incoming sunlight into electricity rather than heat. ("Photovoltaic" means electricity from light — photo = light, voltaic = electricity.) Solar photovoltaic cells consist of a positive and a negative film of silicon placed under a thin slice of glass. As the photons of the sunlight beat down upon these cells, they knock the electrons off the silicon. The negatively-charged free electrons are preferentially attracted to one side of the silicon cell, which creates an electric voltage that can be collected and channeled. This current is gathered by wiring the individual solar panels together in series to form a solar photovoltaic array. Depending on the size of the installation, multiple strings of solar photovoltaic array cables terminate in one electrical box, called a fused array combiner. Contained within the combiner box are fuses designed to protect the individual module cables, as well as the connections that deliver power to the inverter. The electricity produced at this stage is DC (direct current) and must be converted to AC (alternating current) suitable for use.



**Figure 2: Flow diagram for power generation through solar modules**

The inverter is typically located in an accessible location, as close as practical to the modules. Since inverters make a slight noise, this should be taken into consideration when selecting the location. The inverter turns the DC electricity generated by the solar panels into 120-volt AC that can be put to immediate use by connecting the inverter directly to a dedicated circuit breaker in the electrical panel. The inverter, electricity production meter, and electricity net meter are connected so that power produced by solar electric system will first be consumed by the electrical loads currently in operation. The balance of power produced by solar electric system passes through electrical panel and out onto the electric grid.

### 2.3.6 Description of All Project Components per Design Provided by TSEL

The Project Layout Plan and overall process flow diagram of TSEL is shown in [Annex 2](#).

#### Solar PV modules and grid connected inverters

Grid connected inverters convert the DC output from multicrystalline silicon solar panels to grid quality AC electricity. During daytime, the solar PV modules are the main sources of power generation. PV modules of 28 MW installation capacity will be connected to inverters, which will convert DC power to AC power at 400V and step up from 0.4 KV to 33 KV and will supply to the grid transmission line.



## Project Equipment and Civil Works

TSEL will finish the construction of the project within 1 year. The technical specification of the project is shown in [Annex 5](#).

### 2.3.7 Fuel Choice

**Technaf Solartech Energy Limited** will generate electricity through solar panels. Hence, no fuel will be required.

### 2.3.8 Final Product

Final product is electricity with a yearly production of 43,794,720 KWh.

### 2.3.9 Utility Demand

Water and electricity are necessary for this project both at construction and operational phase. These are shown in Table 2.5 below:

**Table 2.5: Utility Consumption during Construction and Operational Phases**

Construction phase		Operational Phase		
Utilities	Quantity	Utilities	Quantity	Source
Water	10 m <sup>3</sup> /day	Water	22.5 m <sup>3</sup> /day	DTW
Electricity	85 KW	Electricity	50 KW	From own source
		Diesel for Emergency Generator	33 liter Diesel per day	Locally purchased

### 2.3.10 Project Schedule

The project is concern with construction and operation phases. It had designed a 3 months construction. Operational period designed with average 5.35 hours/Dayworking of yearly 365 days for 20 years life time. The maintenance will be in the night time of any day as it will run in the day time. The project schedule is shown in [Annex 6](#).

### 2.3.11 Project Cost

Power plant set up is a matter of cost and this total project investment associated with IPFF-II is BDT 3,016.59 Million. Major cost elements are land lease and site development, factory building construction, procurement of machineries and equipment, mechanical and electrical works. The following table shows the breakdown of project cost:

**Table 2.6: Detailed Breakdown of Project Cost**

<b>Items</b>	<b>Amount in Million BDT</b>	<b>Amount in Million USD</b>
Land & development cost / expenses prior to COD	128.36	1.52
Building & Civil Works	511.79	6.06
Imported Machinery	2,080.26	24.62
Import Cost (other than bank charges)	54.44	0.64
Local Machinery & Equipment	31.72	0.38
Furniture, Fixtures, Office Equipment	15.39	0.18
Bank Fee, Commission, Charges, Interest accrued	131.34	1.55
Other Preliminary & Pre-operating Expenses	63.28	0.75
<b>Total</b>	<b>3,016.59</b>	<b>35.70</b>

### 2.3.12 Generation of Solid, Liquid, and Gaseous Waste

Solid : Solid waste generated to be disposed through DOE approved contactors.

Liquid waste : used water (domestic & office use, floor washing water), solar panel cleaning, and gardening and sewage.

Gaseous waste : SPM, PM<sub>2.5</sub> and PM<sub>10</sub>.

### 2.3.13 Civil Construction

Construction period activities mainly include civil, mechanical and electrical works that will be done to set up the plant. The construction activities which will be done for the project are given below:

#### 2.3.13.1 Site Preparation

Site preparation would comprise the land filling of 2 feet and compaction of 1 acre of land. Prior to construction, a 300mm thick carpet of crushed stone should be spread in the lay-down areas and on the working surface.

#### 2.3.13.2 Piling

The power plant is being founded on piles. The piles could be bored, augured or driven and the type will depend upon the geotechnical data available. However given the close location of existing generating plant it is anticipated that the piles will be of a type which could be installed with the minimum of disturbance to existing components. This would imply bored

or augured piles rather than driven types. Design load tests should be made on test piles for design purposes (design piles).

#### ***2.3.13.3 Foundations***

Foundations should be designed to British Standard Code of Practice BS 8004 or equivalent Bangladesh National Building Code 2006. The design of foundations for all structures and equipment are to be such that differential and total settlements or other movements should not exceed acceptable limits and ensure safe and maintenance free operation of the plant. Detail design parameters for the civil works would be provided by the relevant consultant. The nature of the filling material and the construction techniques used should be such that the less heavily loaded equipment and the buildings may be founded on rafts or spread footings.

#### ***2.3.13.4 Proposed storm water drainage system***

It is recommended that the storm water and sewage system should be separate and should be designed in accordance with BS EN 752 Parts 1 to 4 "Drain and Sewer Systems Outside Buildings". Manhole and chamber covers should be heavy duty throughout. The capacity of the surface water drainage system should be sufficient to deal with a storm return period of 1 in 5 years. The surface water drainage should include all necessary gutters, down pipes, gullies, traps, catch pits, manholes etc. The quality of the discharge shall be in compliant with the required statutory limits and standards of Bangladesh.

#### ***2.3.13.5 Site wall***

A security wall (barbed wire fence) shall be built which should be 3m high around the permanent boundary of the site. The entrance gates have to be securely built with steel gates.

### 3 ENVIRONMENTAL POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

#### 3.1 Environmental Policies of Bangladesh

The GOB has developed a policy framework that requires environmental issues to be incorporated into economic development planning. The Key tenets of the various applicable policies are:

- National Environmental Policy, 1992
- National Environmental Management Action Plan, 1995
- National Conservation Strategy, 1992

Table 3.1 presents an outline of other National legal instruments that will have relevance to the Project with respect to the social and environmental considerations.

**Table 3.1: National Legal Instruments relevant to the Project**

Act/ Rule/ Law/ Ordinance	Enforcement Agency - Ministry/ Authority	Key Features	Applicability to the Project
The Environment Conservation Act, 1995 and subsequent amendments in 2000, 2002 and 2010	Department of Environment Ministry of Environment and Forests	<ul style="list-style-type: none"> <li>• Define Applicability of environmental clearance</li> <li>• Regulation of development activities from environmental perspective</li> <li>• Framing applicable limits for emissions and effluents</li> <li>• Framing of standards for air, water, and noise quality</li> <li>• Formulation of guidelines relating to control and mitigation of environmental pollution, conservation, and improvement of environment</li> <li>• Declaration of Ecologically critical areas</li> </ul>	Applicable as the project activity associated with environmental issues
Environmental conservation Rules, 1997 and subsequent amendments in	Department of Environment Ministry of Environment	<ul style="list-style-type: none"> <li>• Declaration of Ecologically critical areas</li> <li>• Requirement of environmental clearance certificate for various</li> </ul>	Applicable Projects falls under Red Category and require EIA

Act/ Rule/ Law/ Ordinance	Enforcement Agency - Ministry/ Authority	Key Features	Applicability to the Project
2002, 2003 and 2010	and Forests	categories of projects <ul style="list-style-type: none"> <li>• Requirement of IEE/EIA as per category</li> <li>• Renewal of the environmental clearance certificate within 30 days after the expiry</li> <li>• Provides standards for quality of air, water and sound and acceptable limits for emissions/discharges from vehicles and other sources</li> </ul>	approval prior to start construction and environmental Clearance Certificate prior to start of operation
Environment Court Act, 2000 and subsequent amendments in 2002	Ministry of Environment and Forests and judiciary	<ul style="list-style-type: none"> <li>• GoB has given highest priority to environment pollution</li> <li>• Passed 'Environment Court Act, 2000 for completing environment-related legal proceedings effectively</li> <li>• Provides the Jurisdictions of environment court, the penalty for violating court's order, trial procedure in special magistrate's court, the power of entry and search, the procedure for investigation, procedure and power of environment court, the authority of environment court to inspect, appeal procedure and formation of environment appeal court.</li> </ul>	Applicable for completing environmental legal requirements effectively

### Renewable Energy Policy of Bangladesh

The renewable energy policy of Bangladesh has been approved on December 18, 2008 with the target of developing renewable energy resources. This Policy laid out the target of meeting 5% of total power demand from renewable energy sources by 2015 and 10% by 2020. The policy provides an overall guidance of

- Institutional arrangements
- Resource, technology, and program development
- Investment and fiscal incentives
- Regulatory policy

The policy promotes the appropriate, efficient and environmentally friendly use of renewable energy. It also suggests that for large biomass electricity projects (i.e., greater than 1 MW) the project developer must demonstrate that the biomass is being sustainably harvested and that no adverse social impact will result from that development. It also restricted the larger scale production and use of biofuels which may jeopardize the existing crops.

Details are discussed in [Annex 7](#).

### **3.2 World Bank Operational Policy/Procedure (OP/BP) 4.03 – World Bank Performance Standards for Private Sector Activities**

The World Bank follows an operational policy statement (updated in February 2011), which stipulates that all operations are carried out in an environmentally responsible manner and that projects must comply with all local environment legal obligations and appropriate World Bank guidelines. World Bank Operational Policy / Procedure (OP/BP) 4.03 – World Bank Performance Standards for Private Sector Activities governs the World Bank requirements applicable to IPFF II.

The eight IFC Performance Standards have been adopted by the Bank as the World Bank Performance Standards for Projects Supported by the Private Sector (“WB Performance Standards”) for application to Bank support for projects (or components thereof) that are designed, owned, constructed and/or operated by a Private Entity, in lieu of the World Bank’s safeguard policies (“WB Safeguard Policies”). Details of all performance standards along with applicability with the project has been shown [Annex 7](#).

### **3.3 Safeguard Requirements of Equator Principle Financial Institutions**

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making. The EPs apply globally, to all industry sectors and to four financial products 1) Project Finance Advisory Services 2) Project Finance 3) Project-Related Corporate Loans and 4) Bridge Loans. The relevant thresholds and criteria for application is described in detail in the Scope section of the EPs.

The EPs have also helped spur the development of other responsible environmental and social management practices in the financial sector and banking industry and have supported member banks in developing their own Environmental and Social Risk Management Systems.

The ten requirements of the Equator Principle Financial Institutions (EPFIs) are discussed in [Annex 8](#).



### 3.4 Comparative Analysis of World Bank Requirements and Bangladesh Regulatory Framework

Table 3.2 lists some key comparisons between GoB and World Bank policies and guidelines in terms of processes for Environmental and Social Impact Assessment (ESIA), categorization (per Bangladesh DoE), stakeholder engagement, public consultation etc. based on the provisions of Performance Standard 1 (Assessment and Management of Environmental and Social Risks and Impacts).

**Table 3.2: Comparison between GOB and World Bank Policies and Guidelines as Applicable to IPFF II Subprojects**

Sl. No.	Criteria	Requirements as Per GoB Laws and Regulations	World Bank Requirements
1	Type of environmental and social analysis	Project specific	Project specific, regional, sectoral, strategic including impact from associated facilities and assessment of cumulative impacts. The scope of identification of risks and impacts will be consistent with good international industry practice.
2	Basis for categorization ( <i>note: IPFF II will follow the E&amp;S risk rating approach prescribed in the BB ESRM Guidelines</i> )	Categorizations of industrial projects are done according to the list in Schedule-1 of the ECR, 1997. As per rule-7(2) of ECR, these categorizations are based on consideration of their sector, site and impact on the environment. Non-industrial projects are reviewed on a case by case basis by the DoE for clearance.	Categorization depends on the project/business activity being financed, magnitude of risks and impacts, context and also the type of investment, as follows: <ul style="list-style-type: none"> <li>• Significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.</li> <li>• Limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.</li> <li>• Minimal or no adverse environmental or social risks and/or impacts.</li> </ul>
3	EA /ESIA scope and outputs	Since detailed rules and regulations for EA have not been	Establish and maintain a process for identifying E&S risks and impacts of the project, covering the 8 thematic Performance

Sl. No.	Criteria	Requirements as Per GoB Laws and Regulations	World Bank Requirements
		<p>prescribed, EA outputs are not specified. However, the industrial sector guidelines, the water sector guidelines and the road sector guidelines have specific EA output requirements, such as:</p> <p>Baseline survey</p> <ul style="list-style-type: none"> <li>• IEE/EIA Report</li> <li>• Site clearance</li> <li>• Risk analysis and management</li> <li>• Analysis of alternatives</li> </ul>	<p>Standards as relevant and applicable and depending on the type, scale, and location of the project. The tools used should be commensurate with the level of potential impact and risks. ESIA process may comprise of the following:</p> <ul style="list-style-type: none"> <li>• A full-scale ESIA, a limited or focused ESIA, or straightforward application of environmental siting, pollution standards, design criteria, or construction standards.</li> <li>• Environmental and/or social audits or risk/hazard assessment when the project involves existing assets.</li> <li>• Environmental and social due diligence if assets to be developed, acquired or financed have yet to be defined.</li> <li>• Comprehensive ESIA, including an examination of alternatives for green-field developments or large expansions with specifically identified physical elements, aspects, and facilities that are likely to generate potential significant environmental or social impacts.</li> </ul> <p>E&amp;S risks and impacts shall be identified in the context of the project's area of influence.</p>
4	Mitigation hierarchy	Not comprehensively addressed	<p>Mitigation hierarchy is one of the core underlying principles of the WB approach to identification, assessment, and management of E&amp;S risks and impacts. It is required to adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,<sup>1</sup> and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.</p>

<sup>1</sup> Acceptable options to minimize will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate.

Sl. No.	Criteria	Requirements as Per GoB Laws and Regulations	World Bank Requirements
5	Public consultation	No special mention is made for public consultation in BECA. Sectoral guidelines mentioned above have prescribed consultation.	<p>Extent and degree of engagement required by the consultation process to be commensurate with the project's risks and impacts to the affected communities. Consultation process:</p> <p>(i) to begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise; (ii) be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information in a language(s) and format understandable to Affected Communities; (iii) focus inclusive engagement on those directly affected as opposed to those not directly affected.</p> <ul style="list-style-type: none"> <li>For projects with potentially significant adverse impacts on affected communities, it is required to conduct a process of informed consultation and participation by actively engaging with stakeholders throughout the lifecycle of the project</li> <li>For projects with adverse impacts on Indigenous People the project sponsor is required to engage them in the ICP process and in certain circumstances required to obtain their Free, Prior, and Informed Consent (FPIC) - requirements related to Indigenous Peoples and the definition of the special circumstances requiring FPIC included in PS7.</li> </ul>
6	Disclosure of information	BECA makes no reference to disclosure. The Sectoral guidelines prescribe some provisions for disclosure	Affected communities to be provided with access to relevant information on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance

Sl. No.	Criteria	Requirements as Per GoB Laws and Regulations	World Bank Requirements
			mechanism. Project to provide periodic and ongoing updates on status of implementation of the various plans developed as part of the ESA process. Disclosure of relevant information to affected communities to continue during the planning, implementation, monitoring, and evaluation of compensation payments, livelihood restoration activities and resettlement.
7	Environmental and Social Management System (for sub-projects)	Environmental Management requirements are established by ECA 95 and ECR 97 but there are no social equivalents.	<p>Environmental and Social Management System will be established for sub-projects and will include the following core elements:</p> <ul style="list-style-type: none"> <li>▪ E&amp;S Policy</li> <li>▪ System for identification of risks and impacts and, in particular, conducting ESIA's</li> <li>▪ Management programs</li> </ul>
8	Management Programs and Action Plans	Not addressed	The sub-project will establish management programs that, in sum, will describe mitigation and performance improvement measures and actions that address the identified environmental and social risks and impacts of the project. The management programs will establish ESAPs which will define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation. As appropriate, the management program will recognize and incorporate the role of relevant actions and events controlled by third parties to address identified risks and impacts.

### 3.5 World Bank Categorization of Projects

The Bank screens the Private Sector Activity in order to determine the nature and extent of the environmental and social assessment needed, based on the type, location, sensitivity, and scale of the activity, as well as the nature and magnitude of its potential impacts. This screening also identifies any additional information required to complete the Bank's environmental and social review and determine whether to support the activity. The Project Activity is categorized by the Bank as Category A, B, C, depending on the nature of the activity and financing mechanism, as follows:

**Table 3.3: World Bank's Categorization for Projects**

Category	Justification
Category A	Projects are those whose impacts are sensitive, diverse, and unprecedented, felt beyond the immediate project environment and are potentially irreversible over the long term.
Category B	Projects involve site specific and immediate project environment interactions, do not significantly affect human populations, do not significantly alter natural systems and resources, do not consume much natural resources and have adverse impacts that are not sensitive, diverse, unprecedented and reversible.
Category C	Projects are mostly benign and are likely to have minimal or no adverse environmental impacts.
Category FI	A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

*Source: World Bank Environmental and Social Safeguard Policy*

The TSEL sub-project is a utility scale (28 MWP) solar PV power plant project and the project activities have potential limited adverse environmental or social risks and/or impacts on a number of issues; which are site-specific and largely reversible. These impacts can be avoided or mitigated by adhering to applicable standards, procedures, guidelines and design criteria as described in the relevant WBG and international good practice documents. The TSEL subproject may therefore be classified in the Category 'B' according to WB OP 4.03.

### 3.6 E&S Risks Rating as per Bangladesh Bank IPFF-II Guidelines

E&S risk rating considers multiple factors that PFIs shall take into account in their risk exposure with regard to E&S issues, including its reputational and contextual risks. The high-level guidance for risk rating is presented in Table 3.4 below:

**Table 3.4: E&S Ratings of Sub-projects**

Category	Description
High risk	<p>Sub-projects that are likely to have significant adverse E&amp;S impacts that are diverse, irreversible, or unprecedented.</p> <p>Examples of significant impacts can be impacts on critical habitats, impacts on vulnerable groups or ethnic minorities, large-scale involuntary resettlement or economic displacement, or critical cultural heritage.</p> <p>PFI will always rate sub-projects that may involve activities on the List of E&amp;S Sensitive Activities as High risk. It should be noted that there may be other high risk situations beyond those included in this List. Therefore, E&amp;S risk rating will be based on a confluence of various factors in specific sub-project circumstances where sector of operation represents only one of many considerations. Both specific nature of impacts and their scale should be considered.</p>
Medium risk	<p>Sub-projects that are likely to have adverse E&amp;S impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures and international best practice. Potential adverse environmental and/ or social impacts on communities or environmentally important areas are smaller in scale than those of High Risk transactions.</p>
Low risk	<p>Sub-projects that do not have the characteristics of High or Medium risk sub-projects are classified as Low risk category and typically involve business activities with minimal or no adverse E&amp;S impacts.</p> <p>While PFI would have Low risk rating within their overall ESMS, IPFF II sub-projects may not be rated Low risk.</p>

*Source: Bangladesh Bank IPFF-II ESPP Guidelines*

The ESIA prepared in line with IPFF-II guidelines indicates the risks to the local environment during pre-construction and construction phase is Medium due to generation of dust and intermittent noise due to the construction machineries used. These impacts are largely reversible and were mitigated. Therefore this phase of the project, the risks were medium.

During the operation phase the risks fall under “Low Risk” since the project activities will have minimal environment and social impacts.

### 3.7 DoE Categorization

Depending upon location, size and severity of pollution loads, projects/activities have been classified in the Environmental Conservation Rules (ECRs) into four categories:

1. Green,
2. Orange A
3. Orange B
4. Red



As per SRO No. 349- act/2017 (24 December 2017) issued by the DOE on the categorization to the Environment Conservation Rules 1997, Solar Power Plants (above 1 MW) falls under category “Orange B”. The DOE approved this project under this category.

### 3.8 Triggering of the WBG Performance Standards (PS) in the present project

The triggering of the WBG Performance Standards (PS) in the present project with explanations are given in the Table 3.5 below. The applicable GOB laws, Rules, Policies, and Guidelines are listed alongside the WBG PS. The International Conventions signed by Bangladesh are also included, as once signed these are equivalent to the laws.

**Table 3.5: Triggering of the WBG Performance Standards (PS)**

Sl.	PS and Title	Triggered	Applicable Bangladesh Laws/Rules and conventions to which Bangladesh is a Party
		Yes/No	
1	<b>Performance Standard 1:</b> Assessment and Management of Environmental and Social Risks and Impacts	Construction Phase: Yes	<ul style="list-style-type: none"><li>• Bangladesh Environmental Conservation Act (ECA95), 1995 and amendments;</li><li>• Environment Conservation Rules (ECR), 1997 and amendments;</li><li>• National Environmental Policy, 1992;</li><li>• National Environmental Management Action Plan, 1995.</li></ul>
		Operation Phase: Yes	
<b>Explanations:</b> PS1 is an umbrella Standard as Assessment and Management of Environmental and Social Risks and Impacts are important in all projects with land-based activities (i.e. during construction, operation and decommissioning phases). PS1 is triggered in this project. The issues that may pose potential E&S risks and/or impacts include air emissions and GHG benefits, electronic wastes, ecological impacts and engagement of labor etc. These issues have to be assessed to determine the extent of the risks and impacts.			
2	<b>Performance Standard 2:</b> Labor and Working Conditions	Construction Phase: Yes	<ul style="list-style-type: none"><li>• Bangladesh Factories Act (1965);</li><li>• Bangladesh Labor Act, 2006;</li><li>• Bangladesh labor Rules (2015),</li><li>• Bangladesh Children’s Act 2013;</li><li>• ILO Conventions 29, 87, 98, 100, 105, 111 and 182.</li></ul>
		Operation Phase: No	
<b>Explanations:</b> PS2 is triggered in this project; as during all phases of the project, labor force will be needed and mobilized, to carry out various duties to construct and operate the project. It is therefore necessary for the Project to maintain appropriate labor and working conditions.			
3	<b>Performance Standard 3:</b> Resource Efficiency and	Construction Phase: Yes	<ul style="list-style-type: none"><li>• Bangladesh Environmental Conservation Act (ECA), 1995</li></ul>

Sl.	PS and Title	Triggered	Applicable Bangladesh Laws/Rules and conventions to which Bangladesh is a Party
		Yes/No	
	Pollution Prevention	Operation Phase: Yes	<ul style="list-style-type: none"><li>Environment Conservation Rules (ECR), 1997 (subsequent amendments in 2002 &amp; 2003)</li></ul>
<b>Explanations:</b> PS3 is triggered in this project; as it will involve use of a lot of resources both raw, semi-manufactured, manufactured components and energy. Thus, pollutants will be produced and these need to be minimized to comply with standards; resources and energy conservation are also prime needs. Construction works are likely to generate wastes during the construction phase hence PS3 is triggered.			
4	<b>Performance Standard 4:</b> Community Health, Safety, and Security	Construction Phase: Yes	<ul style="list-style-type: none"><li>Bangladesh Environmental Conservation Act (ECA), 1995</li><li>Environment Conservation Rules (ECR), 1997 (subsequent amendments in 2002 &amp; 2003)</li></ul>
		Operation Phase: No	
<b>Explanations:</b> PS4 is not triggered in the project as there is no adverse effect in terms of water, air and noise on the local community.			
5	<b>Performance Standard 5:</b> Land Acquisition and Involuntary Resettlement	Construction Phase: No	Acquisition and Requisition Ordinance, 1982.
		Operation Phase: No	
<b>Explanations:</b> PS5 will not be triggered in the project. Land has been leased from landlords on voluntarily basis and no resettlement was required.			
6	<b>Performance Standard 6:</b> Biodiversity Conservation and Sustainable Management of Living Natural Resources	Construction Phase: Yes	<ul style="list-style-type: none"><li>Bangladesh Environmental Conservation Act (ECA), 1995</li><li>Environment Conservation Rules (ECR), 1997 (subsequent amendments in 2002 &amp; 2003)</li></ul>
		Operation Phase: No	
<b>Explanations:</b> PS6 is not triggered in the project as the land was barren and previously salt cultivation used to take place in the project area.			
7	<b>Performance Standard 7:</b> Indigenous Peoples	Construction Phase: No	Chittagong Hill Tracts Regional Council Act, 1998.
		Operation Phase: No	
<b>Explanations:</b> PS7 is not triggered in the project. There are no indigenous people living in the impact zone of the project.			
8	<b>Performance Standard 8:</b> Cultural Heritage	Construction Phase: No	Antiquities Act, 1968; Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972 (World Heritage Convention) (Ratified 1983).
		Operation Phase: No	
<b>Explanations:</b> PS8 is not triggered in the project. Based on current knowledge, there are no known cultural heritage installations in the project impact area. Existing communities in the area do not have significant intangible heritage also.			

## **4 APPROACH AND METHODOLOGY**

### **4.1 General Approach**

Government of Bangladesh has set up the goal of providing electricity to all by 2020 and to ensure reliable and quality supply of electricity at a reasonable and affordable price. Sustainable social and economic development depends on adequate power generation capacity of a country. There is no other way for accelerating development except to increase the power generation by fuel diversification. Development of Renewable Energy is one of the important strategies adopted as part of fuel diversification program. In line with the Renewable Energy policy 2009, the government is committed to facilitate both public and private sector investment in renewable energy projects to substitute indigenous non-renewable energy supplies and scale up contributions of existing renewable energy based electricity productions. The Renewable Energy Policy envisions that 5% of total energy production will have to be achieved by 2015 and 10% by 2020. To achieve this target, GOB is looking for various options preferably Renewable Energy resources. Under the existing generation scenario of Bangladesh, Renewable Energy has a very small share to the total generation. The share of Renewable Energy exceeds more than 1% till now. The present government is placing priority on developing Renewable Energy resources to improve energy security and to establish a sustainable energy regime alongside of conventional energy sources. Government has already launched ‘500MW Solar Power Mission’ to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the immense opportunities, Technaf Solartech Energy Limited (TSEL) is striving to establish a solar based power plant at Alikhali, South Nhill, Cox’s Bazar with 20 MW capacities as a 20 years facility to BPDB.

As per Environment Conservation Rules ’1997 (amended 2002) this type of industry is fallen into Red category. An Initial Environmental Examination (IEE) is to be carried out for this power plant as per regulation of Department of Environment under Ministry of Environment and Forest for getting site clearance. And after site clearance, an Environmental Impact Assessment (EIA) is a formal requirement for the power plant according to the Bangladesh Environment Conservation Act’1995 (Amended 2010) and the Environment Conservation Rules ’1997 (Amended 2002). Bangladesh Centre for Advanced Studies (BCAS) has been engaged by Technaf Solartech Energy Limited (TSEL) to conduct the IEE and ESIA study for this project. After submitting the IEE to DoE, TSEL has already got site clearance for the project. Bangladesh Centre for Advanced Studies (BCAS) has carried out detailed Environmental and Social Impact Assessment (ESIA) to comply with DoE Guidelines as well as the WB Operational Policies (OPs) and Guidelines and JICA Safe Guards Policy for the power plant.

Technaf Solartech Energy Limited (TSEL) is in the process to establish and operate a grid-tied solar power plant at Alikhali, South Nhill, Teknaf, Cox's Bazar beside Arakan Road, around 0.5 km from the bank of Naf River, 2 km from Teknaf PBS-2, 33/11 kV sub-station at Ledha, Teknaf. The total area of the project site is about 116 acres – whole land has been taken lease from the concerned landowners for the project period. Because TSEL has been approved to implement and operate a 20 MW Solar Power Plant for supplying power to Bangladesh Power Development Board (BPDB) on an off-take basis for a contracted period of 20 years. TSEL has qualified for the bid on an unsolicited basis. The required commercial operation date for the project is 12 months from date of signing of project agreements i.e., Power Purchase Agreement and Implementation Agreement. For financing TSEL is expected to source fund from financial institutions having strong commitment on sustainable development.

## **4.2 Methodology**

Based on the above Scope of Work, the study built upon the baseline survey carried out by BCAS as Environment and Social Consultant for the Environmental and Social Impact Assessment (ESIA) during March 2017 to September 2017. The ESIA was carried out to comply with the TOR provided by TSEL as well as to comply with the conditions of the Site Clearance by DoE.

This ESIA have been carried out as a follow up study of IEE and is based on the primary data generated during the period from March 2017 to September 2017. Secondary data was obtained from various sources and field visits. Several field visits had been undertaken to the project location with a view to update the findings of the baseline study carried out by BCAS. During the study period the following steps were followed:

1. Baseline Survey/monitoring data acquisition of the baseline both environmental and social to carry out the ESIA;
2. Understanding the technical aspects of the power plant through primary field data, secondary literature and stakeholder consultations;
3. Identification of potential environmental impacts and evaluating the consequences through using a checklist method has been carried out;
4. Identification of impacts was undertaken using Checklist Matrix and Issues forecasting tabular methods;
5. Discuss with the people living in the plant area about the mitigation measures suggested in the ESIA through stakeholder's consultations and general public consultation;
6. Development of an Environmental and Social Management Plan (ESMP) for possible mitigation/ enhancing measures, respectively, for negative and beneficial impacts;
7. Suggestion of mitigation measures for residual impacts;
8. Completion of a comprehensive social impact assessment through primary data collection;
9. Primary data collection from 30% of the total households within 1 km radius of the project area included in the baseline study carried out by BCAS. The criteria for choosing 30% of households within 1 km radius of the project site was judgmental based on the

expected picture required for the specific study. Additionally, the area is in a mixed rural cum industrial zone. A power plant and few brick fields are situated within close vicinity of the power plant. In choosing the households only the nearby rural households were chosen, as they are going to be affected mostly during construction and operation. A number of Focus Group Discussions (FGDs) with the different categories of stakeholders were held including women;

10. Detailed environmental and socio-economic baseline survey was undertaken throughout the high impact zone (0.4km radius), and low impact zone (0.6km radius) of the project airshed. The basis was that the impact of the project was not expected to exceed the considered radius both from the environmental and social economic impacts due to the project. This is evident from the findings in the anticipated environmental impacts of this study which shows that they are well within the DOE standards. During the mapping exercise, in-depth consultations with local stakeholders were carried out to aid accurate identification of suitable plots. Use of maps and also utilization of the historic maps was undertaken for identifying the plots and ground level. Field verification was undertaken by the team leader after the field data collection. Updated GIS version was applied to finalize the land use map; and

The following primary data was obtained during the ESIA processes:

- Socio-Economic survey data;
- Baseline air quality data;
- Baseline noise data (day and night time);
- Groundwater data from deep and shallow tube wells; and
- Surface Water data

This ESIA report has been prepared in compliance with the following documents:

- Department of Environment (DoE), Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, *ESIA Guidelines for Mix Zone Industrial and residential*, June 1997.
- World Bank Performance Standards 2008
- EHS guidelines for thermal power plants IFC.

List of studies and work streams required in compliance with the applicable laws and regulations as below:

**Table 4.1: List of studies and work streams**

Study Topics	Application WBG PS, ESHG or other national/ international guidelines	Reference Chapter/ Annex
Project Justification and Purpose, Project Location, Project Description and Associated Activities	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 2</a> <a href="#">Annex 1, 2, 3, 4, 5 and 6</a>

Study Topics	Application WBG PS, ESHG or other national/ international guidelines	Reference Chapter/ Annex
Environmental Policy, Legislative And Institutional Framework	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 3</a> <a href="#">Annex 7</a> and <a href="#">8</a>
Project Categorization	World Bank Environmental and Social Safeguard Policy; Bangladesh Bank IPFF-II ESPP Guidelines; Environment Conservation Rules 1997	<a href="#">Chapter 3.5</a> <a href="#">Chapter 3.6</a> <a href="#">Chapter 3.7</a>
Triggering of WB Performance Standards	PS1-8	<a href="#">Chapter 3.8</a>
Stakeholder Consultation, KII, FGD and public consultation	PS1: Assessment and Management of Environmental and Social Risks and Impacts PS4: Community Health, Safety, and Security	<a href="#">Chapter 4.5</a> <a href="#">Annex 9</a>
Environmental And Social Baseline Study	PS1: Assessment and Management of Environmental and Social Risks and Impacts PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<a href="#">Chapter 5</a> <a href="#">Annex 10</a> , <a href="#">11</a> , <a href="#">12</a> , <a href="#">13</a> and <a href="#">15</a>
Analysis Of Alternatives		<a href="#">Chapter 6</a>
Risk Analysis and Identification	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 7</a>
Impact Identification And Evaluation	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 8</a>
GHG Emission	PS3: Resource Efficiency and Pollution Prevention	<a href="#">Chapter 8.5.3</a> <a href="#">Annex 14</a>
Mitigation Measures	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 9</a>
Environmental And Social	PS1: Assessment and	<a href="#">Chapter 10</a>

Study Topics	Application WBG PS, ESHG or other national/ international guidelines	Reference Chapter/ Annex
Management Program (ESMP)	Management of Environmental and Social Risks and Impacts PS2: Labor and Working Conditions to be done PS3: Resource Efficiency and Pollution Prevention	
Monitoring, Evaluation And Reporting		<a href="#">Chapter 11</a>
Labor Assessment	PS2: Labor and Working Conditions	<a href="#">Chapter 11.6</a> <a href="#">Annex 16</a> <a href="#">Annex 19</a>
Environmental and Social Audit	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 11.7</a> <a href="#">Annex 17</a>
Environmental and Social Commitment Plan (ESCP)	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<a href="#">Chapter 11.8</a> <a href="#">Annex 18</a>

### 4.3 ESIA Team

The ESIA Team comprises of the following:

- |  |                     |
|--|---------------------|
| 1. Dr. Moinul Islam Sharif, ESIA Expert                  | Team Leader         |
| 2. Mohammad Imtiaz Sharif, Social & Environmental Expert | Project Coordinator |
| 3. Mr. Shaker Ali, Modeling Expert                       | Member              |
| 4. Mr. Ikbāl Hossain, ESIA Expert                        | Member              |
| 5. Md. Saifullahil Azom, GIS and Land Use Expert         | Member              |
| 6. Mr. Sadman K. Monsur. Socio-economist                 | Member              |
| 7. Mr. Moniruzzaman, Field Surveyor                      | Member              |
| 8. Mr. ZH Khan, Field Surveyor                           | Member              |
| 9. Mr. Kawser Ahmed, Field Surveyor                      | Member              |
| 10. Mr. Imam Hossain, Field Surveyor                     | Member              |
| 11. Mr. Sohel, Data Analyst and SPSS expert              | Member              |
| 12. Ms. Dil Meher Banu, DTP Incharge                     | Member              |



13. Dr. Monirul Islam, Biodiversity Expert

Member

#### **4.4 Assumptions, uncertainties and constraints**

The data collected for inclusion in the ESIA study has been conducted within a limited time frame. More time was required to carry out a more detailed Social Impact Assessment (SIA) of the PAPs who are directly affected by the project which would involve a 100% census of the PAPs and suggest a Livelihood Restoration Framework leading to an assessment of additional benefits to be given to the PAPs by TSEL. However, the ESIA has been prepared with an emphasis to cover all important environmental impacts and formulate pragmatic recommendations for mitigating any adverse environmental impacts.

#### **4.5 Stakeholder Consultation**

##### **4.5.1 Stakeholder Analysis**

The consultation approach was based on a combination of Formal and Informal meetings, Focus Group Discussions (FGDs), Key Informant Interview (KII) with the local elite, college teachers, women group, administration and Ward member. The formal meetings were held through prior notice, appointment and invitation including all the Project Affected Households (PAHs) staying within 1 km radius from the project site, district administration, local administration and other stakeholders in the affected area. Structured questionnaire survey was conducted with the PAHs. In addition, census survey was conducted with another set of structured questionnaires with all the landowners. The findings of the structured questionnaire survey with the PAHs have been described in Chapter 5 of this report. The basis for selecting the stakeholders was based on the following criteria:

- i) Identifying the landowners and other PAHs
- ii) List the number of share croppers or impacted in any other way in the acquired land
- iii) Identify the government agencies connected with the project
- iv) Identify local elites and academicians for their view on the project
- v) Identify the closed households or commercial institutions of the project site and make them aware about the impacts of the project and noted their concerns and reporting.
- vi) Identify the local NGOs working in the area

Three formal meetings specifically including all categories of PAPs were held. One large public consultation meeting which included all types of people affected directly and indirectly. Representatives from the project areas, district and local administration, as well as other community representatives including prominent local people, lawyers, journalists, academicians and the representative from Technaf Solartech Energy Limited (TSEL). Meeting minutes of the consultation with the stakeholders are shown in [Annex 9](#).

## 4.5.2 Consultation and Participation Mechanism

### 4.5.2.1 Consultation

Public consultation has been carried out during different activities in the Project cycle, using different techniques such as public meeting, small group meeting, informal meeting as per environmental social and procedures of BCAS. Meeting minutes of consultation with the stakeholders are shown in the end of this chapter. During such consultations the public was informed about the project in general and in particular about the following:

1. Finalization of the Project plan.
2. Design standards of the Technaf Solartech Energy Limited in relation to the applicable in FINANCIER, international standards like IFC WB, etc.
3. Health Impacts and their mitigation as part of the Environmental and Social Management Plan (ESMP).
4. Measures taken to avoid public utilities and other social infrastructure such as school, hospital, roads etc. as well as to generate employment opportunities, and assist with the development of a small enterprise.
5. To ensure the pollution free environment during operation etc.
6. Social and corporate responsibility and policies should be followed.
7. Ensure payment to the landowners on timely manner from whom the project land was taken as lease.
8. Compensation for any damage associated with the project development.

### 4.5.2.2 Stakeholders' Participation Mechanism

A series of public discussion activities were undertaken by BCAS. These programs included Key Informant Interview (KII), discussion with the various groups of Project Affected People (PAPs), Focus Group Discussion (FGD) and public consultation with all the stakeholders.

### 4.5.2.3 Public Awareness and Disclosure

In general community stakeholders are categorized into two broad categories: directly affected and indirectly affected. Directly affected community stakeholders include people who will have the potentiality to be directly impacted through loss of land, crops and other assets, environmental and social adverse impact due to the project. Indirectly community stakeholders include those people of the project area who have the potentiality to be affected by the project activity at a limited extent.

The methodology used for the disclosure process was as follows:

- i) During the sample-based socio-economic survey which had covered 50 households within the impact zones, dissemination of information on the project activities was also taken and information disclosure carried out.

- ii) Preliminary Informal meetings with various categories of the people
- iii) A public meetings which included all the PAPs, representatives from the three project impacted areas, district and local administration, as well as other community representatives including prominent local people, lawyers, journalists and academician

Preliminary Informal meetings with various categories of the PAPs and households were completed during survey period.

**Table 4.2: Focus Group with different groups**

No.	Village	No. of people attended	Date	Occupation
1	Alikhali	13	10.09.2017	Salt farmers
2	Alikhali	14	11.09.2017	Landowners (various occupation)
3	Alikhali	12	12.09.2017	Farmers

#### 4.5.3 Consultation

Two forms of public consultation were used during preparation of the ESIA to discuss the project and involve the community in planning the mitigation measures and developing the Environmental Monitoring Plan. These are:

- (i) Public meetings were held in the project area, to which representatives of the stakeholders were invited. Attendees were informed about the aim of the relevant project and the benefits they would bring, together with their likely impacts and the ways in which they would be mitigated. Participants were invited to discuss their views and concerns, which were then incorporated into the ESIA.
- (ii) Ad hoc discussions were also held on site with people and communities who could be affected by the project, so that views could be expressed in a less formal setting. These were also considered in preparing the ESIA.

Despite various issues discussed and evaluated due to possible impacts from the proposed paint project activities upon the surrounding physical, social and biological environment, a significant issue is also considered during the ESIA study which is term as public consultant. Considering the value of the suggestions and opinion of the local people, Government and Non-government officials it has become a mandatory criteria to incorporate their suggestion prior to ESIA approval i.e. environmental clearance from the department of Environment. As such, a brief Public consultation was conducted followed by individual interviews with respective government and non-government officials and concerned person of the locality.

#### **4.5.4 Issues Discussed**

The local people were interviewed three ways. In open type public meeting, some prefixed agenda relating to propose project work were discussed. The issues were raised in such way that everybody was able to express his /her opinion without hesitation. A friendly atmosphere was created prior to starting of the informal discussion.

The issues were as follows:

- An overview of the work, its background, justification of settling and future prospect etc.
- Overall impacts on surrounding physical, biological and social environment as observed or anticipated by participants due the plant's setting and future operational stage.
- Overall safety and other precautionary measures taken against any kind of accidental hazard.
- Local people's aspiration about proposed activities of this project.

The findings of the meetings are briefly discussed in the following paragraph:

- TSEL will supply electricity to the National grid through REB, which is expected to be delivered to the people of Teknaf – local people are happy with the project.
- The solar project is good for economy and environment.
- Employment will be generated for the local peoples and also at the national level.
- Local people are interested to get employed in the plant based on their qualification. Besides, TSEL confirmed engagement of at least 100 local laborers during the whole project tenure. Besides, indirect benefits will be attained by the local shops and other industries.

After all this project is utilizing mostly null land (salt field), thus land value will increase around the project area.

#### **4.5.5 Minutes of the Stakeholders' Consultation Meeting**

A stakeholder consultation meeting on Social and Environmental Impact Assessment (ESIA) of the Technaf Solartech Energy Limited was organized by BCAS at the plant premise on 3<sup>rd</sup> October, 2017. Total 24 local people from Alikhali, South Nhilla belonging to different occupational groups (e.g. businessman, service holder, labor, farmer etc.) attended the consultation meeting. Apart from BCAS personnel, officials of TSEL were present in the meeting. The consultation meeting was presided by H K Anwar and was moderated by Mr. Mahmudul Hasan, Managing Director, TSEL. On behalf of BCAS, Mr. Mohammad Imtiaz Sharif, Social & Environmental Expert, described the environmental and social impact of TSEL power plant. Mr. Imtiaz described that the operation of the solar plant is very much environment friendly. However, during construction, noise from piling and other construction activities will be the major problem for the nearby people. It was described that construction activities generating excessive noise has been suggested to be stopped during night time. It was also described that TSEL will use less noise generating equipment, and there will be different mechanisms to reduce noise within acceptable limit set by DoE. After Mr. Imtiaz's

description, local participants provided their opinions regarding the power plant, which have been depicted below:

- Local people expressed their positive opinion about the power plant. They opined that the plant will be helpful to develop the electricity demand of the country as well as economic prosperity of the country. The landowners told that they leased their lands willingly to TSEL and received better than current market rate. Local people also told that a good number of local people are already working in different construction works. Hence, employment opportunity has been improved in the area after starting of TSEL project. Local people also expressed that provision of more job opportunities will be further beneficial to them. Besides, they also opined that economic activities have also been increased at the nearby areas of the TSEL site – a few shops have also been established there.
- The local participants expressed that they expect TSEL to take necessary all the steps to minimize the social and environmental impacts on nearby residents.
- The landowners told that TSEL is leveling all the land parcels and plot identification isles are disappearing. Hence, they are very much worried about taking over their lands on the exact location after the end of the project. In reply, Mr. Mahmudul Hasan, Managing Director, TSEL told that each plot corner has been marked with a permanent pillar before abolishing the concerned isle. Besides, TSEL is preserving digital map of the whole site with land ownership details. Hence, after completion of project tenure, TSEL will return land to the landowners on the previous location.

Finally, the stakeholder consultation meeting was concluded with the commitment from TSEL representative that local people will always have complete access to TSEL personnel and are welcome to share any problem being created by TSEL to local people. TSEL will possess a formal grievance redress mechanism will take proper care of all the TSEL related problems to local citizens. The list of people who participated in the consultation meeting is listed in [Annex 9](#).

**Some pictorial views of the consultation meeting are given below:**







#### 4.5.6 Stakeholder Engagement Plan

Stakeholders are the entities those have stake or share of a project and who are affected directly or indirectly by a project. Generally individual, group, any organization or community within a particular projects influence area are considered as stakeholders of the project. The World Bank Operational Policies suggests that, the operating company should have a Stakeholder Engagement Plan (SEP) for better development practices.

Stakeholder Engagement Plan is considered to be a useful tool for maintaining communications between the project authority and its stakeholders. It will help to improve and facilitate decision making of the local community and will create an atmosphere in such a way so that the stakeholder groups are provided with sufficient opportunities to improve their livelihood. Major components of Stakeholder Engagement Process is detailed out in [Annex 9](#) for reference.

## **5 ENVIRONMENTAL AND SOCIAL BASELINE STUDY**

### **5.1 Baseline Environmental Condition**

#### **5.1.1 General Consideration**

Base line information of existing environment is essential to take decision regarding lay out, mitigation measures and plant operation process. Information was gathered on the existing physical environment including meteorology, geology, topography, soils, hydrology and drainage, surface water quality, air quality and noise levels.

#### **5.1.2 Geographical Location of the Project Area**

The site of the project is located at South Nhilla Alikhali village of 2 No. Nhilla Union, Teknaf Upazila of Cox's Bazar district. The boundaries of the plant location are: salt cultivation land on the north, north-west, east and south side of the project site, few low land parcels have been found on the north-east, south-east and south-west boundaries, a salt factory and a brick field are situated along the south-west boundary of the project site, River Naf flows along the eastern side of the project site. A bituminous carpeting road has passed through the western boundary of the project site. The Project Location is shown in Map 2 and Map 3.

#### **5.1.3 Physio-Chemical Environment**

##### **5.1.3.1 Landscape and Topography**

This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins which are neutral to slightly acidic in reaction. General soil types include predominantly Grey Floodplain soils. Organic matter content is low in ridges and moderate in basins. The Topographic Survey Report of the Project Site and Elevation of the Project Command Area are shown in [Annex 10](#).

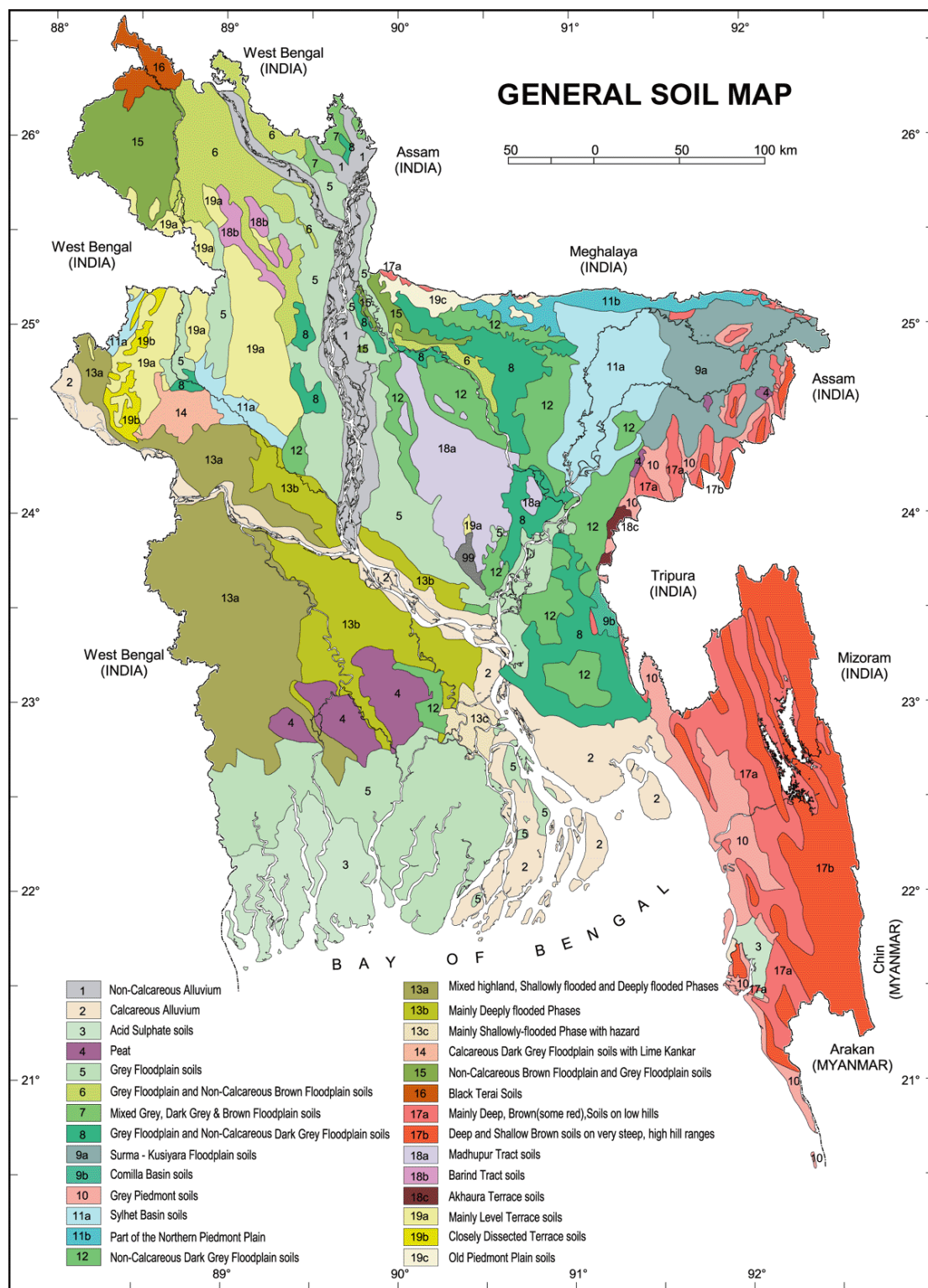
##### **5.1.3.2 Land Cover**

The surrounding land cover of the project area is hills, salt fields, built-up area, vegetated areas and water bodies. The land cover within 5 km radius from the project site is shown in [Annex 2](#).

##### **5.1.3.3 Geology and Soils**

Most of the area of Bangladesh is a vast, low-lying alluvial plain, sloping gently to the south and southeast. According to Soil Research Development Institute's General Soil Map of Bangladesh, the project area falls in the Grey Piedmont Soil category. The following General Soil Map 3 shows the general soil type of Bangladesh.





**Map 3: General Soil Map of Bangladesh**

This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins which are neutral to slightly acidic in reaction. General soil types include predominantly Grey Piedmont Soil category. Organic matter content is low in

ridges and moderate in basins. Within this area, elevations are less than 5.8 m above sea level.

#### 5.1.3.4 Agro-ecological Zones within the Project Area

A 1988 study carried out by the United Nations Development Program (UNDP) classified Bangladesh into a series of Agro-ecological Zones (AEZs) based on an assessment of commonalities in characteristics such as physiography, soil types, climate and drainage. In total, 34 regions were identified and characterized, however this information has been updated and further refined on numerous occasions since the original study was undertaken. Within this area, elevations are less than 5.8 m above sea level, which is shown in Map 5-2.

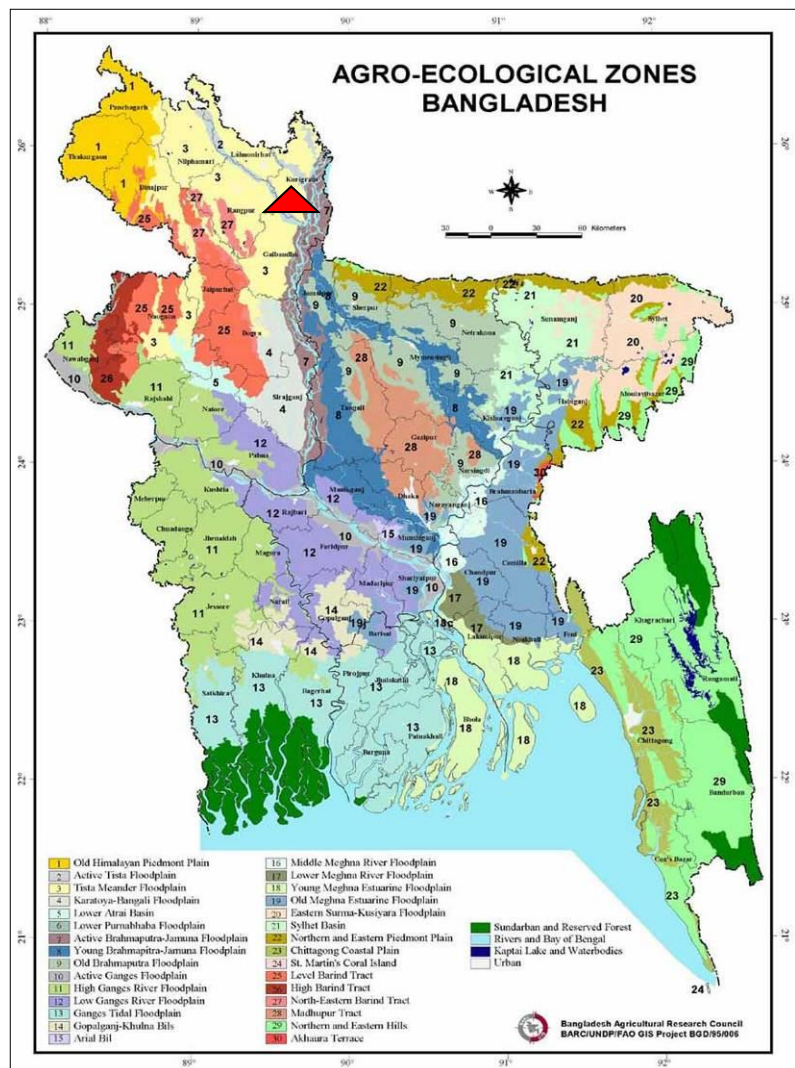
The purpose of assessing the AEZs within the project area is to establish a broad overview of expected soil conditions which can be compared against more detailed, Upazila-level data sources.

The most recent assessment was completed by the Soil Resource Development Institute (SRDI, 1998) which classified Bangladesh into 30 AEZs. The project area contains the below AEZ namely:

#### Chittagong Coastal Plain (23)

This region comprises the belt of unstable alluvial land along the Chittagong coastal areas where land is constantly being formed and eroded by the continuous tidal actions of the Bay of Bengal and its associated rivers and waterway

channels. It has an irregular relief of broad and narrow ridges and depressions. The area is occupied by sandy and silty alluvium, rich in weatherable minerals that are slightly salty in reaction. Organic matter status is low and fertility status is low to medium (Banglapedia, 2012).



Map 4: Agro-ecological zone of Bangladesh

#### **5.1.4 Biological Environment**

Cox's Bazar is a growing city located at the south-east part of the country, which is also called the 'Tourism Capital' of Bangladesh. The TSEL power plant is going to be established on the bank of River Naf. Wetland around 5 km impact zone of the project includes ponds, ditches, and canals (chhara) connecting to River Naf. The impact area supports a diverse animal group and holds a balanced ecosystem.

While establishing TSEL project significant interventions are going to be carried out at the project site. These might have impact on the terrestrial and aquatic biodiversity within the impact zone of TSEL project. In view of this, this study assesses the terrestrial and aquatic flora and fauna within the impact zone of TSEL project. The section below outlines the scope of work or core components of this study.

The scope of work of this study includes:

- a) Identify the terrestrial plants within the impact zone of TSEL project.
- b) Identify the terrestrial fauna (vertebrate) within the impact zone of TSEL project.
- c) Identify the aquatic macro fauna/fish species within the impact zone of TSEL project.

The methodology used to identify the biodiversity, data were collected from the impact zone of TSEL project during September, 2016 as outlined below:

##### **5.1.4.1 Collection of Terrestrial Plants Data**

Plant species were recorded surrounding 5 km of power plant area. At first, the areas were visited to monitor and plant species were recorded. Then two focus group discussions (FGDs) and two key informant interviews were carried out with the local people to prepare a checklist of the plant species available in that area. The participants were also asked to express their observations about changes of plant diversity in last one year by showing the images of plant found nearby power plant area. Sample specimens that remained unidentified from those locations were collected and later identified in the laboratory of the Department of Botany, University of Dhaka using the book Ahmed et al. (2007). The collected data result is shown in [Annex 11](#).

##### **5.1.4.2 Collection of Terrestrial Fauna Data**

Four vertebrate classes (mammals, birds, reptiles and amphibians) were surveyed as this group of animals presumably important and indicator species of a balanced ecosystem. To conduct the biodiversity survey, the researcher team carried out an ecological survey in the core and surrounding areas (up to 5 km) of the power plant site. The sampling was made in a realistic manner to achieve the objectives of this study. Within the impact zone a broad range of terrestrial habitats were identified where wildlife species distributed in a dynamic way with having diversity, abundance and the status of animal species/animal groups supported by those micro and macro-habitats.

Survey of amphibians, reptiles, mammals and birds in the TSEL areas and adjacent areas carried out through conducting field survey by employing different survey methods such as

transact line sampling, point sampling, time sampling methods, opportunistic survey and zigzag survey, and two FGDs. Data were collected based on the direct observation in the field. However, where the animals were not immediately available or difficult to locate or trace, observations were made on foot print, pug marks, trailing, tracks, burrows, nests, animal holes, caves on the trees or fruits made by animal, etc. Besides, local people were discussed (during FGDs) to ascertain the existence and to assess the status/abundance of amphibians, snakes, monitor lizards, mongooses, jackals, foxes, bats, dolphins, birds etc.

In addition, other techniques e.g. Photo Flashing, Spot Lighting, Sound Tracking, call, trapping, collection of specimens etc. were used where necessary. A pair of binoculars was used to track distant animals. Standard taxonomy books, field notebooks, field manuals and taxonomic sheets used for identification of species. The species, which were not possible to identify in the field, brought to laboratory of the Department of Zoology, University of Dhaka for proper labelling for its subsequent identification. The collected data result is shown in [Annex 11](#).

#### **5.1.4.3 Collection of Fish Data**

Fish species was identified and changes in their biodiversity were investigated using key 3informant interviews and 2FGDs. Key informant interviews were conducted with respondents from both aquatic habitat dependent people and outside people who have good knowledge about the biodiversity in those habitats. FGDs (4-8 person in one FGD) were conducted with the habitat depended people to discuss any disputed issue that might have arisen from interviews as well as to triangulate the findings. Fish market survey was also done in one nearby fish market (*Alikhali, South Nhilla Bazar*) in order to verify the fish species identified by the FGD and key informant interview respondents. Picture was taken for each fish available in the market. The fish species were identified using the book of Rahman (2005) and the latest scientific names were updated according to ITIS (2016). The source of the fish present in the market was also asked and only the species caught from the impact zone of TSEL were taken into account. The collected data result is shown in [Annex 11](#).

### **5.1.5 Meteorological Condition**

#### **5.1.5.1 Climate**

The climate of this region is tropical, with monsoons, characterized by a change of four seasons: pre-monsoon (March to May), monsoon (June to September), post-monsoon (October to November) and dry season (December to February). Typical parameters of the weather elements, as recorded for the period of last few years of observations at Cox's Bazar Meteorological Station are presented in Table 5.7 to 5.15 below.

The importance of analyzing the historic climate conditions of the project site is important as it will influence the choice of site for the project. For example areas of high rainfall will entail that the design of the plant's drainage system, proper fortification of the site boundaries to avoid inundation and to decide the extent of land filling required to avoid impacts due to



flash floods. The relative humidity and the maximum and minimum temperatures are essential for the engine design and the cooling loads for the radiative cooling system. The wind direction and speed is important to design the stack height required to ensure dispersion to the desired levels.

#### 5.1.5.2 Rainfall

The annual rainfall is about 2000 mm and approximately 80% of it occurs during the monsoon. Average monthly rainfall during monsoon period varies between 123 mm to 409 mm. Maximum daily rainfalls during this period recorded in August 2012 is 409 mm.

The rainfall follows the general climate pattern with the highest rainfall in the summer month of June to September and minimum rainfall in the cooler and drier months of November to March. It is evident that extreme rainfall events occurred during the monsoon (June-September). Average monthly rainfall values for Cox's Bazar area since 2012 are presented in Table 5.1 below:

**Table 5.1: Monthly Average Rainfall in the project area (2012-2016)**

	Rainfall in mm (Month)											
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2016	7	8	40	302	165	203	256	322	234	112	3	1
2015	4	3	29	289	143	180	227	309	201	143	2	1
2014	2	1	32	245	198	225	267	322	198	132	3	0
2013	3	1	37	269	137	175	226	389	189	122	4	1
2012	0	0	20	123	235	314	356	409	207	112	0	0

#### 5.1.5.3 Relative Humidity

As would be expected, relative humidity during the wet season is significantly higher than those occurring at other period of the year. This is well depicted by the data as shown in the Table 5.2 for relative humidity of Cox's Bazar during the period 2012 -2016:

**Table 5.2: Average Monthly Relative Humidity of the Project Area in last 5 years**

<b>Humidity in %</b>	<b>Monthly Mean Humidity</b>												
<b>Year</b>	<b>Jan.</b>	<b>Feb.</b>	<b>Mar</b>	<b>Apr.</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Annual</b>
2016	72	64	60	68	74	79	81	85	72	70	69	72	69
2015	65	65	56	63	75	80	79	83	76	71	63	71	71
2014	73	54	61	71	74	79	80	82	78	73	68	69	70
2013	66	52	57	69	74	78	77	81	79	75	71	66	67
2012	69	54	57	64	76	80	79	82	77	73	67	73	70

#### 5.1.5.4 Temperature

The annual average temperature of this region varies from maximum 39.5°C to minimum 10.5°C

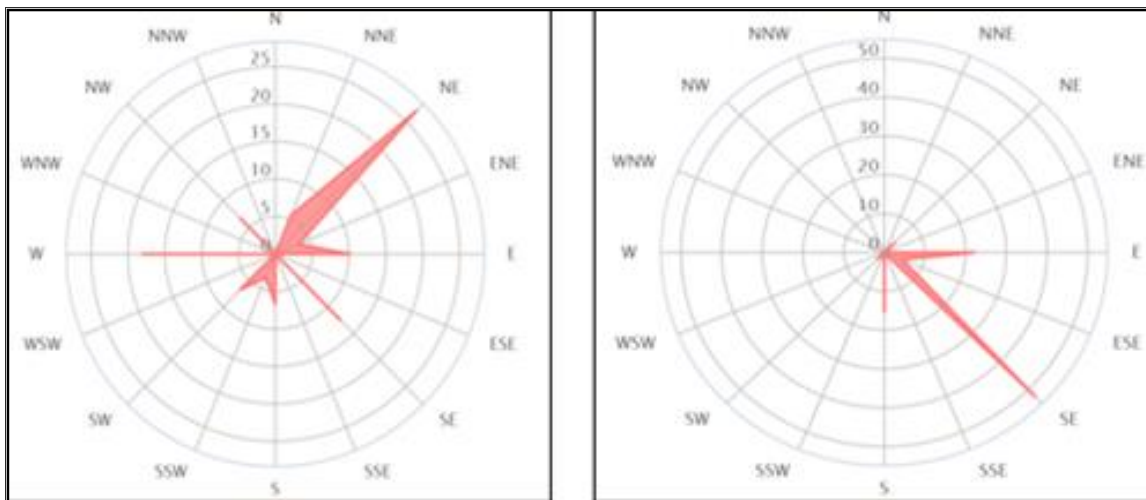
#### 5.1.5.5 Wind Speed and Direction

The maximum wind speed varies from 86 and 98 knots (Meteorological Department). The prevailing wind direction is south and south-east in most part of the year. [Annex 12](#) shows the round year wind speed and its directions for the year of 2012-2016.

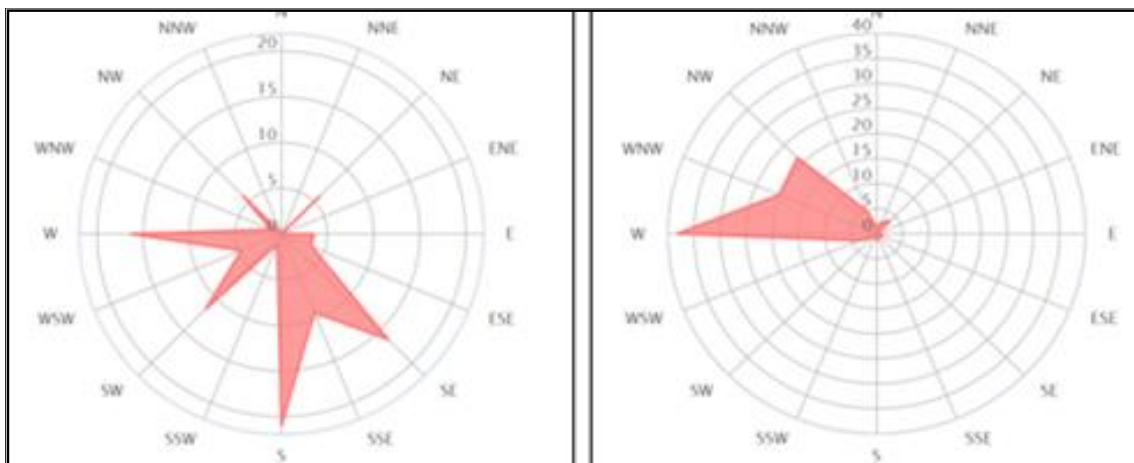
#### 5.1.5.6 Wind roses

Wind rose gives very succinct but information-laden view of how wind speed and direction are typically distributed at a particular location. Presented in a circular format, the wind rose shows the frequency of winds blowing from particular directions. The length of each "spoke" around the circle is related to the frequency of time that the wind blows from a particular direction. Each concentric circle represents a different frequency, emanating from zero at the center to increasing frequencies at the outer circles. The wind roses shown here contain additional information, in that each spoke is broken down into discrete frequency categories that show the percentage of time that winds blow from a particular direction and at certain speed ranges. All wind roses shown here use 16 cardinal directions, such as north (N), NNE, NE, etc.

The wind roses for 2016 are shown in the Figures 3 & 4 :



**Figure 3: Wind-rose distribution in percentage (%) for January-June 2016**



**Figure 4: Wind-rose distribution in percentage (%) for June-December-2016**

The seasonal wind roses indicate shows that in Bangladesh the predominant wind direction are from North West in the winter months and from South West direction in the monsoon months. The prevalent wind directions will determine the AQM sampling locations. The wind roses indicate the prevalent wind direction in an area during the different seasons. During the preparation of the ESIA the wind roses determines the effective points where the air quality needs to be measured. This is primarily guided by the most prevalent wind direction in the project area at the time of measurements. In addition, during environmental monitoring after commissioning of the project, depending on the time of the year when monitoring is done, wind rose indicating the prevalent direction of wind at the time where the air quality will be measured as the concentrations of the pollutants will be the highest in that direction.



#### ***5.1.5.7 Ambient Air Temperature***

In the summer (April to September) the temperature of the country varies with the amount of rainfall. During this period maximum temperature raise 39.6 degree Celsius which was observed in April 2008 where the average minimum temperature was 8.2 degree Celsius in January 2011. [Annex 13](#) shows the month-wise mean, maximum and minimum temperature for the year of 2007-2016.

The monthly average temperature variation in Cox's Bazar District has remained largely uniform over the last 10 years. There have been hotter days in some years but it had negligible effect on the average the temperature over this period. Therefore, constancy of the ambient temperature is crucial for fixing the design of the generators whose efficiency depends on ambient temperature and the design of the radiative cooling design.

#### ***5.1.5.8 Ambient Air Quality***

Air quality at the project site is typical of a rural environment. Ambient pollutant concentrations are relatively low to practically non-existent of vehicles and others. Suspended particulate matter (SPM) increases intermittently in areas where winds pick up dust over unpaved roads and exposed surfaces. The primary sources of emissions, however, are traffic-derived emissions from the plant side road running in east-west direction. Actually, the project site is situated on the bank of River Naf where the pollutant level is not that much significant.

A survey of the ambient air quality was undertaken in the vicinity of the project site during June 2017 to determine pollutant concentrations. The survey undertaken used eight sampling locations situated to the north, south, east, west and Central point of the project site.

For the air quality measurements, a high volume sampler for the particulate matters has been used and simultaneously the concentration of SO<sub>x</sub>, NO<sub>x</sub> and CO was measured through analyzer. For particulate matters special filters were used. The filter papers were accurately weighed and placed in the air intake duct. The filter paper was taken out after every eight hours and weighed again from the difference in initial weight and the final weight was recorded and the calculations of the concentrations were done from the total volume air intake during that period. The air sampling equipment and instruments are shown in the following photos 1 and 2:



**Photo 1: Respirable Dust Sampler for SPM, PM<sub>2.5</sub>, PM<sub>10</sub> and SO<sub>2</sub>, NO<sub>x</sub>, CO measurement instruments**



**Photo 2: Dust Sample measurement activities**

The air quality data as collected from the plant site. Table 5.3 shows the average ambient air quality in terms of 6 major indicators SPM, PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>x</sub> and CO.

To assess the present air quality of the area, one Ambient Air Quality Monitoring (AAQM) Stations were setup. The locations of the monitoring stations for air quality study were selected on the basis of meteorological data, topography, sensitive locations etc. Predominant wind direction during the season is from North to South.

Monitoring was conducted in respect of the following parameters:

- (i) Total Suspended Particulate Matter (SPM)
- (ii) Particulate Matter of 10 micron (PM<sub>10</sub>)
- (iii) Particulate Matter of 2.5 micron (PM<sub>2.5</sub>)
- (iv) Sulphur Di- Oxide (SO<sub>2</sub>)
- (v) Oxides of Nitrogen (NO<sub>x</sub>)
- (vi) Carbon Monoxide (CO)

**Table 5.3: The air quality data as collected from the proposed TSEL site**

Period	Sampling Location		Ambient Air Pollutants Concentration in µg/m <sup>3</sup> (Annual)					
			PM <sub>10</sub>	PM <sub>2.5</sub>	SPM	SO <sub>2</sub>	NO <sub>2</sub>	CO
June 2017	A_Center	In the Center of Power Plant	50.54	ND	154.98	16.98	10.43	ND
	A_1	To the West of Power Plant	48.13	ND	144.28	14.01	9.74	ND
	A_2	To the East of Power Plant	48.93	ND	201.52	14.03	14.05	ND
	A_3	To the North of Power Plant	46.54	ND	126.13	9.33	12.11	ND
	A_4	To the South of Power Plant	45.72	ND	135.69	12.72	12.75	ND

**5.1.5.9 Ambient Noise Quality**

The Project site is found to have ambient noise level with a range of 39.70-49.80 dBA at different time of the day. There were 12 hours noise monitoring at 5 locations in the project site for both day and night times, which have been provided in Table 5.4 and 5.5 below:

**Table 5.4: Day Time Noise Data**

BASELINE SOUND 6:00 AM TO 6:00 PM														
Location of Measurement	Distance from the center of the plant	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM
S_Center	Plant Centre	42.50	42.70	42.00	42.40	43.30	43.50	43.60	43.20	43.80	43.70	43.80	43.80	43.50
S_1	To the West	47.20	47.20	47.20	49.80	49.20	48.20	47.20	47.80	48.00	47.20	47.40	47.30	47.30
S_2	To the East	41.50	41.60	42.00	41.10	41.30	41.50	41.40	42.20	41.70	41.70	41.80	41.60	41.50
S_3	To the North	47.50	46.30	46.40	47.60	46.70	47.90	46.80	46.10	47.00	47.30	47.20	47.40	47.50
S_4	To the South	42.50	42.70	42.00	42.40	43.30	43.50	43.60	43.20	43.80	43.70	43.80	43.80	43.50

Baseline Noise Level Data at day time (12hrs.), Source: Field Survey, June, 2017; by Digital Sound Level Meter-AR814.

**Table 5.5: Night Time Noise Data**

BASELINE SOUND 6:00 PM TO 6:00 AM														
Location of measurement	Distance from the center of the plant	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM
S_Center	Plant Centre	42.90	42.70	42.00	41.40	41.30	41.50	40.60	40.20	40.10	40.70	41.80	41.80	42.50
S_1	To the West	47.20	47.00	47.00	46.80	46.20	46.20	46.20	45.80	45.00	45.20	45.40	45.30	46.30
S_2	To the East	41.20	41.60	41.00	41.10	41.00	41.00	40.40	40.20	39.70	40.00	40.80	41.00	41.00
S_3	To the North	47.10	46.30	46.40	46.60	45.70	45.90	45.80	45.10	45.00	45.30	45.20	45.40	45.50
S_4	To the South	42.60	42.70	42.00	41.30	41.10	41.20	40.80	40.10	40.00	40.70	41.50	41.80	42.50

Baseline ambient noise level data at night time (12hrs), Source: Field Survey, June, 2017; by Digital Sound Level Meter-AR814.

The ambient noise data seems to be moderate. It is to be noted that there is negligible difference between day time data and night time data, as the power plant site is located at a very low density area, where the main source of noise is Cox's Bazar-Teknaf Highway adjoining the project boundary.

Air and Sound Monitoring Points Map of the Project Location is shown in [Annex 2](#).

### 5.1.6 Hydrology and Drainage System

The main sources of water of Teknaf upazila are river, khals and ponds. River Naf is the main river. The river remains navigable all through the year. A good numbers of khals are scattered all over the upazila connecting with Naf River or the Bay of Bengal.

During monsoon, flash floods take place due to rain water coming down from the nearby mountains. The local khals channel out the flash flood water into River Naf or the Bay of Bengal.

There are about a lot ponds in Teknaf upazila. Most of them are not usable. Ponds are found within the settlement areas. Most of the families have one or two ponds used for aquaculture and household purposes. The area of a pond varies from 10 decimal to 1 acre.

### 5.1.7 Water Quality Analysis

#### 5.1.7.1 Surface Water

The Naf River water in the immediate vicinity of the project site contains minimal concentration of pollutants as the river is almost free from both from domestic and industrial contamination sources.

The Naf is the main river and its distributaries are the main sources of surface water to the project site. The river carries run-off water from adjoining areas, which contains minimal pollutants. Water was collected from the river and analyzed in SGS Laboratory. The following Table 5.6 shows the water quality of the Naf River:

**Table 5.6: Surface Water quality (limited parameters) of the Naf River**

Parameters	Units	100 m away from the proposed PP	Bangladesh Standard
pH at 24.5°C	mg/L	6.80	6.5-8.5
TDS	ppm	280	1000
EC	μ S/cm	410	1200
Temperature	°C	25.1	-
DO	ppm	5.69	4.8-8
BOD5	mg/L	20	50
COD	mg/L	48.0	200

Parameters	Units	100 m away from the proposed PP	Bangladesh Standard
Manganese	mg/L	< 0.05	5
Phosphate	mg/L	0.42	-
Phosphorus	mg/L	0.45	1
Conductivity	μS/cm	330	-

Source: SGS Laboratory (June, 2017)

The results show that all the parameters of tested surface water are within the limits of DOE.

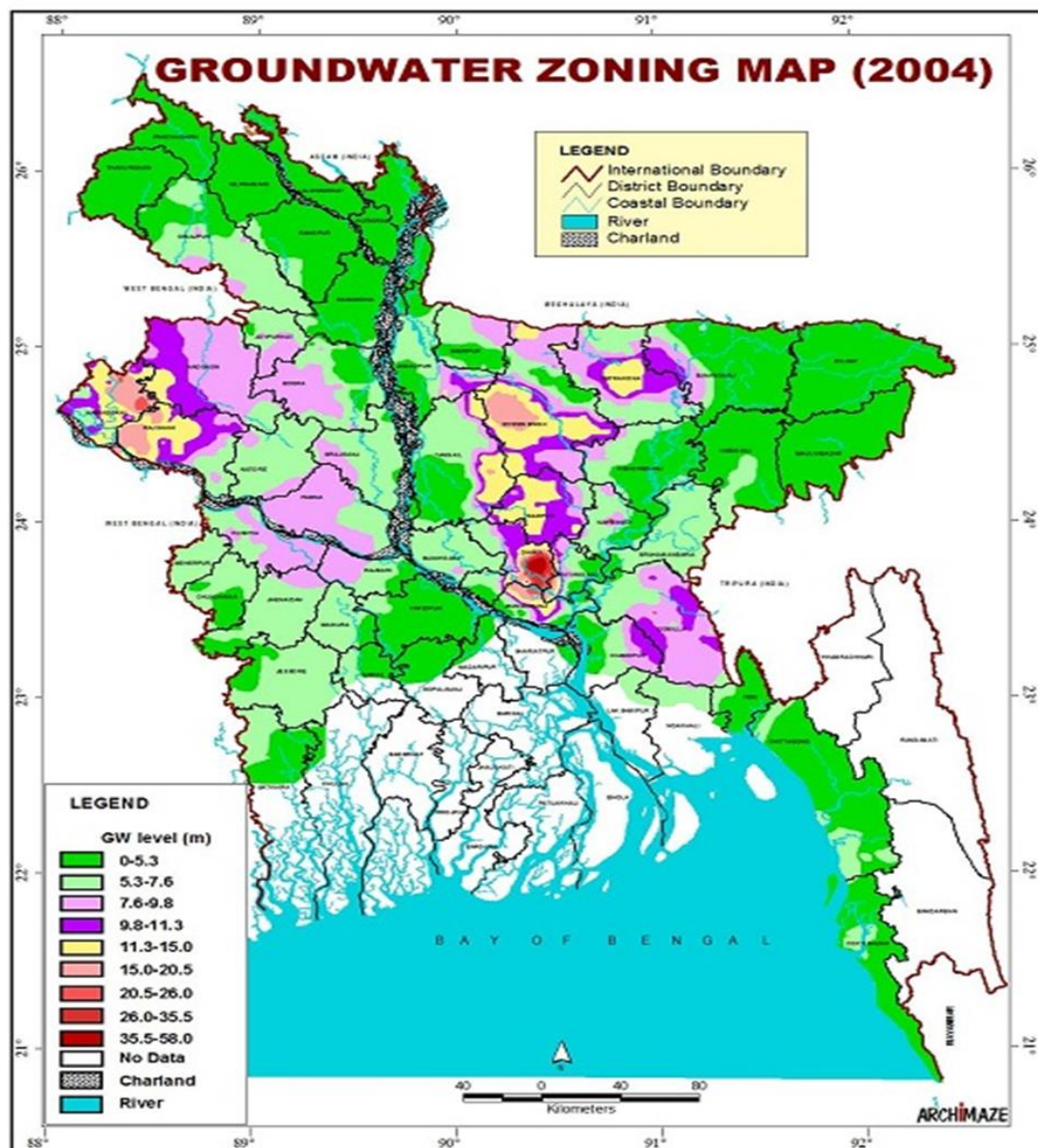
#### 5.1.7.2 Ground Water Features in the Vicinity of the Project Site

Ground water level exists from 0.5 to 3 meter in general, with a maximum limit below 12.0 m depth, which is being recharged mainly by infiltration of rainwater. Ground water is the source of water for potable water in the project. To determine quality of ground water, one sample was collected from the tube well of the project and analyzed for different parameters. The results shows that all the parameters remain within the allowable limit of drinking water value as per as Environmental Quality Standards for Bangladesh. The parameters which have been analyzed during this study are presented below in Table 5.7. The ground water zoning map is shown in Map 5.

**Table 5.7: Ground water quality (limited parameters) from deep tube well**

Parameter	Units	Value	Bangladesh Standard For Inland Ground Water
pH at 26.9°C	mg/L	7.1	6.0 - 9.0
TDS	ppm	90.0	1000
Iron	mg/L	0.8	(0.3 – 1.0)
Alkalinity	mg/L	78.0	-
Hardness	mg/L	68.0	(200 – 500)
Chloride	mg/L	16.4	(150 – 600)
TSS	mg/L	4.8	10
COD	mg/L	11.7	NS
BOD	mg/L	5.5	NS
Arsenic	mg/L	0.050	0.05
Conductivity	μS/cm	696	NS

Source: SGS Laboratory (June, 2017)



**Map 5: Ground Water Zoning Map of Bangladesh**

### 5.1.8 Natural Hazards Analysis

Bangladesh can be regarded as being susceptible to natural calamities. This is due to its unique combination of physiographic, morphological and other natural features, which have led to direct loss of life and physical property on a massive scale. Plausible natural calamities include cyclones/tidal surges/tsunami, flash floods, storms & nor-westers and earthquakes.



#### **5.1.8.1 Cyclones/Tidal Surges/Tsunami**

Bangladesh is a cyclone prone country. The country experiences, at times, catastrophic cyclones that cause loss of life and property. However, cyclones usually decay rapidly after coming into contact with land and such losses are largely confined to coastal regions. The project area is in the coastal belt, the likely impact of cyclones is relatively high.

Bangladesh is prone to occasional devastations due to cyclonic storms. The south-eastern region (SER) of the country though is more prone to cyclonic devastations compared to the south-central (SCR) and south-western (SWR) regions the site is vulnerable to occasional catastrophic cyclones. Ten hazardous cyclones hit the Bangladesh coast between 1960 and 2000 that caused heavy toll on human life and damage to properties. The cyclones are occasionally accompanied by tidal surge up to 10m high at the coast. The project site is relatively protected from the devastations of cyclone/tsunami induced tidal surge by a coastal embankment of BWDB along River Naf. On the other hand, the bay side is obstructed by hills, which will reduce the severity of cyclones.

This is evident from Cyclone Sidr and Aila in 2007 and 2009 respectively. Besides, Chittagong region was hit by a massive cyclone in 1991. Although the project site was not affected by Sidr and Aila, it was affected by the 1991 cyclone – the riverside lands of the project site were inundated by half to one meter. However, it is to be noted that no inundation level data or highest flood level data was available for the project area, as BWDB does not have any measurement station for River Naf.

Currently, the project site is expected to be protected by the BWDB embankment against any surge due to cyclone/tidal surge/tsunami. The Project will not be impacted by the floods or cyclones as the plant has been designed to withstand wind speed of 200 Km/hour (Reference: TSEL). TSEL will establish the solar panels established on metallic support structures in such a way that minimum height of the panels will be over 1.8m from the present ground level, and the panels are not expected to be drowned even if surge water comes inside the project site through any leakage or weak point of the BWDB embankment. Additionally, there will be a two storied control room cum administrative building and a one storied inverter station, for which the plinth level has been designed to be 1m above the level of adjoining Cox's Bazar-Teknaf Highway.

#### **5.1.8.2 Flash Floods**

The occurrence of flash flood is rare at the project area. The last flash flood recorded was in 2009. The flood water came from nearby hills and flushed out through the canal along the southern boundary of the project site. The impact of the flash flood was minimal on the project site, and the water quickly receded through the canal in River Naf. The impact of the flash flood on the project will be minimal as the solar panels will be established at a height of minimum 1.8m from the present ground level.



### 5.1.8.3 Earthquakes

Earthquake vulnerability of any place largely depends on its geology and topography, population density, building density and quality, and finally the coping strategy of its people and it shows clear spatial variations. Geographically Bangladesh is located close to the boundary of two active plates: the Indian plate in the west and the Eurasian plate in the east and north. As a result the country is always under a potential threat of earthquake of any magnitude at any time, which might cause catastrophic devastation in less than a minute. Bangladesh has been divided into three seismic zones. Table 5.8 showing the earth quake zones of Bangladesh and Table 5.9 shows the major earth quake places nearest to the country. The Map 6 shows the earthquake position and its impacts.

**Table 5.8: Earthquake Zone of Bangladesh**

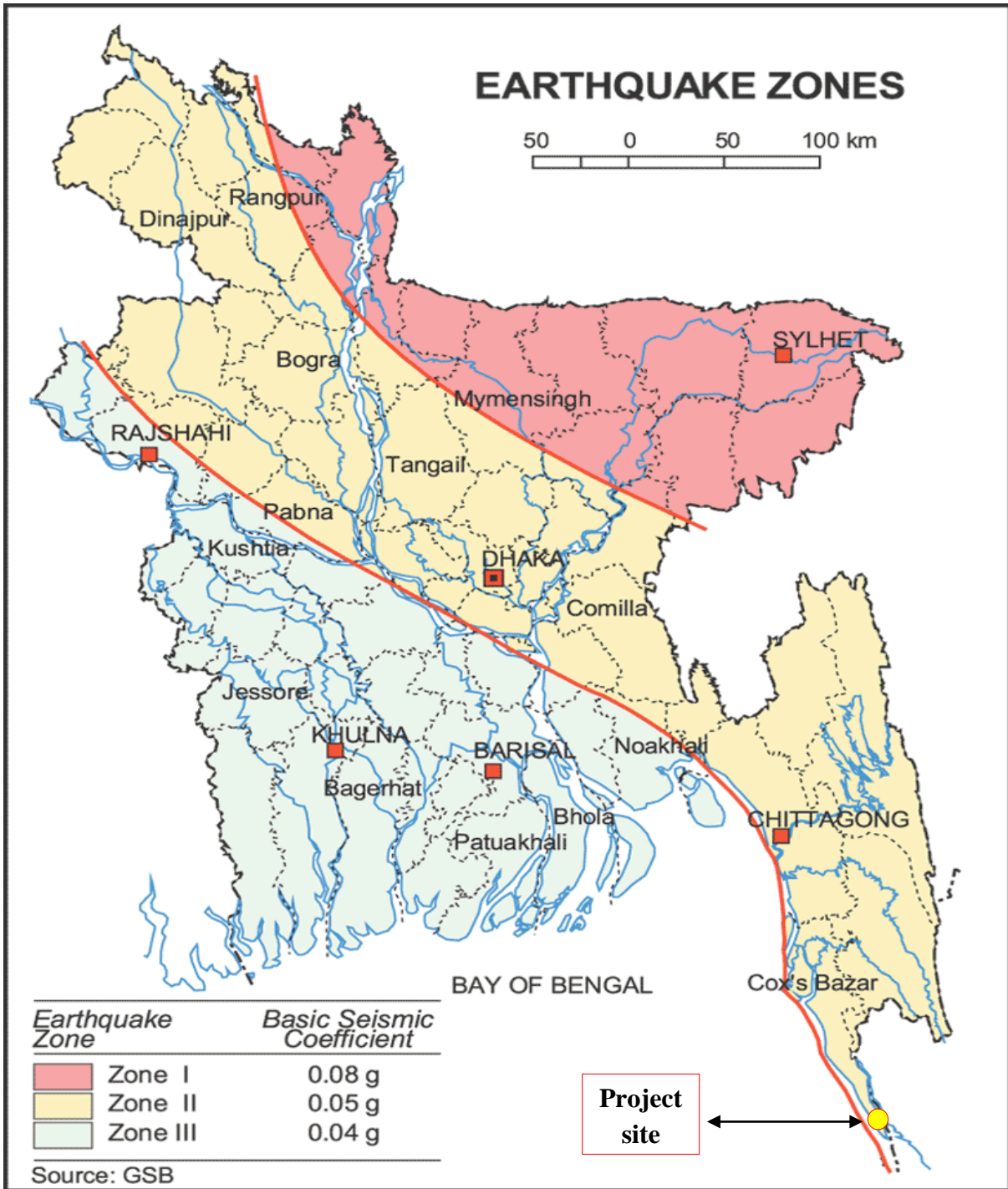
Earthquake Zone	Area Name	Seismic Factor	Seismic Coefficients	Risk
Zone-I	Sylhet, Moulvibazar, Sunamganj, Habiganj, Netrokona, Kishoreganj (part), Mymensingh (part), Sherpur, Kurigram, Rangpur (part), Gaibandha (part), Lalmonirhat (part)	g/5 to g/10	.08	High Risk
Zone-II	Panchagarh, Thakurgaon, Dinajpur, Nilphamari, Rangpur (part), Gaibandha (part), Lalmonirhat (part), Bogra, Naogaon, Jaipurhat, Chapai Nawabganj (part), Rajshahi (part), Natore (part), Pabna (part), Sirajgonj, Tangail, Manikganj, Dhaka, Gazipur, Narayanganj, Munshiganj, Narsingdi, Kishoreganj (part), Mymensingh (part), Comilla, Brahmanbaria (part), Chandpur (part), Feni, Noakhali (part), Chittagong, Rangamati, Khagrachhari, Bandarabn and Cox's Bazar	g/10 to g/15	.05	Medium Risk
Zone-III	Islands, Satkhira, Khulna, Bagerhat, Pirojpur, Barisal, Jhalokathi, Barguna, Patuakhali, Bhola, Madaripur, Gopalganj, Narail, Jessore, Chuadanga, Meherpur, Kushtia, Rajbari, Magura, Faridpur, Shariatpur, Lakhmipur, Chandpur (part), Noakhali (part), Chapai Nawabganj (part), Rajshahi (part), Natore (part), Pabna (part)	g/15 to g/20	.04	Low Risk

Source: The Journal of NOANI, Vol. 18, No. 2, dec 2001

**Table 5.9: Major Earthquakes occurred in Bangladesh**

<b>Date</b>	<b>Name of Earthquake</b>	<b>Magnitude (Richter)</b>
10 January, 1869	Cachar Earthquake	7.5
14 July, 1885	Bengal Earthquake	7.0
12 June, 1897	Great Indian Earthquake	8.7
8 July, 1918	Srimongal Earthquake	7.3
2 July, 1930	Dhuri Earthquake	7.1
15 January, 1934	Bihar-Nepal Earthquake	7.0
15 August	Assam Earthquake	8.5

Cox's Bazar is situated in the Zone II and as such even though it can be considered as earthquake vulnerable area (exceeding 7.0 on the Richter scale. However, the ESIA of the project will take into account the analysis in depth and will suggest the specifications of the civil construction to withstand earthquakes in terms of Richter scale of earthquake allowances to be made in the design of the construction.



Map 6: Earthquake Zoning Map of Bangladesh

### 5.1.9 Traffic Movement

The plant construction and operation will require movement of goods and people. Therefore it is required to have information about present traffic scenario in the locality. The major machineries and materials for the project will be brought by roadway on Cox's Bazar to Teknaf Highway. Since Cox's Bazar to Teknaf Highway is the main roadway communication route for human movement as well as goods transportation, movement of goods and people for TSEL will have negligible impact on this highway as well as for neighboring communities. Although River Naf flows beside the project site, the river does not have any role in the movement of people and goods for the project, as the river flows along the boundary of Bangladesh and Myanmar.

### 5.1.10 Forests and Protected Areas

Overall, the 'Protected Area' of Bangladesh covers an area of 243,435 hectare which accounts for 16% of the total area managed by the Forest Department and almost 2% of total area of Bangladesh. It includes 8 National Parks, 7 Wildlife Sanctuaries, 1 Game Reserve and 5 other conservation sites. These five conservation sites are National Botanical Garden, Dhaka, Baldha Garden, Dhaka, Madhabkunda Eco-Park, Moulavibazar, Sitakunda Botanical Garden and Eco-Park, Chittagong and Dulahazara Safari Parks & Cox's Bazar.

The project site is at well distant place from the nearest protected area and does not fall under any above category. The hill forest areas of Forestry Department fall in the vicinity of TSEL do not fall under the category of protected forest as discussed above.

## 5.2 Baseline Socio-Economic Condition

### 5.2.1 Socio-Economic Condition

The socio-economic baseline condition of the study area is captured to have a picture of the current situation to allow comparison with that of any potential impact associated with the project. The study included an assessment of the baseline condition of the local stakeholders including the local community, governmental organizations, and community development agencies such as NGO/Self Help Groups etc. amongst other as well as taking into account their perceptions on the impacts and benefits from this existing power plant.

### 5.2.2 Methodology and Approach

The methodology and approach adopted for the socio-economic baseline assessment relied on readily available secondary information and primary information collected through consultations with a range of stakeholders for the project as well as sample socio-economic survey of households within the impact zone of study area. The key activities that were carried out for primary and secondary data collection are summarized as follows:

- ✓ **Desk-Based Review** of available project documentation and profile of the project site;
- ✓ **Reconnaissance Survey** to visually observe the social setting in and around 1 km of the area;

- ✓ **Secondary Information** is used from the Bureau of Statistic data for 1 km study area.
- ✓ **Consultations** with the Various Stakeholders ranging from governmental institutions, local administration (village administration), local community, land owners, project proponent etc.
- ✓ **Socio-Economic Survey** of the key settlements within close proximity of the existing power plant. The Socio-Economicsurvey was conducted for 50 households and data was collected based on a pre-developed questionnaire to ascertain general socio-economic indicators of the area;

### 5.2.3 Demarcation of the Project Area for Socio-Economic Study

From the social perspective, considering that the 1 km radius might entail quite large for primary socio-economic landscape, which may not be entirely relevant from the point of studying the social impact for this power plant, the administrative boundaries of the unions, villages and settlements that lie in the immediate vicinity of the plant site and adjacent rural settlement have been taken for primary socio-economic survey of the study area. The adjacent settlement is Alikhali village under 7 and 8 Wards of Nhilla Union.

### 5.2.4 Reconnaissance Survey

The site visit was conducted by a team comprising of four social specialists of BCAS. The entire site visit was conducted in June, 2017. The socio economic survey as well as the stakeholder consultations were concluded during this period.

### 5.2.5 Consultations with Stakeholders

The team consulted with a diverse range of stakeholders associated with the project. These included governmental agencies and departments, local administration, NGO, as well as the community. Furthermore, in order to assess the community and household level impacts, a socio-economic survey for a sample household size of 50 within the close settlement of the existing power plant is undertaken. This survey helped to establish the baseline conditions of the community living in the vicinity of the project footprint as well as to get their opinions, expectation and apprehensions about the existing power plant. The analyses of this data and the inferences drawn have been provided in the following sections.

### 5.2.6 Collection and Review of Documents

During the field assessment and stakeholder meetings, documents of relevance to this study were collected and data from the same was utilized in developing this social baseline. Bangladesh Population Census 2011 Data for Cox's Bazar District were collected and reviewed during this site assessment.

## 5.2.7 Socio-Economic Baseline Profile

### 5.2.7.1 Administrative Profile of Cox's Bazar

Cox's Bazar is a district in the south-east corner of Bangladesh and is a part of the Chittagong division. Total area of Cox's Bazar District is 2,491.85 km<sup>2</sup> of which 940.58 km<sup>2</sup> is under forest and total population is 22, 89,990 (BBS Census 2011). Population density of Cox's Bazar district is 919 per km<sup>2</sup>. Technaf Solartech Energy Limited is located at Alikhali Village of Nhilla union in Teknaf Upazila under Cox's Bazar district. The plant is by the side of Cox's Bazar-Teknaf Highway.

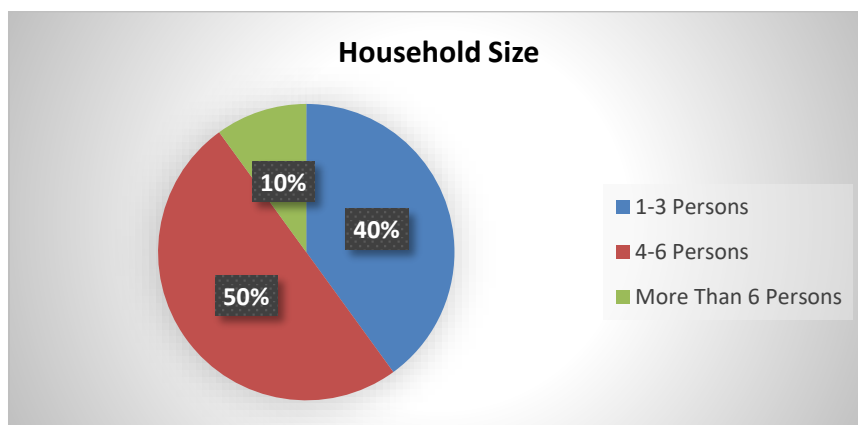
### 5.2.7.2 Findings of Socio-Economic Survey

The baseline assessment also comprised a socio-economic survey which was conducted in the closest rural settlement of the existing Technaf Solartech Energy Limited and data collected from randomly selected 50 households in order to gain first-hand information about the key household level socio-economic indicators. The following sections provide results from the analysis of the data collected.

#### 5.2.7.2.1 Demographic Trends

##### *Household Size*

According to the survey data, the majority of the households in the study area have 4-6 members. A significant percentage (50%) has 4-6 members followed by (40%) households having 1-3 members. Only 10% of the total sample constituted of households having more than 6 members. Figure 5 shows the household size of the study area.



**Figure 5: Household Size of the Study Area**

##### *Population*

According to the BBS 2011, there are 417 households in Alikhali village. The total population is 2400 and the average household size is 5.75 persons. The field survey reveals that there are 202 people living in 50 households in the area giving an average of 4.04 persons per household. Table 5.10 below depicts the no. of households regarding household size at the study area:

**Table 5.10: No. of Households Regarding Household Size at the Study Area**

Household Size	Number of HHs	Percentage
1	10	20.00%
2	2	4.00%
3	8	16.00%
4	9	18.00%
5	10	20.00%
6	6	12.00%
7	2	4.00%
8	1	2.00%
9	1	2.00%
11	1	2.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

***Population Age and Sex Distribution***

According to the BBS 2011, among 2400 people of Alikhali Village, there are 1167 male and 1233 female which expresses that the sex percentage is 48.6% and 51.4% respectively. On the other hand, according to the survey data, among 202 people male are 111 and female are 91. There are about 45% women and 55% men living in the study area. When it is time for age there are several age groups of people living in the study area. In the study it is seen that it is over half (57%) of the people who are in the 18-59 age cohort – the income earning group. The 5-9 and 10-14 years age groups have count of 8.42% and 14.85% respectively. And 15-17 years age group is only 3.47%. Further, 0-4 years (new born) are 11.39% and 60+ years are 4.95% each. Table 5.11 below shows the population distribution of sample households by age groups:

**Table 5.11: Population Distribution of Sample Households by Age Groups**

Age Group	Frequency	Percentage
0-4	23	11.39%
5-9	17	8.42%
10-14	30	14.85%
15-17	7	3.47%
18-34	71	35.15%
35-59	44	21.78%
60+	10	4.95%
<b>Total</b>	<b>202</b>	<b>100.00%</b>



### Religious Status of the Study Area

According to the BBS 2011, among the total population of Alikhali Village, 2399 are Muslims and 1 is Hindu which indicates about 100% are Muslims. According to the sample survey, 100% of the population in the study area are Muslims by religion which is much higher than our country's religious profile.

### Marital Status

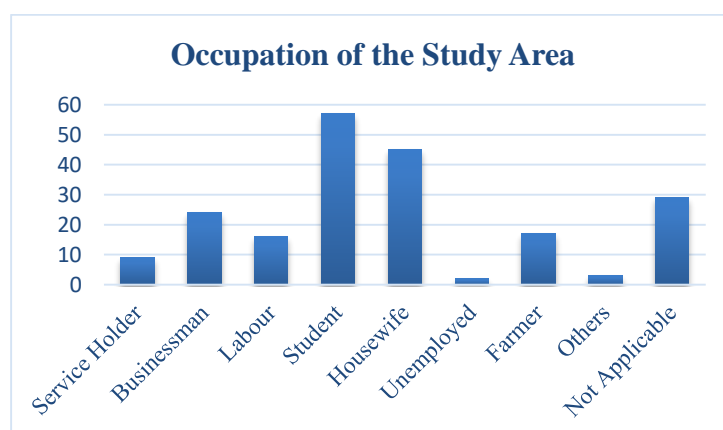
Table 5.12 presents marital status of the sample surveyed population in the study area. It is revealed from the study that, 47.52% of the population in the study area is married. The unmarried population is 15.84%. Although a huge 36.63% people of the study area who are not applicable to this status as they are below 15 years of age.

**Table 5.12: Marital Status of the Sample Surveyed Population in the Study Area**

Marital Status	Frequency	Percentage
Married	96	47.52%
Unmarried	32	15.84%
Not Applicable	74	36.63%
<b>Total</b>	<b>202</b>	<b>100.00%</b>

#### 5.2.7.2.2 Occupational Profile

As per the survey data it can be observed that almost 28.22% of the respondents are students followed by housewife (22.28%), businessman (11.88%), farmer (8.42%), labor (7.92%), service holder (4.46%) and others (1.49%) in the study area. There are only 1% who are not engaged in any works as they are unemployed. But almost 14.36% people are not applicable for any occupation as they are too old or too young to work. Among the 7.92% labor there are rickshaw-puller, construction worker, agriculturallabor, electrician etc. It can also be observed that majority of the women respondents are housewives or involved in household activities. Besides these, there are driver and village animal doctor also who are in others group. Figure 6 below shows the occupational profile of the study area:



**Figure 6: Occupational Profile of the Study Area**

#### 5.2.7.2.3 Education & Literacy

According to the BBS 2011, the literacy rate for 7+ years population of Alikhali village is 16.7%. But the sample survey revealed that 80.69% of the household heads of the study area are literate. Majority of the respondents (37.13%) were found to have primary level education. High School level education is attained by 19.31% of the total sample respondent. Not a significant proportion is illiterate (7.92%). Also about 17% of the respondents complete SSC and HSC level education. A mere 7.43% people completed degree/honors level education. There are 11.39% people who are less than 5 years old and are not applicable to this status. Table 5.13 below shows the education and literacy of the HH heads of the study area:

**Table 5.13: Education Status of the HH Heads of the Study Area**

<b>Educational Status</b>	<b>Frequency</b>	<b>Percentage</b>
Illiterate	16	7.92%
Primary	75	37.13%
High School	39	19.31%
SSC	17	8.42%
HSC	17	8.42%
Degree/Honours	15	7.43%
Not Applicable	23	11.39%
<b>Total</b>	<b>202</b>	<b>100.00%</b>

#### 5.2.7.2.4 Access to Utilities & Resources

##### ***Property of Household***

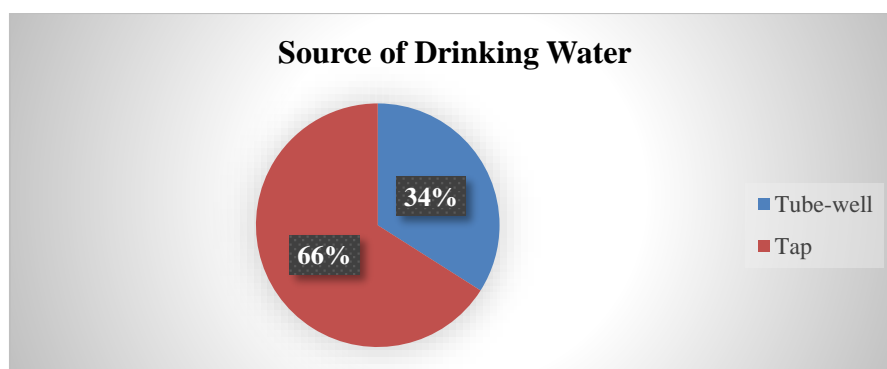
According to the BBS 2011, 98.8% people have their own house and 1.2% are rent free regarding the study area. In the present survey, data on household land ownership reveals that 100% respondents reside in their own houses.

##### ***Sanitation Facilities***

According to the BBS 2011, 30.4% latrine is septic (water-sealed), 16.9% are sanitary (non-water-sealed), 51.4% are non-sanitary and 1.2% have no latrine regarding Alikhali Village. But the sample survey revealed that all of the households (100%) in the study area have septic latrines (water-sealed and non-water-sealed).

##### ***Sources of Drinking Water***

According to the BBS 2011, relative larger part of the households (92.3%) use tube-well, and 0.2% households use tap and 7.5% household use others for their drinking water in the Alikhali Village. But it can be observed from the sample survey that majority of the households or approximately 64% in the project study area use Tap and 34% household use Tube-well for drinking water. Figure 7 depicts Sources of drinking water for the sample surveyed households:



**Figure 7: Sources of Drinking Water for the Sample Surveyed Households**

### *Provision of Electricity*

According to the BBS 2011, only 15% household have the electricity of Alikhali village. It can be observed from the survey that all the households have Electricity facilities

### *Source of Fuel for Cooking*

Households in the study area use fuel for cooking purposes from mainly two different sources including firewood and cylinder gas. Sources of fuel for 82% household is cylinder gas and for 18% household is firewood. Table 5.14 below shows the sources of fuel for the sample surveyed households:

**Table 5.14: Sources of Fuel for the Sample Surveyed Households**

Cooking Materials	No. of HHs	Percentage
Firewood	9	18.00%
Cylinder Gas	41	82.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

### *Access to Resources*

Among the surveyed household within the project study area, certain questions were asked with respect to access to key resources such as water sources, grazing land, educational facilities, hospital and markets. All surveyed households reported to have immediate access to resources way within a 1 kilometer distance as reported in the following Table 5.15:

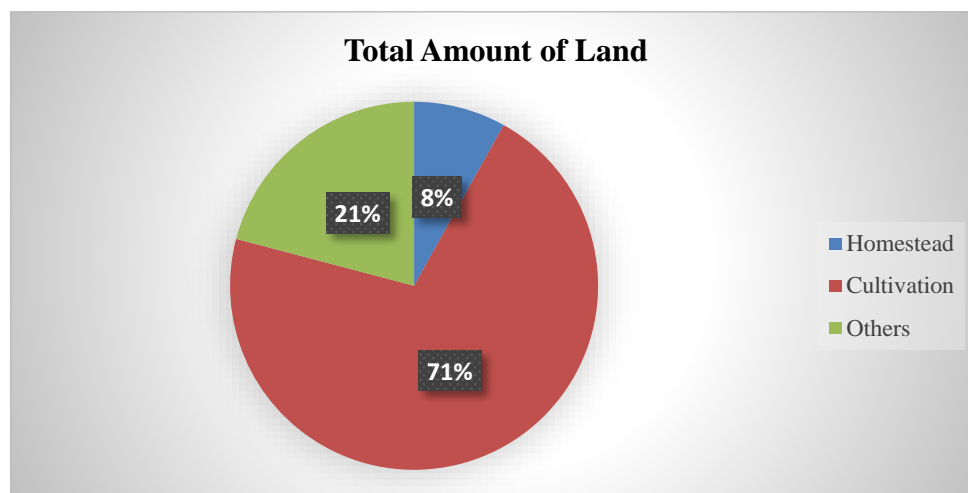
**Table 5.15: Access to Resources**

Access to Resources	Less Than 1 km	1-3 km	>3 km	Total Households
Water Source	50	-	-	50
Hospital/Medicine	50	-	-	50
Masjid/Temple	50	-	-	50
Grazing Land	50	-	-	50
Surface Water Sources	50	-	-	50

#### 5.2.7.2.5 Asset Ownership

##### **Land Ownership**

The survey has revealed that about 71% of land used by the households as cultivated land whereas 8% of land used as own homestead and 21% of land used in other purposes. The household have average 23.02 decimal land as their homestead and 201.8 decimal land for their cultivation. And average of 59.4 decimal land is used for other purposes. Figure 8 below depicts the use of land by the landowners:



**Figure 8: Use of Land by the Landowners**

##### **House Type**

According to the BBS 2011, 1.9% houses are pucca, 7.7% houses are semi-pucca, 78.5% houses are katcha and 11.8% houses are jhupri at Alikhali Village. But majority of the houses in the sample surveyed area are pucca (38%) followed by semi-pucca houses (32%). And 28% houses have been observed as mud (katcha) houses whereas only 2% houses are jhupri. There are 63% pucca houses are 1 story buildings and 37% houses are 2 storied buildings. In the study area all semi-pucca houses are built with ‘pucca wall, pucca floor, and tin roof’. All of the mud (katcha) houses are built with ‘mud wall, mud floor, and tin roof’. Table 5.16 below shows the types of houses at the study area:

**Table 5.16: Types of Houses at the Study Area**

Types of House	Frequency	Percentage
Pucca	19	38.00%
Semi-Pucca	16	32.00%
Kutchra	14	28.00%
Jhupri	1	2.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

### ***Household Income***

Various income sources of the household members of the study area were agriculture and livestock, agriculture labor, fisheries, non-agriculture labor, industry, business, hawker, transport, construction, service, rent, remittance, and others. Among the surveyed households, only 2% households earn less than Taka 10,000 per month – this group might be considered as poor. 44% households earn Taka 10,000-19,999 per month – this group might be considered as lower middle class. 32% households earn Taka 20,000-39,999 per month – this group might be considered as middle class. A great 18% households earn Taka 40,000 - 74,999 per month – this group falls under upper middle class category. There are 4% household earns above Taka 75,000 per month was found in the study area, who could have been considered as rich. In general, the household head is found as the main income-earner of the family. But there are few joint families, where income-earners are more than one. Table 5.17 below shows income level of the households of the study area:

**Table 5.17: Income Level of the Households of the Study Area**

<b>Household Income Range</b>	<b>No. of HHs</b>	<b>Percentage</b>
<10000	1	2.00%
10000-19999	22	44.00%
20000-39999	16	32.00%
40000-74999	9	18.00%
75000+	2	4.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

### ***Domestic Animals***

The percentage of households possessing domestic animals is observed to be moderate in the study area with only 14% not owning any form of domestic animals. However within the remaining 86% most of the household owned or reared cows, buffaloes, goats, hens, ducks and pigeon. About 51.16% domestic animals are duck and hen, 39.53% animals are cows, about 2.33% animals are goat and about 6.98% animals are buffaloes and pigeons. Table 5.18 below shows the no. of households having different types of animals:

**Table 5.18: No. of Households Having Different Types of Animals**

<b>Types of Livestock</b>	<b>Frequency</b>	<b>Percentage</b>
Cow	17	39.53%
Goat	1	2.33%
Duck, Hen	22	51.16%
Others	3	6.98%
<b>Total</b>	<b>43</b>	<b>100.00%</b>

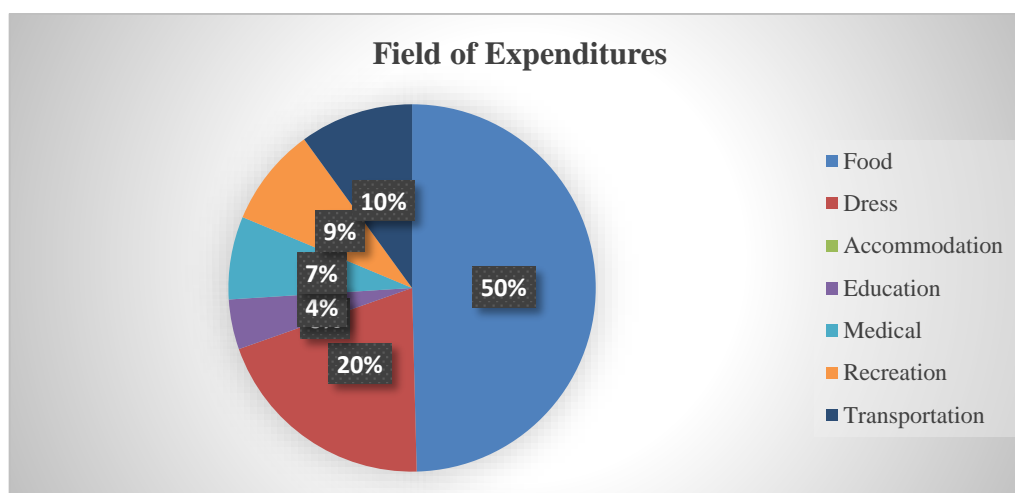
#### 5.2.7.2.6 Household Expenditure

The sample survey data reveals that 2% households have average expenditure below Taka 5,000 per month, while 36% households expend Taka 5,000-9,999 per month on average, 48% households have expenditure of Taka 10,000-19,999 per month, 12% households spend Taka 20,000-39,999 per month and 2% households spend Taka 40,000-74,999 per month on an average. Table 5.19 below depicts the Expenditure Ranges of the Households of the Study Area.

**Table 5.19: Expenditure Ranges of the Households of the Study Area**

Expenditure Range	No. of HHs	Percentage
<5000 Taka	1	2.00%
5000-9999 Taka	18	36.00%
10000-19999 Taka	24	48.00%
20000-39999 Taka	6	12.00%
40000-74999 Taka	1	2.00%
<b>Total</b>	<b>50</b>	<b>100.00%</b>

It can be observed from the survey that the majority of the expenditure is attributed to food and consumable resources with almost half of the monthly income being allocated for the same. Other significant expenditures include clothing, Transportation, recreation, medical and education. Figure 9 below depicts the fields of expenditures of the households:



**Figure 9: Fields of Expenditures of the Households**

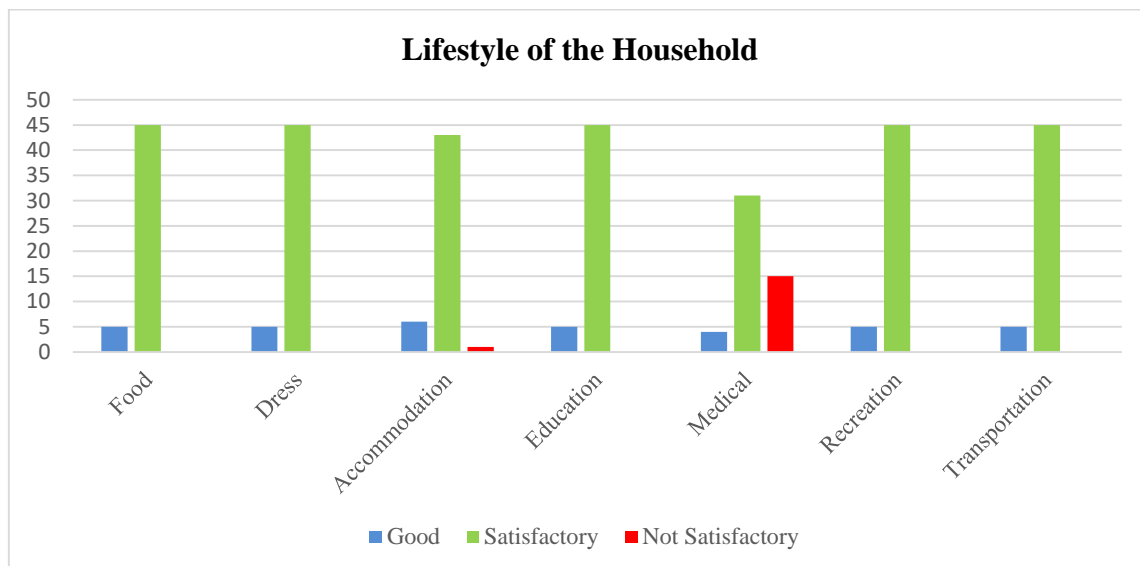
Field survey also revealed a great finding that 92% households have savings on their earnings.

#### 5.2.7.2.7 Involvement with NGOs/CBOs

Sample household survey reveals that 44% households in the study area are involved with non-governmental and community-based organizations (NGOs/CBOs) and 56% family member has not any involvement with NGOs/CBOs. BRAC and DSK work with local people for social and economic development – people have involvement with NGOs for taking loan and saving their money. Besides, there is a common CBO for Muslims which is Masjid Committee.

#### 5.2.7.2.8 Satisfaction Level in Life Style

The analysis of the households' life style has focused on accessibility and affordability regarding food, clothing, educational facilities, medical facilities, transport facilities, recreation etc. With respect to availability of food, clothing, education, recreation and transportation, it is considered “satisfactory” by 90% each of the households under the survey. Food, clothing, education, recreation and transportation availability are considered “good” by 10% each of the households in the study area. As for housing /accommodation facilities, it is found “satisfactory” by 86% of the respondents, 12.0% of the respondents found it “good” and only 2% of the respondents found it “unsatisfactory”. Medical facilities are generally considered “satisfactory” by only 28.0% of the respondents in the study area whereas 68.0% of the respondents found them “unsatisfactory”. However, transportation facilities were scored as “satisfactory” by only 62% of the respondents, while a great 30% considered them as “unsatisfactory” and 8% considered it “good”. So it is matter of regret that in case of medial “unsatisfactory” percentage are far greater than other basic needs’ “unsatisfactory” level. Figure 10 below shows the satisfaction level of the household in their daily life style:



**Figure 10: Satisfaction Level of the Household in their Daily Life Style**



#### 5.2.7.2.9 Overall Perception about the Existing Power Plant

Almost all the people know about the project to be implemented. All of the respondents have a positive perception about the power plant. They express their opinion that the power plant is a national asset and support to meet our electricity demand. Positive expectations of the surveyed household are primarily with respect to overall development in the area, medical facilities, improved road facilities and employment opportunity for the local people.

## **6 ANALYSIS OF ALTERNATIVES**

### **6.1 ‘No Project’ Alternative**

From physical and environmental points of view, the ‘do-nothing’ is preferable to any project implementation, since it would avoid creation of any of the adverse impacts associated with the project. But the ‘without project alternative’ is not acceptable since this will strongly reduce the potential for socio-economic development of the country. In spite of having greater potentiality, the industrial growth is retarded mainly due to inadequacy of electricity facility.

So, it is concluded that the ‘No build’ alternative is unacceptable, and the potential socio-economic benefits of implementation of such project far outweigh the adverse impacts, all of which can be controlled and minimized to an allowable level.

### **6.2 Analysis of Technology Alternatives**

GOB is looking for various options preferably Renewable Energy resources. Under the existing generation scenario of Bangladesh, Renewable Energy has a very small share to the total generation. The share of Renewable Energy exceeds more than 1% till now. The present government is placing priority on developing Renewable Energy resources to improve energy security and to establish a sustainable energy regime alongside of conventional energy sources. Government has already launched ‘500MW Solar Power Mission’ to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the scenario, solar energy generation is the most feasible technological alternative amongst others.

### **6.3 Analysis of Site Alternatives**

Bangladesh is a land hungry country, where getting more than 100 acres of land within single boundary is almost impossible. Moreover, the project land was agriculturally unproductive, where salt cultivation took place only seasonally. Hence, landowners have also been found to be benefitted through 24 years lease to the project. Taking all these into consideration, the best possible site for the project is at the location.

## 7 RISK ANALYSIS AND IDENTIFICATION

Risk analysis and identification has been carried out on qualitative basis. Each of the impacts has been analyzed and categorization has been made based on the impacts being high, medium and low. Tables show the risk analysis of the risk analysis of the project during pre-construction, construction and operation phase.

**Table 7.1: Anticipated Risks on Important Environmental & Social Components during Pre-construction and Construction Phase**

Project Stages/ Source of Risks	Anticipated Risks on Important Environmental & Social Components during Pre-construction and Construction Phase																								Comments		
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/Aquatic Fauna			Human Health			Homesteads				Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Adverse	Beneficial
Impacts on Aquatic Ecology	✓															✓											There will be minimal discharge during the pre-construction and construction phase of solid waste and water. <b>Mitigation measures:</b> No mitigation measure is required.
Health and Safety					✓						✓									✓							Particular matter (PM) generation during pre-construction and construction phases Generation of noise due to piling and other construction activities and transportation of construction materials <b>Mitigation Measures:</b> <ul style="list-style-type: none"><li>Regular sprinkling of water at the project</li></ul>

Project Stages/ Source of Risks	Anticipated Risks on Important Environmental & Social Components during Pre-construction and Construction Phase																								Comments		
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/Aquatic Fauna			Human Health			Homesteads				Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Adverse	Beneficial
																										site	
																										<ul style="list-style-type: none"><li>• Use of nose mask for workers</li><li>• Traffic management to reduce adverse effect due to noise</li></ul>	
Solid Waste Management																										There will be changes in the topography of the land due to excavation and leveling of land. Air quality will deteriorate during these phases on temporary basis. There may be generation of water during the piling operation. <b>Mitigation measures:</b> <ul style="list-style-type: none"><li>• The soil excavated will be used for leveling of the project site. So there is no accumulation of solid waste. No mitigation measure is required.</li><li>• Regular sprinkling of water at the project site to reduce the dust generation</li><li>• For incoming transportation of construction materials, it is to be ensured that the engines of the truck should be switched off to prevent emission of SOx,</li></ul>	

Project Stages/ Source of Risks	Anticipated Risks on Important Environmental & Social Components during Pre-construction and Construction Phase																									Comments	
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/Aquatic Fauna			Human Health			Homesteads			Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Adverse		Beneficial
																											NOx, CO and PM. The fitness certificate of all transportation should be checked and recorded. <ul style="list-style-type: none"><li>In case of water generation during piling, the water should be adequately disposed to ensure that the generated water does not have any impact on the surrounding environment.</li><li>Use of PPEs to prevent inhalation of dust particles.</li></ul>
Hazardous Materials Storage																											There will be no hazardous material used or stored in the project site during construction site. <b>Mitigation measures:</b> No measure is required.
Transmission line, switch gears and transformers																			✓								Certain amount of electromagnetic radiation will occur near the transformer, switch gear and transmission lines. <b>Mitigation measures:</b> <ul style="list-style-type: none"><li>Design of transmission line, switch gear and transformer to comply with the limits</li></ul>

Project Stages/ Source of Risks	Anticipated Risks on Important Environmental & Social Components during Pre-construction and Construction Phase																								Comments		
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/ Aquatic Fauna			Human Health			Homesteads				Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Adverse	Beneficial
																										of electromagnetic interference <ul style="list-style-type: none"><li>The electricity transmission area should be fenced and limited access of workers are to be ensured.</li></ul>	

**Table 7.2: Anticipated Risks on Important Environmental & Social Components during Operation Phase**

Project Stages/Sources of Risks	Anticipated Risks on Important Environmental & Social Components during Operation Phase																					Comments					
	Natural Environment															Socio-economic Environment											
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/Aquatic Fauna			Human Health				Homesteads			Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Low	Medium	High	Adverse	Beneficial
Impacts on Aquatic	✓														✓											There will be minimal discharge during operation phase of solid waste and water. <b>Mitigation measures:</b>	



Project Stages/Sources of Risks	Anticipated Risks on Important Environmental & Social Components during Operation Phase																								Comments		
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/ Aquatic Fauna			Human Health			Homesteads				Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Adverse	Beneficial
Ecology																										No mitigation measure is required.	
Health and Safety																											There will be no emission (Sox, NOx, CO and PM) in the operation phase. So there will be no adverse risk on workers. <b>Mitigation Measures:</b> No measure is required.
Solid Waste Management																											Insignificant amount of solid waste will be generated from the office building and canteen. <b>Mitigation measures:</b> The waste should be collected and disposed for recycling purposes outside the project area.
Hazardous Materials Storage																											Hazardous materials like transformer oils/ spent oils and solvents required for coating of PV panel fittings etc. may be stored in the plant site. <b>Mitigation measures:</b> Transformer oils/ spent oils should be stored adequately in drums with secondary containment and sealed and marked as hazardous. These should be stored in a designated area. Periodically these materials should be disposed to outside DoE approved contractors for proper disposal.

Project Stages/Sources of Risks	Anticipated Risks on Important Environmental & Social Components during Operation Phase																								Comments		
	Natural Environment																		Socio-economic Environment								
	Land / Agriculture			Air			Hydrology & Drainage			Noise			Vegetation			Terrestrial/ Aquatic Fauna			Human Health			Homesteads				Employment	
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High		Adverse	Beneficial
Transmission line, switch gears and transformers																			✓								Certain amount of electromagnetic radiation will occur near the transformer, switch gear and transmission lines. <b>Mitigation measures:</b> <ul style="list-style-type: none"><li>Design of transmission line, switch gear and transformer to comply with the limits of electromagnetic interference</li><li>The electricity transmission area should be fenced and limited accesses of workers are to be ensured.</li><li>The electromagnetic radiation should be monitored by a third party on an annual basis.</li></ul>

From the above analysis it can be concluded that during the pre-construction and construction period, the risks are medium and for the operation phase the risks are low.

## **8 IMPACT IDENTIFICATION AND EVALUATION**

### **8.1 General**

The project may have impact on the environment during construction & operation phases. During the construction phase, the impacts may be regarded as temporary or short-term; while long term impacts may be observed during the operation stage. Spatially the impacts have been assessed over the study area of 5 km radius of the project site.

The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of Solar PV power. It will certainly meet the ever increasing Demand of Power and to bridge the Gap between Demand and Supply of Power.

### **8.2 Potential Impact Generation Activities**

The construction and operation phase of the project comprises various activities each of which may have an impact on environmental parameters. The impacts of the project are envisaged during the design and planning, during pre-construction phase, construction phase.

During the construction phase, the following activities may have impacts on environment:

- Site preparation
- Minor excavation and leveling
- Hauling of earth materials and wastes
- Cutting and drilling
- Erection of concrete and steel structures
- Road construction
- Painting and finishing
- Clean up operations
- Landscaping and afforestation

The activities can be divided into two categories, viz. sub-structural and super-structural work. Moreover, construction work will involve cutting of trenches, excavation, concreting etc. All these activities attribute to dust pollution. The super-structural work will involve steel work, concrete work, masonry work etc. and will involve operation of large construction equipment like cranes, concrete mixers, hoists, welding sets etc. There may be emission of dust and gases as well as noise pollution from these activities.

Mechanical erection work involves extensive use of mechanical equipment for storage, transportation, erection and on-site fabrication work. These activities may generate some air contaminants and noise pollution. The electrical activities are less polluting in general.

### 8.3 Impacts during Planning and Design Phase

The potential adverse environment impacts associated with transmission lines have been avoided or minimized through careful route selection. The alignment is sited away from major settlements, whenever possible, to account for future urban expansion. Forests areas and vegetation areas are avoided. Alignment in this project has avoided geologically unstable areas, which can also pose foundation related problems. No land acquisition is required for placing transmission towers on private land.

### 8.4 Impacts during Pre-Construction & Construction Phase

The environmental impact during construction phase is localized and of short term magnitude. However, as this project land shall be govt. barren land, the change in land use will be minimum.

Impact is primarily related to the civil works and some intensive impact due to erection of the equipment. The details of the activities and probable impact are brought out in table below:

**Table 8.1: Identification of Activities & Probable Impacts (Pre-construction & Construction Phase)**

Construction Activities	Environment Attribute	Probable Impacts
Land use	Land	No significant impact on land-use.
	Socio-economics	No Impact due to Rehabilitation & Resettlement issues is expected as barren salt field will be used for the power plant construction. The ROW for the transmission line is sited away from major settlements and agricultural use of the ROW will be allowed.
Site clearing and Leveling (cutting, stripping, excavation, earth movement, compaction)	Air	<ul style="list-style-type: none"> <li>➤ Fugitive Dust Emissions</li> <li>➤ Air Emissions from construction equipment and machinery</li> </ul>
	Water	Run-off from construction area
	Land	Loss of top soil is minimal as the land was mostly barren as abundant salt cultivation activities.
	Ecology	Minimal loss of vegetation / habitat as the site is has barren land with almost no vegetation.
Transportation and Storage of	Air	<ul style="list-style-type: none"> <li>➤ Air Emissions from vehicles</li> <li>➤ Fugitive Dust Emissions due to traffic movement</li> </ul>

Construction Activities	Environment Attribute	Probable Impacts
Construction Material/ Equipment	Water	Run-off from Storage Areas of construction Material
	Public Utilities	Increased flow of traffic
Civil Construction Activities	Air	➤ Air Emissions from construction machinery ➤ Fugitive Dust Emissions
	Water	Run-off from Construction Areas
Mech. and Elec. Erection Activities	Air	Air Emissions from Machines / activities
Influx of Labor and construction of temporary houses	Socio-economics	➤ Employment opportunities shall increase ➤ Stress on infrastructure
	Land	Change in land use pattern of the area
	Water	Sanitary effluents from labor colonies
Transportation and Disposal of Construction Debris	Air	➤ Air Emissions from Transport Vehicles ➤ Fugitive Dust Emissions due to Movement of Traffic ➤ Spillage and fugitive emissions of debris materials
	Water	Run-off from Disposal Areas
	Soil	No Conversion of land into waste land as already barren salt field.

#### 8.4.1 Impact on Land use

The mobilization of construction equipment and construction materials will require space for storage and parking of construction vehicles and equipment, construction material storage yards, disposal sites, and labor camps for human resource to avoid environmental impact and public inconvenience. These locations shall comply with the local laws and regulations and need approval from authorities to utilize these facilities (access roads, telecommunication, and pipe borne water supply).

The construction activities attract a sizeable population and the influx of population is likely to be associated with construction of temporary hutments for construction work force, having

an effect on land use pattern of the areas surrounding the project. However, this impact is envisaged to be insignificant due to following reasons.

- Temporary labor colonies shall be situated in the areas already acquired for the project.
- It will be only a temporary change (restricted to construction period). After construction phase, the areas acquired by labor colonies shall be reverted back similar to preconstruction stage
- Any use of private land will follow the principles in the Resettlement Framework.

Further, TSEL shall also be in the process to improve the infrastructure of the area such as roads, schools, hospitals, etc. The project would add to the economic development of the area through allied business, which will be set-up along with the plant.

#### **8.4.2 Impact on Soil Cover**

As the construction activities for the main plant units of project would be confined in the barren salt field, the impact on soil will be minimal and confined. Only a very few cutting and filling is required during construction. The construction activities result in loss of vegetation cover (grass and shrubs) and topsoil in the plant area. No adverse impact on soil in the surrounding area is anticipated.

#### **8.4.3 Impact of Solid Waste**

Solid waste during the construction phase consists primarily of scrapped building materials, excess concrete and cement, rejected components and materials, packing and shipping materials (pallets, crates, Styrofoam, plastics etc.) and human waste.

#### **8.4.4 Air Impact**

As the project is Solar PV Project, the impact during construction of is expected to be minimal as a Greenfield Project plant.

Particulate matter in the form of dust would be the predominant pollutant affecting the air quality during the construction phase. Dust will be generated mainly during excavation, back filling and hauling operations along with transportation activities.

The main source of gaseous emission during the construction phase is movement of equipment and vehicles at site. Equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO<sub>2</sub>, NO<sub>x</sub>, and particulate matter. The impact is reversible, marginal and temporary in nature.

#### **8.4.5 Noise Impact**

The major noise generating sources during the construction phase are vehicular traffic, construction equipment like dozer, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. The operation of this equipment will generate noise ranging between 75 – 90 dB (A).



#### 8.4.6 Impact on Water Environment

The construction personnel would be housed in temporary settlements. These settlements would discharge considerable amount of domestic wastewater. Stagnant pools of water would increase breeding of mosquitoes and generally create insanitary conditions. Contractor will provide Soak pit with a depth of 2 meter to dispose liquid water so that such water do not form stagnant pools nor aggravate soil erosion. The main pollutants are organic components and microorganisms with the potential to cause contamination of water quality.

Construction processes include fabrication of concrete and related water usage. Wastewater from construction activities would mostly contain suspended impurities. The waste water will be arrested before discharge, to prevent solids buildup in the existing drains. Thus, the construction site wastewater would be led to sedimentation basins, allowing a hydraulic retention time of 1 ½ to 2 hours, where excess suspended solids would be settled out and relatively clear supernatant would be discharged to the plant drain. Generally, surface run-off water is not there in dry months during construction. Also, since the area is low land, there will be considerable surface runoff. However, during monsoon, surface run-off including effluents may cause load of suspended solids.

#### 8.4.7 Ecological Impact

The project site is mainly barren salt field and there are no major habitats near the site. The impact of the construction activities would be primarily confined to the project site. Since, the entire land is barren salt field with some xerophytic plants, shrubs. Thus, the site development works would not lead to any significant loss of important species or ecosystems.

#### 8.4.8 Impacts Due To Transmission Lines during Construction Phase

The project activities during construction phase will not involve any clearing of trees along the route alignment wherever required, excavation for installation of towers, erection of towers, civil works related to transmission line and line stringing as the line will connect with the existing poles of REB. During the operation phase, most of the construction phase impacts will get stabilized and the impacts will be restricted only to the operation and maintenance of the project.

The impacts of the project activities on various environmental attributes are discussed in subsequent sections.

### 8.5 Impact during Operation Phase

Various activities of operation and maintenance phase and their probable impacts on various sectors of environment are presented in table below.

**Table 8.2: Identification of Activities and Probable Impacts in Operation Phase**

O&M Activities	Sector	Probable Impacts
Transportation	Air	<ul style="list-style-type: none"> <li>➤ Air Emissions from Vehicles</li> <li>➤ Fugitive Dust Emissions due to Traffic</li> </ul>

O&M Activities	Sector	Probable Impacts
		Movement
	Public Utilities	Increased flow of traffic
	Water	No effluent generation
Power Generation	Air	There is no emission from solar Project
Water Treatment for various uses	Water	Generation of Wastewater due to PV Cleaning Modules. The effluent is non-toxic and will be discharged in the canal within the project site.
Operation of Transformers and Switchyard	Water	There may be transformer oil spillages during maintenance.
Electromagnetic Radiation	Health & Safety	There will be some electromagnetic radiation near the transformer, switchyard and the transmission lines.
proper maintenance of PV plant	O&M	The O&M activities for a solar PV power plant are less demanding than those related to other forms of electricity generation. This is mainly due to the fact that there are no moving parts in a solar PV system (unless it is a tracking system). However, maintenance is still an important factor in maximising both the performance and lifetime of the plant components.

### 8.5.1 Impact on Land use

The project will be set up on barren salt field. The site, after completion of its development, would consist of built structures, landscaped to give a pleasing outlook. Following the construction phase, the temporarily modified land use pattern, such as construction of temporary tents to accommodate some construction personnel will be totally removed during the operation stage. Land released from the construction activities would be put to economic and aesthetic use to hasten recovery from adverse impacts.

### 8.5.2 Impact on Soil Cover

Most impacts of Solar PV project on soil are restricted to the construction phase, which will get stabilized during operation phase.

During operation of a project, no appreciable adverse changes in the soils are anticipated.

### 8.5.3 Air Impact & GHG Emission

Plant operation would not significantly affect the air quality, as Solar project is green field project & there are no any gaseous emissions during operation phase from the project.

There is no net GHG emission from the project. However, GHG avoidance from 20 MW HFO based power plant has been shown to compare the impact.

Fuel requirement for a 20 MW HFO based power plant:

Item	Unit	Quantity	
		per day	yearly
HFO	MT	180 g/kWh x 20,000 kW x 24h = <b>86.4 MT</b>	86.4 T x 365 days x 0.8 (plant utilization factor) = <b>25,228.8 MT</b>

Estimated GHG Emission\* from 20 MW HFO based Power plant:

Annual Fuel Consumption (Tons)	CO <sub>2</sub> (t CO <sub>2</sub> per t of Fuel)	CH <sub>4</sub> (t CH <sub>4</sub> per t of Fuel)	NO <sub>2</sub> (t NO <sub>2</sub> per t of Fuel)	t CO <sub>2</sub> Equivalent per year
25,228.8	3.127	0.000032	0.0012	79,001

\* The Green House Gas (GHG) emission from the Project has been estimated with the use of IFC's Carbon Emissions Estimation Calculator (CEET) (Details in [Annex 14](#)).

So by installing a 20 MW Solar PV plant instead of 20 MW HF based power plant, **GHG emission of 79,001 ton CO<sub>2</sub>e per year** can be avoided.

#### 8.5.3.1 Impact of Refrigerant Used In ACs

In TSEL premises, total 11 ACs have been installed- seven in Control Rooms with total capacity of 18 Ton and four in First floor office with total capacity of 4 Ton. Refrigerants used in these ACs are R410A & R22. R-410A is a hydro-fluorocarbon (HFC) which does not contribute to ozone depletion. But R22, hydro-chlorofluorocarbon (HCFC), not only has ozone depletion potential but also has high global warming potential. So care should be given while choosing the right refrigerant during replacement of ACs.

### 8.5.4 Noise Impact

#### Work Zone Noise Levels

Protective instruments will be provided to the operators and workers working near the high noise generating machinery. As per Occupational Safety and Health Administration (OSHA) Standards, the maximum allowable noise level for the workers is 90 dB (A) for 8 hours exposure a day.

## **8.5.5 Impact on Water Environment**

### **8.5.5.1 Impact on Ground Water**

No ground water due to plant operation will be drawn during operation phase but there will be usage of ground water for cleaning it and its amount is very low. So lowering of groundwater table will not be an issue.

### **8.5.5.2 Impact on Surface Water**

There shall be minimal discharge of wastewater from cleaning of Solar PV modules. The wastewater emanating from cleaning operations shall be recycled for plantation and greenbelt development around the plant.

### **8.5.5.3 Terrestrial Ecology**

There is no sensitive ecological area / protected forest area such as national wildlife park, bird sanctuary crossing the proposed route alignment. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion.

## **8.5.6 Impacts of Transmission Lines during Operation Phase**

### **8.5.6.1 Electric Shock**

This may lead to death or injury to the workers and public in the area.

### **8.5.6.2 Noise Generation**

Nuisance to the community around the substation site can occur during the project operation stage. Provision of appropriate noise barriers at substations shall be made in this regard.

### **8.5.6.3 Maintenance of Transmission Line and Substation**

Possible exposure to electromagnetic interference could occur during these activities. Design of transmission line shall comply with the limits of electromagnetic interference from overhead power lines.

### **8.5.6.4 Oil Spillage**

Contamination of water on land/nearby water bodies by the transformer oil can occur during operation due to leakage or accident.

## **8.5.7 Impact of Solar PV Panel**

TSEL is using Multicrystalline Silicon Solar Module for their solar plant. In order to assess the environmental impact of solar panels it is essential to consider the Life Cycle Analysis (LCA) of a solar panel.

In the manufacturing process of a solar panel there are mining and processing of the mined raw material which are energy intensive and uses non renewable energy and therefore causing emission of GHGs.

Solar power plants once in operation have no GHG emissions or water pollution. The efficiency of solar panels have been increasing over the years as result it has been estimated that currently it takes between 2-3 years of operation of a solar power plant to offset the GHG emission caused during the manufacturing process of solar panels. Therefore, for solar power plants having a lifetime of 20 years is clearly beneficial in terms of net reduction of GHG emission over the plant life.

On completion of the lifetime of the TSEL the plant will have to be decommissioned and the panels cannot be dumped in the environment and therefore have to be recycled or disposed through recommended means. It may be possible to export to countries having recycling facilities.

#### **8.5.8 Impacts of O&M activities for Solar PV plant**

Compared to most other power generating technologies, PV plants have low maintenance and servicing requirements. However, proper maintenance of a PV plant is essential to optimise energy yield and maximise the life of the system.

Suitably thorough scheduled maintenance should minimise the requirement for unscheduled maintenance although, inevitably, some failures still occur. A robust and well-planned approach to both scheduled and unscheduled maintenance is important.

[Annex 15](#) describes the possible O&M activities for an ideal solar PV plant.

### **8.6 Social Impacts**

#### **8.6.1 Traffic Congestion**

No overburden on the local transportation system is envisaged due to the Project.

#### **8.6.2 Labor Influence**

##### **8.6.2.1 Construction Phase**

During construction activities, there will be a sizeable influx of population and labor colony is being constructed with basic amenities for the laborers working on the project. The peak labor population shall be 300 but on an average. This will have an effect on social fabrics of the areas surrounding the project. However, this impact is envisaged to be insignificant due to the following reasons:

- Temporary labor colonies shall be situated in the areas already acquired for the project.
- It will be only a temporary change (restricted to construction period). After construction phase, the areas acquired by labor colonies shall be reverted back similar to preconstruction stage

TSEL has a Human Resources Policy, which specifies the terms of employment and working conditions. These include procedures for hiring and recruiting, probation, training, performance review, promotion, insurance, salary and compensation, resignation, lay-off and

retrenchment, leave and vacation, and superannuation, which follow Bangladesh Labor Rules, 2015. All the employees will have access to the human resources policy and procedures. Labor inspections are done annually by the relevant government agency, which reviews wages, working hours, benefits, etc.

Most of the construction labor will be on contractual basis. Separate labor camps shall be made within the plant premises for the construction labors. Therefore, conflict of the migrating labor with locals, will not take place during the construction phase. Regarding monitoring of diseases corresponding to labor influx, regular health status monitoring of labors and its surrounding population will be carried out with the mobile health care facilities shall be developed and operated by TSEL in this area. The health areas and issues that requires attention by TSEL is as follows:

**Table 8.3: Labor Health Management Issues and Possible Mitigation Measures**

General Living Facilities	
Issue	Mitigation Measures
Drainage	The building site should be adequately drained to avoid the accumulation of stagnant water which may cause proliferation of potential disease vectors such as mosquitoes, flies and others.
Heating, air conditioning, ventilation and light	<ol style="list-style-type: none"> <li>1. For facilities located in cold weather zones, the temperature should be kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.</li> <li>2. For facilities located in hot weather zones, adequate ventilation and/or fans are to be provided.</li> <li>3. Both natural and artificial lighting are to be provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting should be provided.</li> </ol>
Water	<ol style="list-style-type: none"> <li>1. Access to an adequate and convenient supply of free potable water should be always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are to be available.</li> <li>2. Drinking water meets national/local or WHO drinking water standards.</li> <li>3. All tanks used for the storage of drinking water should be constructed and covered as to prevent water stored therein from becoming polluted or contaminated.</li> <li>4. Drinking water quality should regularly monitored.</li> </ol>
Wastewater and solid waste	<ol style="list-style-type: none"> <li>1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.</li> <li>2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odors associated with decaying organic materials.</li> <li>3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where</li> </ol>



General Living Facilities	
Issue	Mitigation Measures
	warranted, pest and vector monitoring should be performed on a regular basis.
Room/dormitory facilities	<ol style="list-style-type: none"> <li>1. Rooms/dormitories are to be kept in good condition.</li> <li>2. Rooms/dormitories should be aired and cleaned at regular intervals.</li> <li>3. Rooms/dormitories should be built with easily cleanable flooring material.</li> <li>4. Sanitary facilities are to be located within the same buildings and provided separately for men and women.</li> <li>5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).</li> <li>6. A minimum ceiling height of 2.10 metres is to be provided.</li> <li>7. In collective rooms, which are minimized, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.</li> <li>8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.</li> <li>9. There should be mobile partitions or curtains to ensure privacy.</li> <li>10. Every resident is to be provided with adequate furniture such as a table, a chair, a mirror and a bedside light.</li> <li>11. Separate sleeping areas are to be provided for men and women, except in family accommodation.</li> </ol>
Bed arrangements and storage facilities	<ol style="list-style-type: none"> <li>1. A separate bed for each worker is provided. The practice of “hot-bedding” should be avoided.</li> <li>2. There is a minimum space between beds of 1 metre.</li> <li>3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimized. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 metres.</li> <li>4. Triple deck bunks are prohibited.</li> <li>5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.</li> <li>6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).</li> <li>7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.</li> <li>8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.</li> </ol>

Sanitary And Toilet Facilities	
Issue	Mitigation Measures
Toilet facilities	<ol style="list-style-type: none"> <li>1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.</li> <li>2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be (“must be” in cold climates) in the same building as rooms and</li> </ol>

	dormitories.
Showers/bathrooms and other sanitary facilities	<ol style="list-style-type: none"> <li>1. Shower/bathroom flooring is made of anti-slip hard washable materials.</li> <li>2. An adequate number of handwash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Handwash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.</li> <li>3. An adequate number of shower/bathroom facilities is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.</li> <li>4. Showers/bathrooms are conveniently located.</li> <li>5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.</li> </ol>

Canteen, Cooking And Laundry Facilities	
Issue	Mitigation Measures
Laundry facilities	<ol style="list-style-type: none"> <li>1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.</li> <li>2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.</li> </ol>
Canteen and cooking facilities	<ol style="list-style-type: none"> <li>1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.</li> <li>2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.</li> <li>3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.</li> <li>4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.</li> <li>5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.</li> <li>6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.</li> <li>7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.</li> <li>8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.</li> <li>9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.</li> </ol>

Leisure, Social And Telecommunication Facilities	
Issue	Mitigation Measures
Leisure, social and telecommunication facilities	<ol style="list-style-type: none"> <li>1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multipurpose halls to providing designated areas for radio, TV, cinema.</li> <li>2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, and</li> </ol>

	<p>educational facilities.</p> <p>3. Workers are provided with dedicated places for religious observance if the context warrants.</p> <p>4. Workers have access to public phones at affordable/ public prices (that is, not inflated).</p> <p>5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.</p>
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Medical Facilities and Health Safety Issues On Site	
Issue	Mitigation Measures
Medical facilities	<p>1. A number of first aid kits adequate to the number of residents are available.</p> <p>2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.</p> <p>3. An adequate number of staff/workers is trained to provide first aid.</p> <p>4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, and minor surgery).</p>
Health and safety on site	<p>1. Health and safety management plans including electrical, mechanical, and structural and food safety have been carefully designed and are implemented.</p> <p>2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.</p> <p>3. An adequate number of staff/workers is trained to provide first aid.</p> <p>4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.</p> <p>5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.</p> <p>6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.</p> <p>7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.</p> <p>8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).</p> <p>9. Interactions with local communities should be minimized in order to prevent vector borne diseases by the contractor management.</p>

#### 8.6.2.2 Operation Phase

The operation & maintenance staff will be accommodated in the TSEL Township, which will be located at Teknaf Town. Therefore no impact on the local life pattern is envisaged due to operational worker of the project.

#### 8.6.3 R&R Issue

The Solar PV Project will be set-up on barren salt field. Therefore there is no R & R issue for the project site. Initial survey of the 2.95 km transmission line right of way (ROW) show that it will pass through Alikhali and Leda village. The preliminary survey observed that the transmission line and line stringing as the line will connect with the existing pole of REB.

#### **8.6.4 Change in Socio-economic Condition**

**Employment:** The project will generate employment opportunities for the local population. Even indirect job opportunities will be created outside the project boundary. Many people will find employment in service sector and marketing of day-to-day needs viz. poultry and other agricultural products. The project will improve the basic infrastructure and the people of nearby villages can also use these amenities.

TSEL is working for the employment and skills training for the locals through following steps.

- Provision in project contracts to provide priority in employment
- Training for skills up-gradation
- Efforts to employ educated unemployed youth

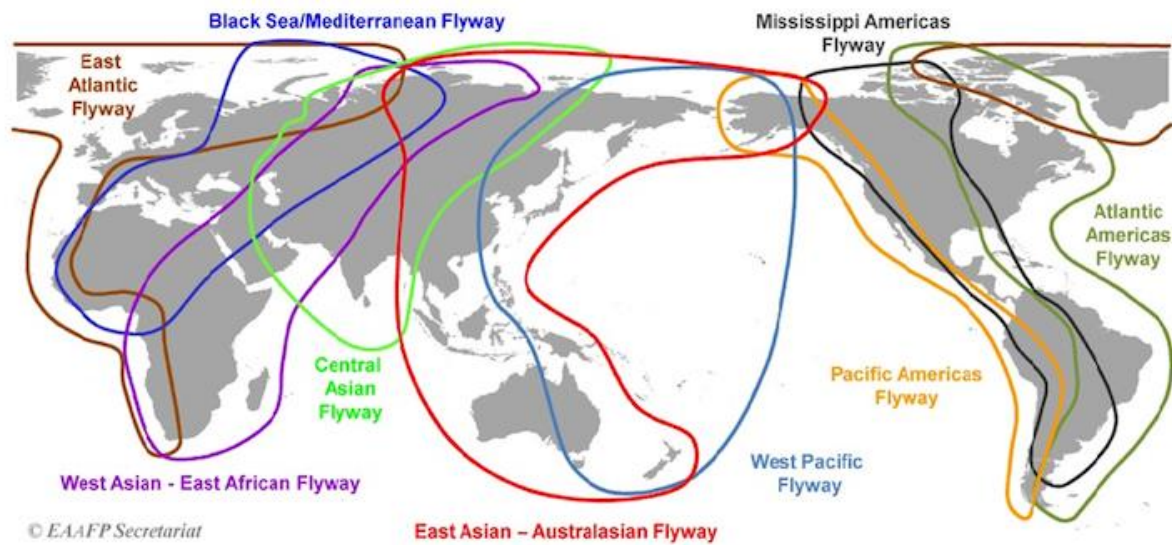
Overall there will be marginal impact on the socio-economic condition of the locality and the impact will be mostly positive.

**Development of Infrastructure:** The job opportunities in non-agricultural sector are likely to increase. The installation of the power plant is expected to further increase the prospects by bringing in direct and indirect employment opportunities.

As the project and consequent activities are expected to generate additional employment and income opportunities for the local population, market expansion supported by infrastructural development will foster economic growth in the area. Flow of reliable and adequate power from the plant will not only enhance growth in the region, but will also bring about a change in energy consumption pattern by switching over from other sources of energy. This will ease off burden on the existing biomass.

#### **8.7 Impact on Migratory Birds**

Migration studies of birds in Bangladesh are in their infancy, however in recent years it is notable that small numbers of waterbirds using Bangladesh have been fitted with satellite transmitters. Evidence so far indicates local movements within Bangladesh between wetlands plus some longer movements from the north-east to the lower Meghna and coast. In addition, waterfowl wintering in Orissa (India) pass through north-western Bangladesh, ducks wintering in Hakaluki Haor migrate through Assam and on to breeding grounds spread from the Tibetan plateau and western China, to western Mongolia, and even in one case a route through Manchuria to far eastern Siberia.



**Figure 11: Nine Major Migratory Flyways**

Flyways for migratory birds, wetlands like haor and breeding grounds of migratory birds do not fall under project area of investigation (AoI). So it can be said that project area, activities or project transmission lines do not impact on migratory birds.

### 8.8 E-Waste generation

Various electrical equipment such as solar PV panels, inverter, rectifiers, batteries and electrical cords are used in the power plant. A small quantity, apx 20 KVA battery bank is used for internal control & protection relay power supply system. Usual life time of such led battery is 2 years, after life time which are usually sold to the battery company as per country practice. Quantity of such VRLA (Valve Regulated Lead Acid) batteries in TSEL premises is 146 (150 AH – 42 Nos, 120 AH – 80 Nos, 50 AH, 2V – 24 Nos).

Some of these electrical equipments may get damaged or broken during construction and operation phase. Over the time, the amount may accumulate to a significant number. E-waste can be categorized as hazardous waste. Proper mitigation measures have to be adopted to reduce the impact on environment.

## 9 MITIGATION/ OPTIMIZATION MEASURES AND RESIDUAL IMPACTS

### 9.1 Mitigation measures taken during Pre-construction & Construction phase

Mitigation measures for the anticipated impacts occurring in the pre-construction and construction phase are described below:

Impact Indicator	Land Use
Mitigation Measure	<p>The selection of temporary lands shall be made in such a way that it is away from highly populated areas, natural flow paths, agricultural lands, important ecological habitats and residential areas. The removal of trees and green cover vegetation will be minimized during preparation of access road and other facilities.</p> <p>Each corner of each plot to be physically marked with marking pillars and digital map to be prepared showing exact land plots for each land owners.</p> <p>There should be adequate arrangements to ensure proper handing over of the leased lands on the same location to the landowners after the end of the project</p>

Impact Indicator	Soil Cover
Mitigation Measure	<p>Appropriate soil erosion control measures such as plantation activities would be undertaken by TSEL to appease the chances of soil erosion. Completion of excavation and foundation work in limited time schedule would also reduce / minimize the chances of soil erosion.</p>

Impact Indicator	Solid Waste
Mitigation Measure	<p>During the construction there will be generation of garbage, for which designated practices of solid waste disposal shall be followed. Solid waste disposal will be done as follows:</p> <ul style="list-style-type: none"> <li>• A waste inventory of various waste generated will be prepared and periodically updated.</li> <li>• The excavated material generated will be reused for site filling and leveling operation to the maximum extent possible.</li> <li>• The scrap metal waste generated from erection of structures and related construction activities will be collected and stored</li> </ul>



	<p>separately in a stack yard and sold to local recyclers.</p> <ul style="list-style-type: none"> <li>• Food waste and recyclables viz. paper, plastic, glass etc will be properly segregated and stored in designated waste bins/containers. The recyclables will be periodically sold to local recyclers while food waste will be disposed through waste handling agency.</li> <li>• Hazardous waste viz. waste oil etc will be collected and stored in paved and bunded area and subsequently sold to authorized recyclers. Necessary manifest for the same will be maintained.</li> </ul>
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<b>Impact Indicator</b>	Noise
<b>Mitigation Measure</b>	<p>To minimize the noise impact on nearby communities, construction schedules have been optimized and vehicular traffic will be routed away from the nearest settlement, Alikhali village, which is approximately 1 km from the power plant site. Also the noise level is substantially lower near the plant boundary due to attenuation caused over the distance. Overall, the impact of generated noise on the environment during construction period is insignificant, reversible and localized in nature.</p>

<b>Impact Indicator</b>	Water
<b>Mitigation Measure</b>	<p>To address potential impacts on water quality, disinfected latrines (e.g., through regular liming) will be used as main component of the sanitation system.</p>

<b>Impact Indicator</b>	Ecology
<b>Mitigation Measure</b>	<ul style="list-style-type: none"> <li>• Construction workers prohibited from harvesting wood in the project area during their employment.</li> <li>• Prevent work force from disturbing the flora, fauna including hunting of animal</li> <li>• Proper awareness programs regarding conservation of flora, fauna including ground vegetation to all drivers, operators and other workers.</li> <li>• Greenery development to be ensured over 33% area of the project site with plantation of fruit and other trees. This shall be done after completion of major construction works, preferably before starting</li> <li>• Marking of trees to be removed prior to clearance, and ensure replantation of trees within the project area where feasible.</li> </ul>



Impact Indicator	Construction equipment and schedule
Mitigation Measure	<ul style="list-style-type: none"> <li>• Selection of construction techniques and machinery to minimize ground disturbance</li> <li>• Minimize construction activities undertaken during the night and local communities informed of the construction schedule.</li> <li>• Construction equipment to be well maintained.</li> <li>• Avoid storage of construction materials beside the road, around water bodies, residential or public sensitive locations</li> </ul> <p>Construction materials should be stored in covered areas to ensure protection from dust, emissions and such materials should be bundled in environment friendly and nuisance free manner</p>

Impact Indicator	Transportation
Mitigation Measure	<ul style="list-style-type: none"> <li>• Existing roads and tracks used for construction and maintenance access to the site wherever possible</li> <li>• Transport loading and unloading of construction materials should not to cause nuisance to the people by way of noise, vibration and dust</li> <li>• As much as possible existing access ways will be used.</li> <li>• Compensation will be paid for loss of caused by the project,</li> </ul>

## 9.2 Mitigation measures taken during Operation Phase

Mitigation measures for the anticipated impacts occurring in the operation phase are described below:

Impact Indicator	Soil Cover
Mitigation Measure	<p>The soil conditions of the project site would be allowed to stabilize during this period after the impacts of the construction phase. The topsoil in non-built up areas would be restored and such portions of the site would be replanted with appropriate plant species to stabilize soil. The species shall be suitable for local climate and available.</p>

Impact Indicator	Noise
Mitigation Measure	<p>Adequate protective measures in the form of ear mufflers/ear plugs to the workers working in high noise areas will be provided.</p> <p>In addition, reduction in noise levels in the high noise machinery areas will be achieved by adoption of suitable preventive measures such as adding sound barriers, use of enclosures with suitable absorption material, etc.</p>

<b>Impact Indicator</b>	Water
<b>Mitigation Measure</b>	The wastewater emanating from cleaning PV Panel operations shall be recycled for plantation and greenbelt development around the plant.

<b>Impact Indicator</b>	Ecology
<b>Mitigation Measure</b>	Soil erosion due to removal of herbaceous vegetation minimized through adoption of mitigation measures like paving and surface treatment and water sprinkling.

<b>Impact Indicator</b>	Use of refrigerants
<b>Mitigation Measure</b>	<ul style="list-style-type: none"> <li>• HCFC refrigerants such as R-22 have ozone depleting potential as well as global warming potential.</li> <li>• Conduct regular inspection and maintenance of air-conditioning and refrigeration appliances to prevent and minimize refrigerant leakage.</li> <li>• Re-filling records should be kept and maintained.</li> <li>• For existing air-conditioning and refrigeration appliances that operate on HCFCs, the refrigerant should be recovered or recycled whenever an overhaul of equipment is to be carried out. Replacing or retrofitting such equipment to operate on non-HCFCs refrigerant should also be considered.</li> <li>• Alternative refrigerants should be looked for future replacement or purchase.</li> </ul>

<b>Impact Indicator</b>	Electric Shock
<b>Mitigation Measure</b>	<p>Injury due to electric shock shall be minimized or avoided by:</p> <ul style="list-style-type: none"> <li>• Security fences around substation</li> <li>• Establishment of warning signs</li> <li>• Careful design using appropriate technologies to minimize hazards.</li> </ul>

<b>Impact Indicator</b>	Electromagnetic radiation
<b>Mitigation Measure</b>	Design of transmission line shall comply with the limits of electromagnetic interference from overhead power lines.

Impact Indicator	Oil spillage
Mitigation Measure	Substation transformers are normally located within secure and impervious areas with a storage capacity of 100% spare oil. Also proper drainage facilities will be constructed during the construction stage to avoid overflow or contamination with natural flow paths especially during the rainy season. TSEL shall maintain account of the usage of oil, inbuilt technical methods and procedures for oil monitoring mechanism, and will prepare mitigation plan for any oil spillage.

Impact Indicator	Hazardous Waste Storage
Mitigation Measure	<ul style="list-style-type: none"> <li>Waste should be stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs</li> <li>Should be stored in closed containers away from direct sunlight, wind and rain</li> <li>Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment</li> <li>Secondary containment should be included wherever liquid wastes are stored in volumes greater than 220 liters. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater) in that specific location</li> <li>Adequate ventilation should be provided where volatile wastes are stored.</li> <li>Provision of readily available information on chemical compatibility to employees, including labeling each container to identify its contents</li> <li>Access to hazardous waste storage areas should be limited to employees who have received proper training</li> <li>Clearly identifying (label) and demarcating the area, including documentation of its location on a facility map or site plan</li> <li>Periodic inspections of waste storage areas should be conducted and the findings are to be documented</li> <li>Spill response and emergency plans should be prepared and implemented to address their accidental release</li> <li>Underground storage tanks and underground piping of hazardous waste should be avoided</li> </ul>

Impact Indicator	Hazardous Waste Transportation
Mitigation Measure	<ul style="list-style-type: none"> <li>On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>All waste containers designated for off-site shipment should be secured and labeled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards.</li> </ul>

Impact Indicator	Hazardous Waste Treatment and Disposal
Mitigation Measure	<ul style="list-style-type: none"> <li>Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment</li> <li>Have all required permits, certifications, and approvals, of applicable government authorities</li> <li>Have been secured through the use of formal procurement agreements</li> <li>It is to be ensured that commercial or government waste contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled.</li> <li>Compliance with applicable local and international regulations have to be ensured.</li> </ul>

## **10 ENVIRONMENTAL AND SOCIAL MANAGEMENT PROGRAM**

### **10.1 General**

This chapter deals at length with the measures that TSEL will take in response to the need for sound environmental management throughout the various phases of the project. The chapter also outlines measures that will be taken in relation to the management of social impacts and the need to address grievances that the various project stakeholders might have, in respect of various stages of project implementation, throughout the life of the project.

The mitigation measures proposed in another chapter of this ESIA Report, which are designed to avoid or minimize impacts during pre-construction, construction, operational and decommissioning phases of the project form the basis of this Chapter. This Chapter presents the specific plan for implementing the mitigation and addressing community grievances within the framework of an Environmental and Social Management Program (ESMP). The following principles were used to guide the preparation of the ESMP:

- Focus on occupational health, safety, and environment risk prevention;
- Affordable, safe technologies are used wherever failure of equipment would have a significant effect on safety, health, or the environment;
- Conformance with relevant standards, codes, and practices will be considered in the application of the safe technologies;
- All activities will be performed in a safe and effective manner and all equipment will be maintained in good operating conditions for the protection of health and safety of all persons and the conservation of the environment and property;
- All necessary precautions are carried out to control, remove, or otherwise correct any hazardous materials leaks and/or spills, or other health and safety hazards;
- All activities and components related to construction of the power station will meet relevant international standards which ensure sufficient technical levels of safety; and
- Necessary measures will be ensured to redress grievances that the communities within and in the proximity of the Project Site might experience.

This Chapter describes the ESMP of the TSEL Power Plant project and addresses the following key components:

- Management activities and systems;
- Plans, procedures, and programs;
- Implementation schedule; and
- Plans for integrating the ESMP within the overall development plan for TSEL

## **10.2 Environmental and Social Management**

TSEL is committed to constructing and operating the power plant in an environmentally responsible manner and in compliance with relevant environmental laws, regulations, and guidelines in force in the country and also those prescribed by lending agencies, including the World Bank and other financing agencies. TSEL will implement an Environmental and Social Management System (ESMS), including an environmental policy that states the principles and intentions of the enterprise in relation to its overall environmental performance. Such principles and intentions will be communicated to each employee as well as the nature of their individual environmental responsibilities. Where appropriate, staff training will be undertaken to ensure their continued environmental performance. In addition, TSEL will aim to obtain International Organization for Standardization (ISO) 14001 accreditation for the ESMS within the first three years of operation.

TSEL is also committed to the creation and implementation of programs to reduce the probability of occurrence of adverse impacts upon the environment. As required, contingency plans will be developed for mitigating potential adverse incidents. TSEL will expect the same level of environmental performance from its agents, suppliers, and contractors and will stipulate this in any legally binding agreements it enters with these parties.

TSEL will also ensure that appropriate corporate resources, personnel and reporting and accountability systems, are in place for the successful implementation of the ESMP. They will, on a continuing basis, review the objectives of the ESMP as well as the company's success in achieving them.

Where objectives are not being achieved, corrective action will be taken. The ESMP objectives will also be modified over the life of the TSEL Power Plant, as appropriate, to reflect changing environmental laws, regulations, standards, and technologies.

## **10.3 Plans, Procedures and Programs**

As part of the ESMP objectives, several plans, procedures, and programs have been developed to guide every stage of project construction, operation, and decommissioning so that the environmental performance of the power plant is optimized. While formulating a detailed ESMP for the TSEL Power Plant project, the pertinent impacts during the three phases, (i.e. construction, operation and decommissioning) have been taken into consideration. The pertinent impact aspects during the three project stages, as applicable, have been as under the following major headings:

1. Air Quality (dust and other particulate matter generation, stack emissions);
2. Noise and Vibration;
3. Hydrology and Surface Water Quality;
4. Drainage and Flood Control;
5. Terrestrial Ecology;

6. Aquatic Ecology;
7. Land Use;
8. Water Use;
9. Traffic and Transportation;
10. Solid Wastes;
11. Occupational Health and Safety;
12. Emergency Response;
13. Socio-Economics; and
14. Public Relations.

The following sections present an overview of the plans, procedures, and programs that will be developed for the TSEL Power Plant.

#### **10.4 Environmental and Social Management Program (ESMP)**

The ESMP is sub-divided into the following phases of development:

- Pre-construction & Construction Phase;
- Operational Phase;

It is to be noted that for this project the mitigation measures are minimal and the activity wise cost are not kept in record.



**Table 10.1: ESMP Activities in Pre-construction, Construction and Operation Phases**

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
<b>Pre-construction &amp; Construction Phase</b>						
1. Equipment layout and installation	Project Site	<ul style="list-style-type: none"> <li>Selection of construction techniques and machinery to minimize ground disturbance</li> </ul>	<p>Construction techniques and machinery</p> <p>It was observed that no major topographical and land contour changes in the vicinity of the project site.</p> <p>Proper internal drainage is in place to ensure that no water logging happens in and around the project site.</p>	TSEL	Implementation in Construction period	Not Recorded
2. Construction schedules	Project Site	<ul style="list-style-type: none"> <li>Minimize construction activities undertaken during</li> </ul>	Timing of construction	TSEL, Contractor	Implementation in Construction	Not Recorded

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
		the night and local communities informed of the construction schedule.	Checking of working hours during this phase	through contract provisions	period	
3.Provision of facilities for Construction workers	Project Site	<ul style="list-style-type: none"> <li>Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.</li> </ul>	Amenities for Workforce facilities	TSEL, Contractor Through contract	Implementation in Construction period	Not Recorded
4.Wood/ vegetation loss, harm to animals	Project Site	<ul style="list-style-type: none"> <li>Construction workers prohibited from harvesting wood in the project area during their employment.</li> <li>Prevent work force from disturbing the flora, fauna including hunting of animal</li> <li>Proper awareness programs regarding conservation of flora, fauna including ground vegetation to all drivers, operators and other workers.</li> <li>Greenery development to be ensured over 33% area of the project site with plantation of</li> </ul>	<ul style="list-style-type: none"> <li>Illegal wood /vegetation harvesting (area in m2, number of incidents reported)</li> <li>Habitat loss</li> <li>Tree plantation</li> </ul>	TSEL, Contractor through contract provisions	Implementation in Construction period	Not Recorded

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
		fruit and other trees. This shall be done after completion of major construction works, preferably before starting				
5.Site clearance	Project Site	<ul style="list-style-type: none"> <li>Marking of trees to be removed prior to clearance, and ensure replantation of trees within the project area where feasible.</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation marking and replantation</li> </ul>	TSEL, Contractor through contract provisions	Implementation in Construction period	Not Recorded
6.Removal of Plot Boundary Isles	Project Site	<ul style="list-style-type: none"> <li>Each corner of each plot to be physically marked with marking pillars and digital map to be prepared showing exact land plots for each land owners.</li> <li>There should be adequate arrangements to ensure proper handing over of the leased lands on the same location to the landowners after the end of the project</li> </ul>	<ul style="list-style-type: none"> <li>Proper land parcel marking</li> <li>Digital mapping of plots</li> </ul>	TSEL, Contractor through contract provisions	Implementation in Construction period	Not Recorded
7.Mechanized	Project Site	<ul style="list-style-type: none"> <li>Construction equipment to be</li> </ul>	<ul style="list-style-type: none"> <li>Construction</li> </ul>	TSEL,	Implementation in	Not

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
construction		well maintained. • Proper maintenance and turning off plant not in use.	equipment - estimated noise emissions and operating schedules	Contractor through contract provisions	Construction period	Recorded
8. Construction of internal roads for accessibility	Project Site	• Existing roads and tracks used for construction and maintenance access to the site wherever possible	• Access roads, routes (length and width of access roads)	TSEL, Contractor through contract provisions	Implementation in Construction period	Not Recorded
9. Transportation and storage of materials	Project Site	• Transport loading and unloading of construction materials should not to cause nuisance to the people by way of noise, vibration and dust • Avoid storage of construction materials beside the road, around water bodies, residential or public sensitive locations Construction materials should be stored in covered areas to ensure	• Water, AirQuality and Noise levelsresults • Records of Grievance redress mechanism	TSEL	Implementation in Construction period	Not Recorded

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
		protection from dust, emissions and such materials should be bundled in environment friendly and nuisance free manner				
10. Health and safety	Project Site	<ul style="list-style-type: none"> <li>Contract provisions specifying minimum requirements for construction camps</li> <li>Contractor to prepare and implement a health and safety plan and provide workers with required PPE.</li> <li>Contractor to arrange for health and safety awareness programs and trainings</li> </ul>	<ul style="list-style-type: none"> <li>Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)</li> </ul>	TSEL (Contractor through contract provisions)	Implementation in Construction period	Not Recorded
11. Nuisance to nearby properties	Project Site	<ul style="list-style-type: none"> <li>Contract clauses specifying careful construction practices.</li> <li>As much as possible existing access ways will be used.</li> <li>Compensation will be paid for loss of caused by the project,</li> </ul>	<ul style="list-style-type: none"> <li>Reinstatement of land status (area affected, m<sup>2</sup>)</li> </ul>	TSEL (Contractor through contract provisions)	Implementation in Construction period	Not Recorded

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
		if any.				
<b>Operational Phase</b>						
1. Electric shock	Project Site	<ul style="list-style-type: none"> <li>• Security fences around substation</li> <li>• Establishment of warning signs</li> <li>• Careful design using appropriate technologies to minimize hazards</li> </ul>	<ul style="list-style-type: none"> <li>• Proper maintenance of fences and sign boards</li> <li>• Usage of appropriate technologies (lost work days due to illness and injuries)</li> </ul>	TSEL	Implementation throughout the operation	Not Recorded
2.Noise generation	Project Site	<ul style="list-style-type: none"> <li>• No action needed.</li> </ul>	<ul style="list-style-type: none"> <li>• Noise level records quarterly</li> </ul>			Not Recorded
3.Transmission line, switch gears and transformers	Project Site	<ul style="list-style-type: none"> <li>• Design of transmission line, switch gear and transformer to comply with the limits of electromagnetic interference</li> </ul>	<ul style="list-style-type: none"> <li>• Required ground clearance (metres)</li> <li>• Report on electromagnetic radiation in the transformer area and high-tension transmission line.</li> </ul>	TSEL	Measurement of electromagnetic force should be done by a certified agency for the transmission line, switch gears and	Not Recorded

Issues/ Aspects	Location	Mitigation Measures	Key Verifiable Indicator	Person Responsible	Remarks	Cost (USD)
					transformers at least once per year.	



## **11 MONITORING, EVALUATION AND REPORTING**

### **11.1 Institutional Requirements**

For ensuring the construction and operation of the power plant according to the required compliance, there should be designated entity/institution or unit. The institution will be fully responsible to maintain the safeguard compliances. TSEL has realized the importance of establishing a separate entity for environmental monitoring and management. So, to maintain the environmental and social compliances, TSEL has planned to establish an individual compliance unit operating under the guidance of Head of Operation. They are planning to name the unit as Environmental and Social Monitoring Unit (ESMU). The detail of the ESMU has been discussed in the following sections.

#### **11.1.1 Environmental and Social Monitoring Unit**

TSEL is in principal obligated to relevant national and international environmental and social compliances and standards. It has informed that it will try to maintain all relevant compliances during construction and operational phases. In doing so, it has planned to form ESMU as is mentioned in the earlier section. The duties of the ESMU will include to:

- ✚ Ensure environmental and social safeguard compliances;
- ✚ Coordinate environmental monitoring process;
- ✚ Act as liaison with the public, local organizations and government;
- ✚ Ensure and supervise record keeping, data storage for follow-up actions;
- ✚ Monitor hazardous materials storage and handling;
- ✚ Promote environmental awareness and safety measures; and
- ✚ Prepare environmental management and periodic monitoring reports as required by DOE.

#### **11.1.2 Composition of Environmental and Social Monitoring Unit**

The ESMU will be based on three tiers operational mechanism. It will be led by Head of Operation of the power plant. Head of Operation will serve as General Manager (Planning, Administration and Safeguard Compliance). Under his guidance there will be one Compliance Manager, who will be supported by two Compliance Officers. One Compliance Officer will be responsible for all sorts of environmental aspects and standards and another one will be assigned to maintain social and occupational health and safety aspects and standards.

Consulting services will be mobilized as necessary to assist in initial operations, to ensure that the ESMU will be self-sufficient for ESMP implementation, submission of progress reports, and preparation of environmental assessment for subsequent construction works.

Additional third-party services may be employed by the TSEL as necessary. Qualified and experienced construction contractor will be responsible for implementation of mitigation measures during the construction phase.

To look after the EHS aspects, TSEL should deploy an EHS Officer/Compliance Officer having sound qualification and experience. Based on the performance, he will be extended for the Operation Phase or a new EHS officer will be recruited. The major responsibilities of the EHS Officer/Compliance Officer are as follows:

- Monitor the environmental, health, safety, fire protection and emergency response matters;
- Ensure the compliance of the Department of Environment;
- Ensure the compliance of other external stakeholders;
- Monitor the implementation of the ESMP;
- Develop standard operational procedure (SOP) for EHS aspects;
- Conduct safety inspections; provide safety training to promote a safe working environment for the employees.

### **11.1.3 Environmental Training**

Training is an integral part of a preventive strategy. Environmental and disaster management training will be required to ensure proper implementation of effective environmental management and monitoring plan; and disaster management plan. However, training could be organized by ESMU involving relevant staff. As a trainer, competent Consultant can be outsourced. Important training under the spectrum of ESMU needs to include:

- Training on firefighting;
- Training on environmental regulations and standards;
- Staff training on environmental monitoring;
- Training on environmental health and safety measure.

## **11.2 Environmental and Hazardous Waste Monitoring**

Environmental monitoring is an essential component of environmental management plan, as it provides the basic scenario of the impact of the project on baseline condition. The prime objectives of environmental monitoring are:

- Assess the effectiveness of proposed mitigation measures by comparing monitoring result with baseline data/environmental standards;
- Identify the extent of environmental impact;
- Determine project compliance with regulatory requirements;

- Adopt remedial action and further mitigation measures if found to be necessary.

During the Construction Phase, the construction contractor will ensure that activities like land leveling, clearing work, access road construction, putting proper traffic signals etc. have been accomplished properly to minimize the level of impact. This in turn has to be monitored by the Compliance Officer of ESMU of the power plant, in operation phase. Preventive maintenance should be carried out to identify and resolve problems. Other environmental good practices include maintaining hygienic conditions, maintenance of fire and safety equipment etc. and clearing of grass should be done periodically.

TSEL should develop a working relationship with the DOE by undertaking a joint monitoring program to monitor ambient air quality and also to assess whether there exists any significant noise problem; or they may exchange data and information or submit periodic report on self-monitoring to the DOE or as the situation may require.

The proposed monitoring program should be in compliance with national environmental standards. The importance of this monitoring program is also for ensuring that the plant does not create adverse environmental changes in the area and provide a database of operations and maintenance, which can be utilized if unwarranted complaints are made.

### 11.2.1 Environmental Monitoring Parameters

Environmental monitoring requires set of parameters that could be conveniently measured, assessed and evaluated periodically to observe the trends of change in base line environmental quality. The lists of possible parameters to be tested, sample number and sampling frequency are given in Table 11.1 and Table 11.2 for the construction and operation phases respectively.

**Table 11.1: Monitoring parameters and frequency of monitoring during construction**

Key parameters to be monitored: (1) Ambient Air Quality			
location	frequency	parameter	submission
At Project site, residential /institutional /commercial areas within 500m outside from plant boundary	Quarterly (routine) analysis	SPM, PM <sub>10</sub> , PM <sub>2.5</sub>	Quarterly submission to Cox's Bazar District Office of DOE.
Key parameters to be monitored: (2a) Surface Water			
location	frequency	parameter	submission
Project site at Cox's Bazar	Bi-annual basis in each year (pre-monsoon and post-monsoon)	pH, Temperature, DO, BOD, COD, TDS,	Bi-annual submission to Cox's Bazar District Office of

		TSS, Oil and grease	DOE.
<b>Key parameters to be monitored: (2b) Ground Water</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
Project site at Cox's Bazar	Bi-annual basis in every year (pre-monsoon and post-monsoon)	pH, Temperature, DO, BOD, COD, TDS, Oil and grease	Bi-annual submission to Cox's Bazar District Office of DOE.
<b>Key parameters to be monitored: (3) Noise</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
At four corners of Project boundary, residential/institutional /commercial areas within 100m and 300m outside from plant boundary	Quarterly (routine) analysis  Hourly basis for 24 hours during	Limits in dBA	Quarterly submission to Cox's Bazar District Office of DOE.

**Table 11.2: Monitoring parameters and frequency of monitoring during operation phase**

<b>Key parameters to be monitored: (1) Ambient Air Quality</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
At Project site, residential /institutional /commercial areas within 500m outside from plant boundary	Quarterly (routine) analysis	SPM, PM <sub>10</sub> , PM <sub>2.5</sub>	Quarterly submission to Cox's Bazar District Office of DOE.
<b>Key parameters to be monitored: (2a) Surface Water</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
Project site at Cox's Bazar	Bi-annual basis in each year (pre-monsoon and post-monsoon)	pH, Temperature, DO, BOD, COD, TDS, TSS, Oil and grease	Bi-annual submission to Cox's Bazar District Office of DOE.
<b>Key parameters to be monitored: (2b) Ground Water</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
Project site at Cox's Bazar	Bi-annual basis in every year (pre-monsoon and post-	pH, Temperature, DO, BOD, COD, TDS, Oil and	Bi-annual submission to Cox's Bazar District Office

	monsoon)	grease	of DOE.
<b>Key parameters to be monitored: (3) Noise</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
At four corners of Project boundary, residential/institutional /commercial areas within 100m and 300m outside from plant boundary	Quarterly (routine) analysis  Hourly basis for 24 hours during	Limits in dBA	Quarterly submission to Cox's Bazar District Office of DOE.
<b>Key parameters to be monitored: (4) Electromagnetic Force</b>			
<b>location</b>	<b>frequency</b>	<b>parameter</b>	<b>submission</b>
Measurement of electromagnetic force by a certified agency for Transmission line, switch gears and transformers	Annual	electromagnetic force	Lender/Financier

### 11.2.2 Hazardous Waste Monitoring

The management of hazardous and non-hazardous waste should include the following monitoring activities:

- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labeled and stored.
- Regular audits of waste segregation and collection practices
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes
- Keeping manifests or other records that document the amount of waste generated and its destination
- Periodic auditing of third party treatment, and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal location
- Regular monitoring of groundwater quality in cases of Hazardous Waste on site storage and/or pretreatment and disposal

***When significant quantities of hazardous wastes are generated and stored on site, the following activities are to be practiced by the management:***

- ✓ *Inspection of vessels for leaks, drips or other indications of loss*
- ✓ *Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors*
- ✓ *Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied)*
- ✓ *Checking the operability of emergency systems*
- ✓ *Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or groundwater)*
- ✓ *Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage*

**Monitoring records for hazardous waste:**

- i. Name and identification number of the material(s) composing the hazardous waste
- ii. Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
- iii. Quantity (e.g., kilograms or liters, number of containers)
- iv. Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter
- v. Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste
- vi. Location of each hazardous waste within the facility, and the quantity at each location

### **11.3 Environmental Monitoring and Management Budget**

Environmental monitoring is conducted to compare the change between baseline condition and after project scenario, by testing some environmental parameters of air, water and noise and in case of necessity soil is tested. ESMU is fully responsible for environmental monitoring as well as implementation of environmental management plan. As testing environmental parameters required sophisticated instruments, it is suggested that ESMU should outsource consulting firm for testing and analyzing environmental parameters. But it will have to be equipped with required instruments gradually by purchasing required instruments. However, a tentative environmental monitoring budget has been proposed in Table 11.3. Laboratory analysis fees considered as per monitoring fees format of DOE/private laboratories.

**Table 11.3: An Annual Tentative Budget for Environmental Monitoring**

Activity	Units	Annual Total
Firefighting and suppression equipment, training and annual fire safety drill	lump sum	150,000
Cost of occupational health and safety	lump sum	300,000
Quarterly test of ambient air quality (SPM, PM <sub>10</sub> , PM <sub>2.5</sub> )	4	100,000
Half yearly test of surface water (pH, Temperature, DO, BOD, COD, TDS, Oil and	2	75,000
Half yearly test of ground water (pH, Temperature, DO, BOD, COD, TDS, Oil and	2	75,000
Quarterly noise monitoring	4	100,000
Measurement of electromagnetic force by a certified agency for Transmission line, switch gears and transformers (annual)	1	300,000
Environmental Training	lump sum	125,000
Quarterly Environmental & Social Audit by Third Party	4	2,800,000
<b>Sub Total in Tk.</b>		4,025,000
<b>Contingency (10 %)</b>		402,500
<b>Total in BDT</b>		<b>4,427,500</b>
<b>Note: (Considering USD 1 = Tk. 82.0)</b>		<b>USD 53,994</b>

### 11.4 Financial Arrangement for Environmental Monitoring and Management

TSEL will provide the full financial support to Environmental and Social Monitoring Units (ESMU). For ensuring smooth and uninterrupted functioning of ESMU, it is suggested that TSEL will allocate the required fund based on analysis of estimated budget proposed by ESMU early in the every financial year. So, ESMU can run its operation to ensure environmental monitoring as well as implementation of proposed environmental management plan as may cause due to the unavailability of fund.

### 11.5 Environmental & Social Monitoring and Management Reporting

As a part of environmental and social compliances, TSEL will engage third party consultant for conducting quarterly Environment, Health, Safety & Social Compliance Monitoring/Auditing and the monitoring/audit report of the Project should be submitted to the financier/lender. It will describe in detail about the status of implementation of Environmental and Social Management and Monitoring Plan (ESMMP) as described in Section 10.4 of this report. This will also take into account compliance with national and



lender required/international legal requirements in line with Environment, Health, Safety & Social Compliances. FINANCIER/LENDER will monitor the EHS compliance as and when required. The schedule of reporting the monitoring arrangement has been presented in the following Table 11.4.

**Table 11.4: Reporting schedule**

Reporting entity	Frequency of Report	Entity to whom the report will be submitted
Third Party Consultant	Quarterly EHS & Social Compliance Report during construction phase	To the Financier/ Lender through TSEL
Third Party Consultant	Quarterly EHS & Social Compliance Report during for the 1 <sup>st</sup> 2 years of operation phase	To the Financier/ Lender through TSEL

## 11.6 Labor Assessment

The Environmental and Social Action Plan (ESAP) for TSEL identified the necessity for undertaking labor audit covering own and subcontractor workers of TSEL to assess compliance with the national laws and World Bank PS2 requirements. In this regard, TSEL hired Bangladesh Centre for Advanced Studies for carrying out the labor audit.

The prime objective of the labor audit was to undertake labor audit covering own and subcontractor workers of the plant to assess compliance with the national laws and WB PS2 requirements, and then suggest corrective action plans for ensuring improved labor conditions at the plant.

Operation of a solar power plant is not that much labor intensive. At TSEL, about 12 employees work at a times. TSEL ensures that Bangladesh Labor law is strictly followed. TSEL provides various compensation & benefits to their permanent and contractual employees. Internal grievance mechanism is in place for the TSEL staff. No child labor is accepted or encouraged in TSEL. TSEL focuses on their worker's health and safety. Adequate training on various safety related issues, use of PPEs, emergency preparedness and job hazards are arranged frequently.

Given the nature of the project, the BCAS Team recommends that labor audit should be carried out half yearly monitoring for at least two consecutive years of operation.

Detailed assessment/ audit report is in [Annex 16](#) and the HR policy of TSEL is shown in [Annex 19](#).

### **11.7 Environmental and Social (E&S) Audit**

An Environmental and Social Audit was conducted by third party- Bangladesh Centre for Advanced Studies (BCAS) on January 2020 covering the reporting period of May 2019 to October 2019. The primary objective of this audit was to assess the compliance status of the Project and its various components with respect to the agreed ESAP, Operations Phase Environmental & Social Management & Monitoring Plan (ESMMP) of the ESIA, and applicable Performance Standards of World Bank.

Out of 19 ESAP items, 7 items have been observed that need further improvement to comply efficiently. Besides, BCAS Team has identified 19 out of 54 World Bank PS items in which TSEL should start working on improvement. Since, this was the first environmental and social audit for TSEL, attempts were made to observe as many items as possible in an overall or gross perspective. BCAS Audit Team will endeavor to observe various environmental, social, health and safety issues in further detail during the future audits.

Detailed audit report is in [Annex 17](#).

### **11.8 Environmental and Social Commitment Plan (ESCP)**

After the E&S Audit conducted by Bangladesh Centre for Advanced Studies on January 2020, TSEL was given a set of recommendation for the improvement of environmental and social aspects by on World Bank Performance Standards (WB PSs). TSEL has already implemented/ complied few of them. TSEL management is committed to implement the remaining recommendations as well. The targeted timeline is set for May-June 2020 within this time TSEL will try to implement and improve the remaining corrective actions.

The detailed commitment plan including the recommendations, third party observation responsible person and expected timeline is listed in [Annex 18](#).

## 12 CONCLUSION AND RECOMMENDATIONS

### 12.1 General

The ESIA study of **Technaf Solartech Energy Limited** at **Alikhali, South Nhilla, Cox's Bazar** has been concluded that the all environmental, metrological, geographical, biological aspects are well suited for the project. By adopting all documents of project such as layout, total land, proposed activities (during construction and operational stage), project cost, utilities requirement, transportation mode the team found out the possible impact of project on surrounding environment, socioeconomic condition of project area.

World Bank categorization, Bangladesh Bank IPFF-II Guidelines and DoE categorization have been followed to justify the project. The analysis is given below:

- World Bank Policy on Environmental and Social Categorization:  
The TSEL sub-project is a utility scale (28 MWP) solar PV power plant project and the project activities have potential limited adverse environmental or social risks and/or impacts on a number of issues; which are site-specific and largely reversible. These impacts can be avoided or mitigated by adhering to applicable standards, procedures, guidelines and design criteria as described in the relevant WBG and international good practice documents. The TSEL subproject may therefore be classified in the Category 'B' according to WB OP 4.03.
- E&S Risks Rating as per Bangladesh Bank IPFF-II Guidelines:  
During the operation phase the risks falls under "Low Risk" since the project activities will have minimal environment and social impacts.
- DoE Categorization:  
As per SRO No. 349- act/2017 (24 December 2017) issued by the DOE on the categorization to the Environment Conservation Rules 1997, Solar Power Plants (above 1 MW) falls under category "Orange B". The DOE approved this project under this category.

The project activities in pre-construction, construction and operation phase may trigger World Bank Performance Standards (PSs) such as PS1, PS2 and PS3. Other Performance standards such as PS4, PS5, PS6, PS7 and PS8 so not get affected by the project activities. Observing all legal issues related to the project, the team gave a set of management plan to minimize the negative impacts and enhance the positive impacts. The management plan/mitigation measures have been given to run the proposed plant environment friendly way without damaging ambience. Finally it has been stated that ESIA team try to follow strictly the ESIA Guideline for industry of Department of Environment.

The recommendations of ESIA team are followed:

- The plant will have a number of impacts on the environment so special care should be taken for complying with the ESMP outlined in this report. The occupational health safety documentation should be put in place.

- Accidental disaster, and Emergency response plan should be in plan and monitored regularly.
- Good O&M practices and management plans have been formulated for managing the environmental issues and probable impacts due to residual pollution and accidental situation in an efficient way. The O&M manuals should be prepared for different phases of the project. The authority will give proper attention to the training need for good O&M practices to the persons working in it.
- Implementation of the mitigation measures suggested in the ESIA report will certainly eliminate the undesirable pollution problems.
- The authority will also arrange adequate budgetary allocation for materialization of formulated environmental management plan.

## **12.2 Concluding Remarks**

The ESIA report of the project presents the findings based on specific data obtained and gathered from field survey works/public consultation in the project area. Based on which analysis has been undertaken by ESIA team to assess the environmental and social impacts.

The ESIA provides a comprehensive description of the prevailing environment together with a review of all activities during the proposed construction and operational phases of the power plant. It has further indicated that the activities may create some adverse short-term impacts on the adjacent environment and the overall level of these impacts upon environment and surrounding resources are relatively minor/low and acceptable on adoption of specific management and mitigation measures plans which have been discussed in this ESIA report.

The impact on air due to dust during construction phase ( $PM_{10}$ ,  $PM_{2.5}$  and SPM) will be below the standards set by DOE and other international lending agencies. There are no waste water effluents except storm water runoff – hence, no ETP will be required. The impact of noise on the nearest settlement, located approximately 100 meters from the project boundary will be below the limit set by DOE.

The ESIA study further pointed out that there remains chances of potential impacts from accidental events, which may occur during the construction, operation and lifetime of the proposed plant. The types of events which could occur include sudden fire, earthquake, floods, seasonal storm etc and other potential impacts of limited category. Considering all circumstances, all certain important specific mitigation measures and management plans have been incorporated in this ESIA as per national requirement to reduce/control the anticipated level of environmental impacts associated with the setting up of the proposed project location.

The proposed project is expected to proceed without having unacceptable environment in which the plant will be setup in the long-term basis if the abatement and control measures, proper and careful process operation and plant machinery maintenance, adoption of the hazard/ disaster, health, safety and fire protection, Emergency Response Management Plans

including effective pollution preventive management practices are followed properly by project authority.

Finally, to ensure effectiveness of suggested mitigation measures and management plans to overcome the significant/potential environmental impacts, it is recommended that all personnel and employees of the plant should be well trained on EHS issues.

# **Volume-III**

## **Annexes**





## Registration from Bangladesh Investment Development Institute

30/02/17

[ BIDA : Online Registration System - English Version ]



### Bangladesh Investment Development Authority (BIDA) Prime Minister's Office

Ref No. 03.231.161.00.00.1529.2017, 39

Date: 2017-03-30

Sub: Registration of proposed industrial project under the title: Technaf Solartech Energy Limited

Dear Sir,

With reference to your application received on 2017-03-29 concerning the above subject, I am pleased to confirm that your proposed industrial project has been duly registered with the Bangladesh Investment Development Authority. The Registration number for this project is **J-401017036753-H** and the particulars of the terms and conditions of which are appended.

If we could be of any further assistance to you, please do not hesitate to call our Service Center representative who could be reached at telephone # 9561416, 9577271-2, 9587352-3.

In the meantime, we would like to take this opportunity to extend our best wishes to you in your future endeavours.

Thanking You,

MANAGING DIRECTOR

Technaf Solartech Energy Limited

House/Plot/Holding Number: ABC HOUSE, Flat/Apartment/Floor Number:  
8TH FLOOR,

Road Name/Road Number: 08 KEMAL ATATURK AVENUE, Post Office:

BANANI,

Thana/Upazilla: BANANI, District: Dhaka, - 1213.

Sincerely yours,

(Sabina Yeasmin)

Director (R&I-Foreign Industry),  
Bangladesh Investment Development  
Authority

Ref No. 03.231.161.00.00.1529.2017

Date: 2017-03-30

Copy for kind information and necessary action:


1. Director General, Department of Environment, Poribesh Bhaban, Plot No. 16 Agargaon, Sher-e-Bangla Nagar, Dhaka.
2. Registrar, Joint Stock Companies & Firms, TCB Bhaban, 1 Karwan Bazar, Dhaka.
3. General Manager, Statistics Department Bangladesh Bank, 29 th Storied Building, Motijheel C/A, Dhaka.
4. Deputy Commissioner, COX'S BAZAR.
5. Director (Policy Advocacy), Bangladesh Investment Development Authority, Jibon Bima Tower, 10 Dilkusha C/A, Dhaka.
6. Director (IM&C), Bangladesh Investment Development Authority, Jibon Bima Tower, 10 Dilkusha C/A, Dhaka.
7. P.S. to Executive Chairman, Bangladesh Investment Development Authority, Dhaka.
8. Master file.

Sincerely yours,

(Abu Mohammad Nurul Hayat Tetul)  
Assistant Director (R&I-Foreign

Bangladesh Investment Development Authority, Prime Minister's Office, Jibon Bima Tower, 10 Dilkusha C/A, Dhaka-1000  
Phone : PABX 88-02-9561416, 9577271-2, Fax : 88-02-9562312, E-mail : service@bida.gov.bd, Web : www.bida.gov.bd  
Bangladesh Investment Development  
Authority

## Site Clearance from DOE



## গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

পরিবেশ অধিদপ্তর, কক্সবাজার জেলা কার্যালয়  
সায়মন রোড, ঝাউতলা, কক্সবাজার সদর, কক্সবাজার।  
E-mail: coxsbazar@doe.gov.bd www.doe.gov.bd  
ফোন ৪ ০৩৪১-৬২২৩২।

নম্বর- ০২৪

[পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭-এর বিধি ৭ ও ৮ অনুসারে অবস্থানগত ছাড়পত্র]

স্মারক নম্বর: ২২.০২.২২০০.২১৩.৭২.১৯৪.১৭. ০৫৮

তারিখ: ০১/০৬/১৪২৪ বঙ্গাব্দ  
১৭/০৬/২০১৭ খ্রিস্টাব্দ

বিষয়: টেকনাফ সোলারটেক এনার্জি লিমিটেড নামক সৌর বিদ্যুৎ উৎপাদন কেন্দ্র এর অবস্থানগত ছাড়পত্র (শ্রেণীঃ লাল)।

তারি ১০/০৪/২০১৭ তারিখের কক্সবাজার জেলা কার্যালয়ে অবস্থানগত ছাড়পত্র আবেদনের প্রেক্ষিতে গত ২১/০৮/২০১৭ ও ২২/০৮/২০১৭ তারিখে পরিবেশ অধিদপ্তর, সদর দপ্তর পরিবেশগত ছাড়পত্র বিষয়ক কমিটির ৪১২ তম সভার ত্রুটিক নং ৫ (৬) এ বর্ণিত শর্তাবলীর আলোকে পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭ অনুযায়ী লাল শ্রেণীভুক্ত বিবেচনায় সাহ- অসীমালী, দক্ষিণ জীলা, উপজেলাঃ টেকনাফ, জেলাঃ কক্সবাজার এ অবস্থিত টেকনাফ সোলারটেক এনার্জি লিমিটেড নামক সৌর বিদ্যুৎ উৎপাদন কেন্দ্র এর অবস্থানগত ছাড়পত্র পরিবেশ অধিদপ্তর অধিনস্তর চট্টগ্রাম অঞ্চল কার্যালয়ের অনুমোদনক্রমে নিম্নবর্ণিত শর্তসাপেক্ষে প্রদান করা হলো। ট্রেন্ডেয়া আবেদনিত যে কোন শর্ত ভঙ্গের কারণে জারীকৃত ছাড়পত্র বাতিল বলে গণ্য হবে।

**শর্তাবলীঃ**

১. অবকাঠামোগত উন্নয়নের আওতায় অন্যান্য বিষয়ের মধ্যে আইইই প্রতিবেদনে বর্ণিত সকল মিটিগেশন মেজার্স যথাযথভাবে বাস্তবায়ন করতে হবে।
২. সৌর বিদ্যুৎ উৎপাদন কেন্দ্র স্থাপন কর্মকান্ড ও পরিচালনা দ্বারা কোনভাবে পরিবেশ (মাটি, পানি, বায়ু ও শব্দ) দূষণ করা যাবে না।
৩. পরিবেশ অধিদপ্তর কর্তৃক আইইএ প্রতিবেদনে কার্যপরিধি (TOR) অনুমোদন করিয়ে নিতে হবে। অনুমোদিত TOR-এর ভিত্তিতে আইইএ প্রতিবেদন প্রণয়ন করতে হবে এবং উক্ত আইইএ প্রতিবেদন পরিবেশ অধিদপ্তরের অনুমোদনের নিমিত্তে পেশ করতে হবে।
৪. আইইএ প্রতিবেদনে এ প্রকল্প স্ট্রী গ্যাসীয় পদার্থের নিঃসরণ এবং বস্তু কণা (Particulate Matters) নির্গমন পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭-এ উল্লেখিত মানমাত্রার মধ্যে রাখা, কৃষি ও গাভীর পুনর্বাসনকার্যের ব্যবস্থা, বর্জ্য ব্যবস্থাপনার ক্ষেত্রে প্রতিটি বিভাগের স্টেজের বিস্তারিত ও বাস্তবসম্মত বর্ণনা এবং ১০০% ওয়াটার বিশাইলিটি- এর বিষয় অর্ন্তভুক্ত করতে হবে।
৫. আইইএ প্রতিবেদনে নিজস্ব সৌকর্য ও ইকুইপমেন্ট-এর সমন্বয়ে ইলেক্ট্রিক এনভায়রনমেন্টাল মনিটরিং সিস্টেম গড়ে তোলার বিষয়ে প্রয়োজনীয় কার্যপরিধি ও আর্থিক প্রস্তাবনা অন্তর্ভুক্ত করতে হবে।
৬. আইইএ অনুমোদিত না হলে আমদানিকৃত যন্ত্রপাতির অনুল্লেখ L/C খোলা যাবে না।
৭. প্রকল্প চক্রের মূল্যতম ৩০% জারজা উপযুক্ত প্রজাতির ফলজ ও বনজ গাছ লাগিয়ে সবুজায়ন করতে হবে।
৮. প্রকল্প নির্মাণকালে স্ট্রী ধূলা/ডাঙ্গি নিয়ন্ত্রণের জন্য সময়ে সময়ে পর্যাপ্ত পানি ছিটানোর ব্যবস্থা গ্রহণ করতে হবে।
৯. ভূমিকনের পেশাগত স্বাস্থ্য রক্ষার্থে সকল ব্যবস্থা যেমনঃ হার্ট হেলমেট, নোজ মাস্ক, বুট, চশমা ইত্যাদির ব্যবস্থা রাখতে হবে।
১০. এই ছাড়পত্র জমির মালিকানা স্বত্ব নির্ধারণ করে না।
১১. IEE প্রতিবেদনে বর্ণিত সকল Mitigation Measures বাস্তবায়ন করতে হবে।
১২. সৌর বিদ্যুৎ উৎপাদন কেন্দ্র স্থাপনের বিরুদ্ধে পরিবেশ দূষণমূলক কোন অভিযোগ উত্থাপিত ও অত্র দপ্তর কর্তৃক তা প্রমাণিত হলে অত্র দপ্তরের নির্দেশিত নিয়ন্ত্রণ/সংশোধনমূলক ব্যবস্থাদি (স্থানান্তর/কার্যক্রম বদলসহ) গ্রহণে প্রতিটানটি বাধ্য থাকবে।
১৩. প্রতিটান নির্মাণ কার্যক্রম দ্বারা আশেপাশের জমি, জমির ফসল, বনজ ও ফলজ সৃষ্টির ক্ষতিসাধন কার্য যাবে না।
১৪. প্রতিটানের ডিম্বাকৃতি কয়েক স্ট্রী তরল বর্জ্য যথোপযুক্ত সেটিং ট্যাংকে রেখে নির্গমন করার ব্যবস্থা রাখতে হবে।
১৫. উর্বর জমিজমি, পাহাড় কিংবা টিলা কেটে সৌর বিদ্যুৎ উৎপাদন কেন্দ্র মাটি ভরাট কাজে ব্যবহার করা যাবে না। তৎপরিবর্তে সরকারী বিধি অনুসারে বন্যায় কর্তৃপক্ষের অনুমোদন সাপেক্ষে মজা পুকুর/খাল/বাড়ী/দিঘী/নদ-নদী/হাওর/চর/খাল বা তৎসমতুল্য জায়গা হতে মাটি সংগ্রহের ব্যবস্থা করতে হবে।
১৬. সৌর বিদ্যুৎ উৎপাদন কেন্দ্র স্থাপনে কর্মরত শ্রমিক কর্মচারীদের স্বাস্থ্যসম্মত পরিবেশ এবং নিরাপত্তামূলক ব্যবস্থা নিশ্চিত করতে হবে।
১৭. এই ছাড়পত্র কোনভাবেই সৌর বিদ্যুৎ উৎপাদন কেন্দ্রে ব্যবস্থার জমির মালিকানার শর্ত পূরণ করে না। এ সত্ত্বেও কোন প্রকার জটিলতা সৃষ্টি হলে এ ছাড়পত্র বাতিল বলে গণ্য হবে।
১৮. সৌর বিদ্যুৎ উৎপাদন কেন্দ্র নির্মাণ কর্মকান্ডে কর্মরত শ্রমিকদের সুপায় পানির ব্যবস্থা রাখতে হবে।
১৯. অগ্নি দৃঢ়তা নিয়ন্ত্রণকল্পে ডাঙার যথোপযুক্ত অগ্নি নির্বাপক ব্যবস্থা গড়ে তুলতে হবে।

২০. বিদ্যুৎ উৎপাদন কেন্দ্রের নির্মাণ কার্যক্রমে উৎপন্ন শব্দ এবং কঠিন/তরল/বায়বীয় বর্জ্যের নিঃসরণ/নির্গমন মাত্রা যথাক্রমে শব্দ দূষণ (নিয়ন্ত্রণ) বিধিমালা, ২০০৬ এবং পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭-এ বর্ণিত মানমাত্রার মধ্যে হতে হবে।
২১. ১-২০ নং পর্যন্ত শর্তাবলী পূরণ সাপেক্ষে এবং সৌর বিদ্যুৎ উৎপাদন কেন্দ্র নির্মাণ কাজ সম্পন্ন করে পরিবেশগত ছাড়পত্রের জন্য আবেদন করতে হবে। পরিবেশগত ছাড়পত্র গ্রহণ ব্যতীত কোন অবস্থায় সৌর বিদ্যুৎ উৎপাদন কার্যক্রম চালু করা যাবে না।
২২. প্রতিষ্ঠান নির্মাণ কার্যক্রম দ্বারা জনস্বার্থের ক্ষতি হলে তৎক্ষণাত্ত ক্ষতিপূরণ দিতে হবে। দূষণ নিয়ন্ত্রণ ব্যবস্থা কার্যকর না থাকলে এবং এর ফলে পরিবেশ ও প্রতিবেশের ক্ষতি হলে Polluters Pay Principle অনুসারে ক্ষতিপূরণ ধার্য করা হবে এবং নির্ধারিত সময়ের মধ্যে ক্ষতিপূরণ দিতে হবে।
২৩. এই ছাড়পত্র জারীর তারিখ হতে পরবর্তী ০১ (এক) বৎসরের জন্য বহাল থাকবে এবং মেয়াদ শেষ হবার অন্ততঃ ৩০ (মিশ) দিন পূর্বে নবায়নের জন্য আবেদন করতে হবে।
২৪. অবস্থানগত ছাড়পত্রের মূলকপি প্রতিষ্ঠানে সংরক্ষণ করতে হবে। পরিবেশ অধিদপ্তরের এনফোর্সমেন্ট টিম, পরিদর্শক ও পরিদর্শনের ক্ষমতাস্বাধীন অন্যান্য কর্মকর্তাগণ প্রতিষ্ঠান পরিদর্শনকালে ছাড়পত্র/নবায়নপত্র প্রদর্শন এবং সৌর বিদ্যুৎ উৎপাদন কার্যক্রম পরিদর্শনে সহযোগিতা করতে হবে।
২৫. উপর্যুক্ত ১-২৫ অনুচ্ছেদে বর্ণিত যে কোন শর্ত ভঙ্গ করলে এ ছাড়পত্র বাতিল বলে গণ্য হবে এবং তাঁর/তার প্রতিষ্ঠানের বিরুদ্ধে বাংলাদেশ পরিবেশ সংরক্ষণ আইন, ১৯৯৫ (সংশোধিত-২০১০); পরিবেশ সংরক্ষণ বিধিমালা, ১৯৯৭; শব্দ দূষণ (নিয়ন্ত্রণ) বিধিমালা, ২০০৬ অনুসারে আইনগত ব্যবস্থা গ্রহণ করা হবে।

✓ জনাব মাহমুদুল হাসান  
ব্যবস্থাপনা পরিচালক  
টেকনাক সোলারটেক এনার্জি লিমিটেড  
সং-অলীখালী, দক্ষিণ ইীলা,  
উপজেলাঃ টেকনাক, জেলাঃ কক্সবাজার।

(সরদার শরীফুল ইসলাম)  
সহকারী পরিচালক

২০ ফোনঃ ০৩৪১-৬২২৩২

\*স্বাক্ষর নম্বরঃ ২২.০২.২২০০.২১৩.৭২.১৯৪.১৭.

/০৫/১৪২৪ বঙ্গাব্দ  
তারিখঃ-----  
/০৯/২০১৭ খ্রিস্টাব্দ

অনুলিপিঃ সমস্ত অফিসের জন্য-

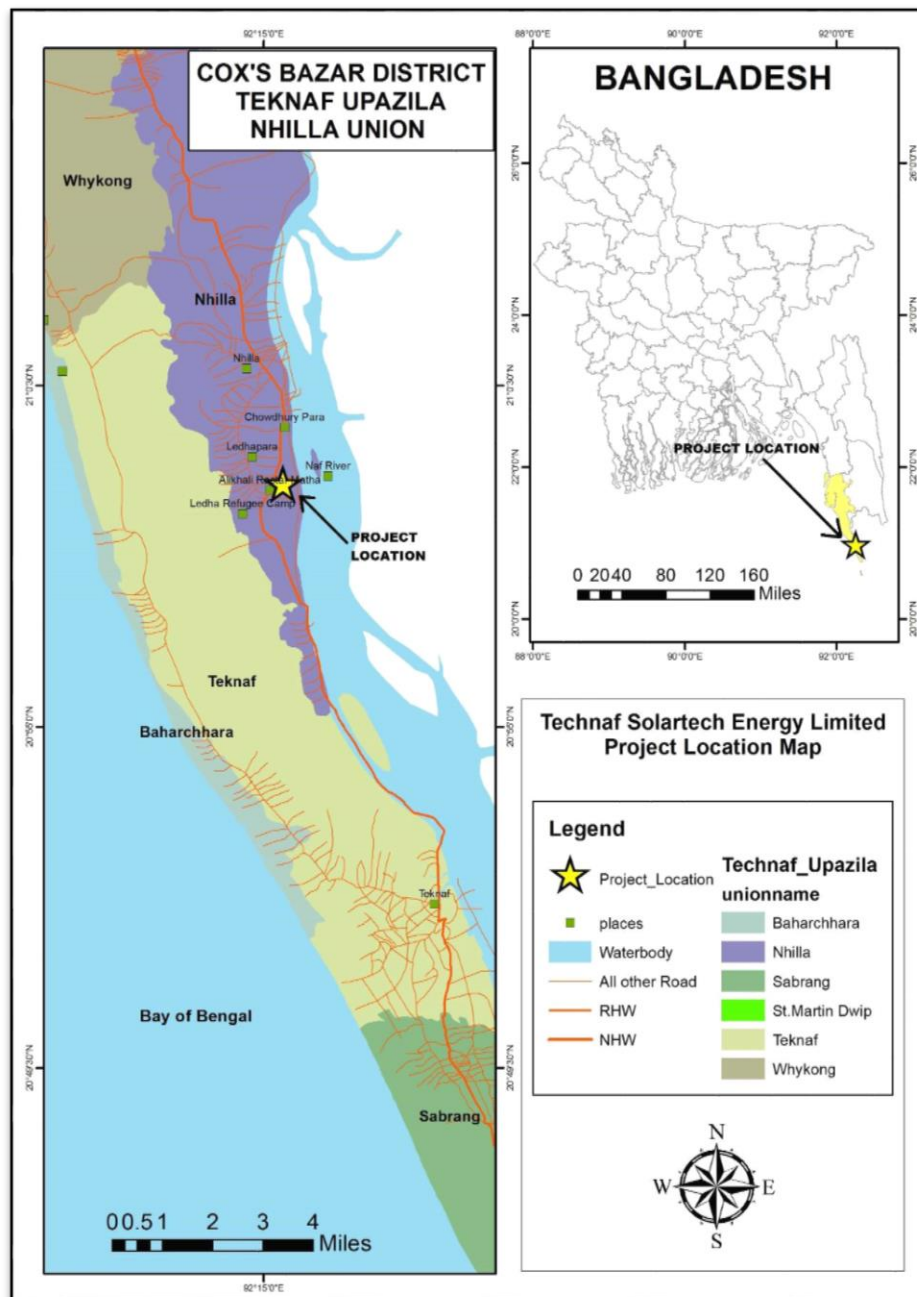
- ১। পরিচালক, পরিবেশ অধিদপ্তর, ৪৫নং অঞ্চল কার্যালয়, ঢাকায়।
- ২। জেলা প্রশাসক, কক্সবাজার।
- ৩। অফিস কপি।

(সরদার শরীফুল ইসলাম)  
সহকারী পরিচালক  
ফোনঃ ০৩৪১-৬২২৩২

## Annex 2: Project Detailed Drawing

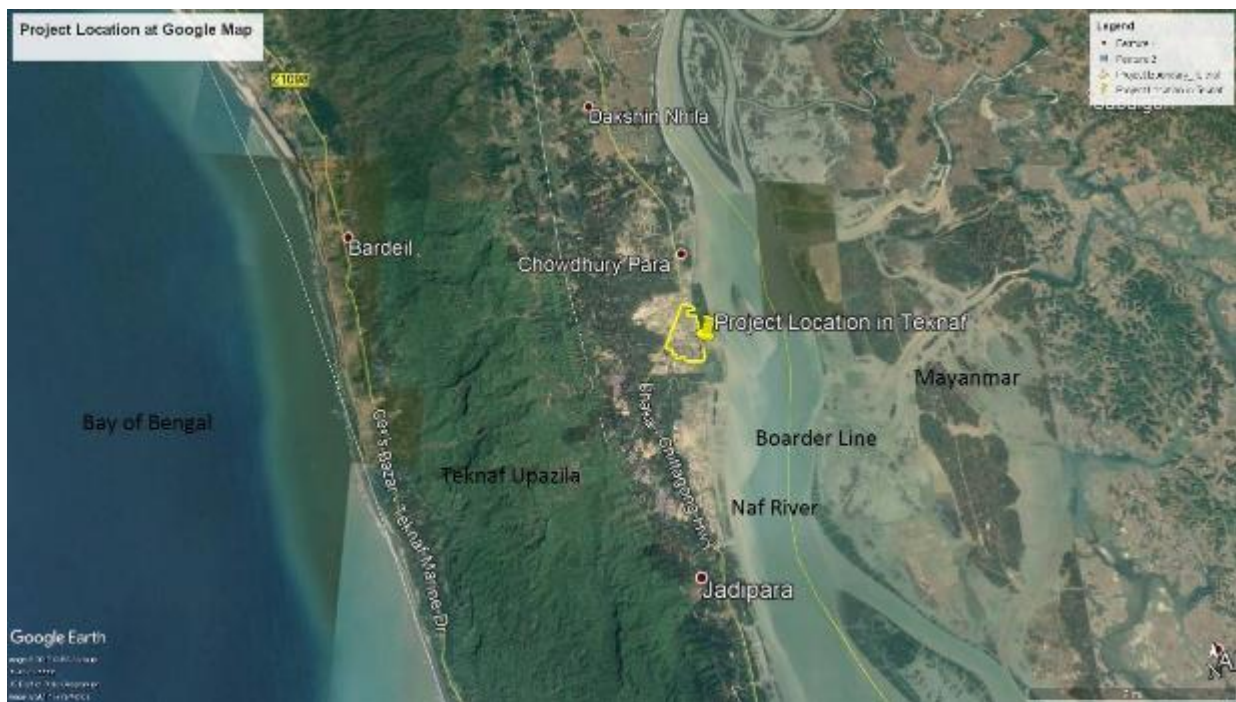
### Project Location of TSEL

The site of the project is located at South Nhilla Alikhali village of 2 no. Nhilla Union, Teknaf Upazila of Cox's Bazar district (shown in Map 7).



**Map 7: Location Map of the Proposed Solar Power Plant Project**





**Map 8: Location of the Proposed Project on Google Map**



**Photo 3: Proposed Site of the Plant**



**Photo 4: South Side of the Project Area**



**Photo 5: East Side of the Project Area**





**Photo 6: North Side of the Project Area**

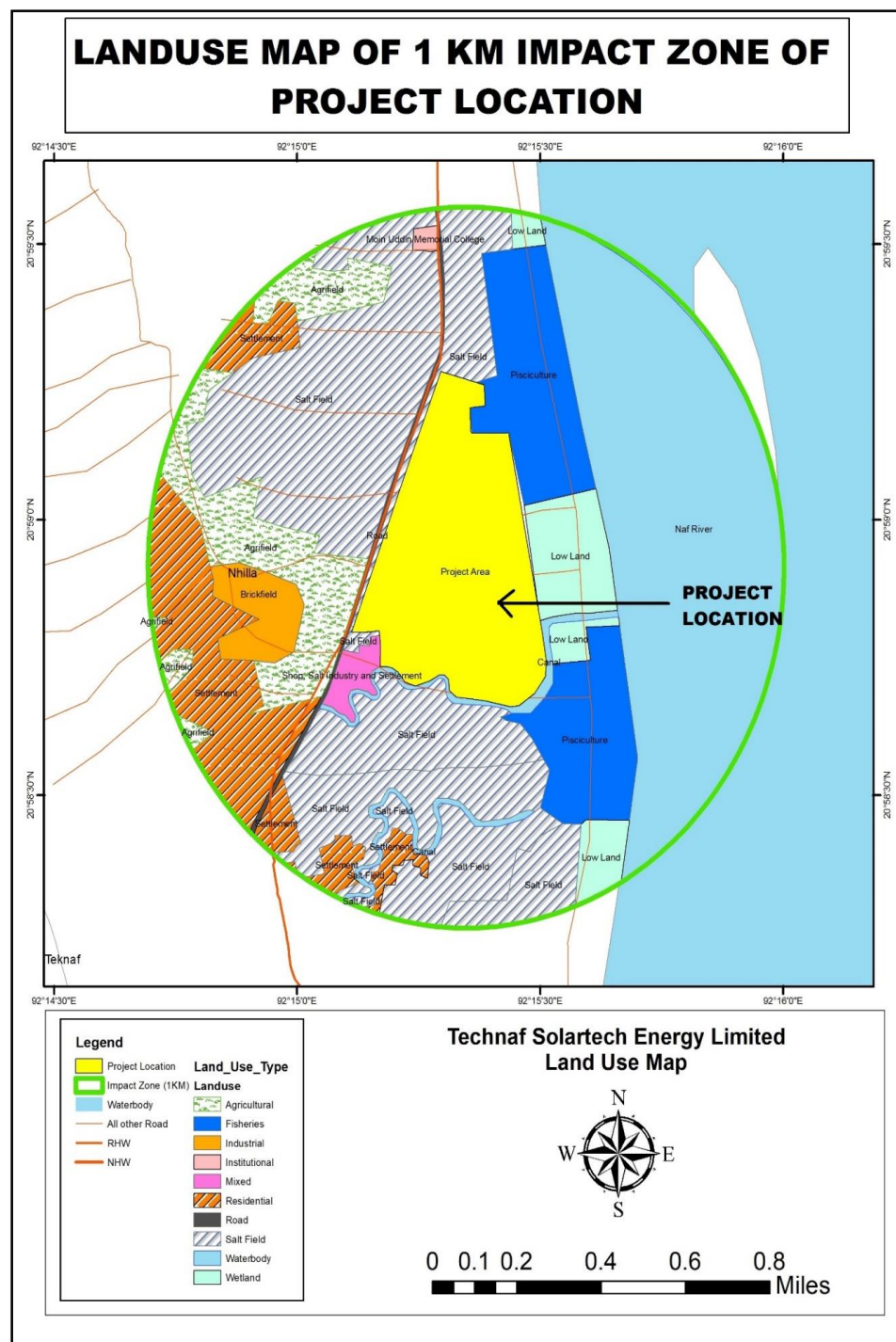


**Photo 7: West Side of the Project Area**



## Major Land Use

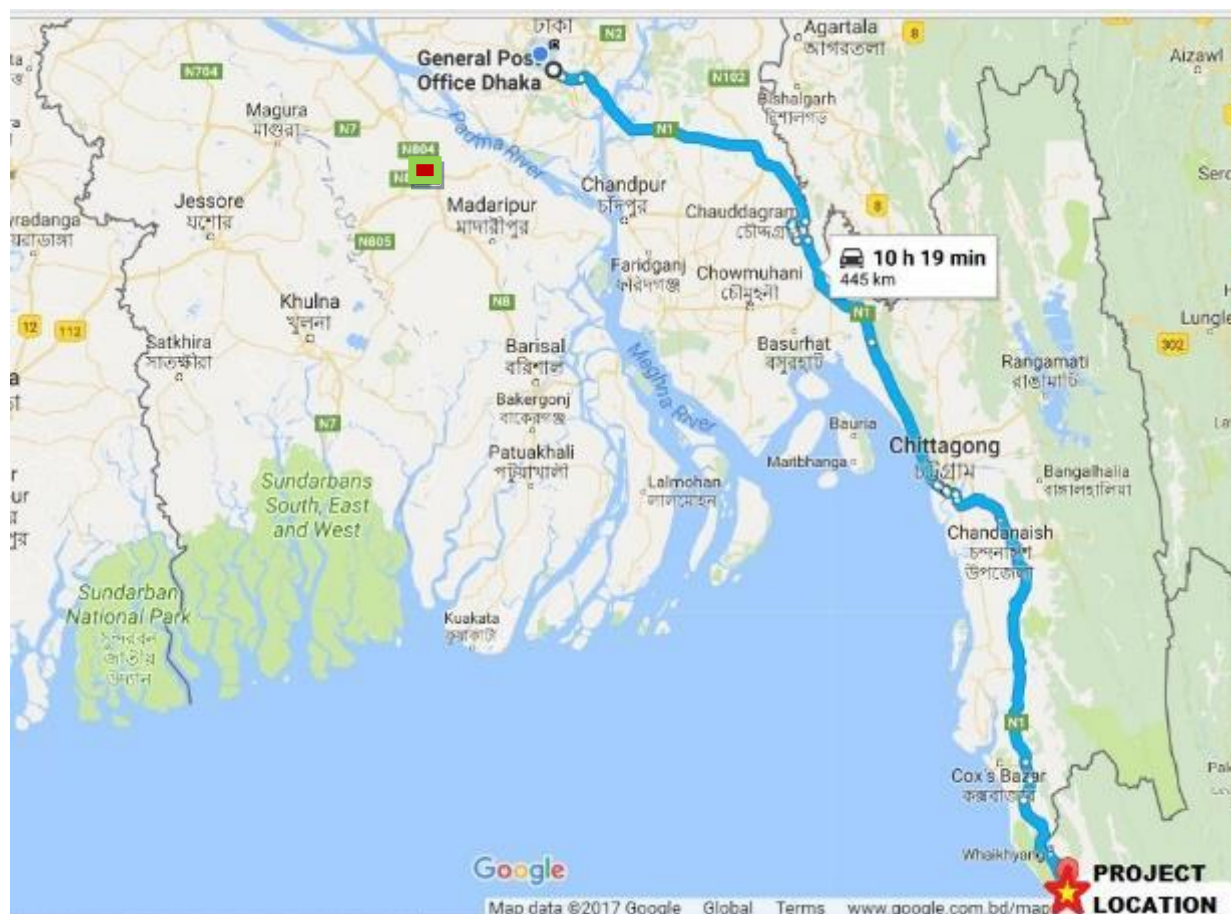
About 1 km radius of the plant has been surveyed. Administratively, the air shed spreads over 2 No. Nhilla Union of Teknaf Upazila (shown in Map 9).



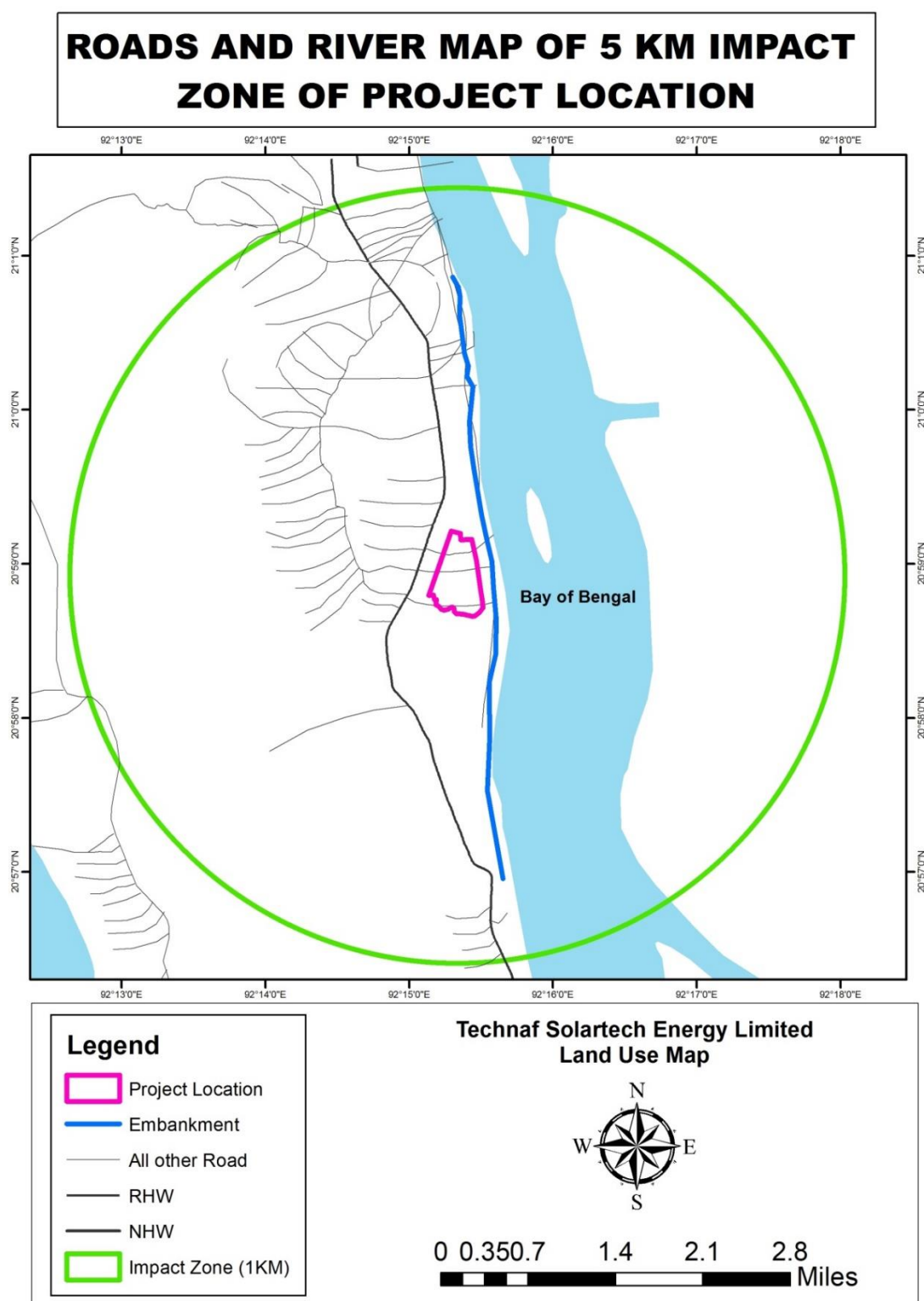
**Map 9 : Current land use pattern of the power plant area**

### Means of Roadway Access and Road Network around the Project Site

Means of access and road network around the project site (5 km radius) are presented in Map 10 & 11.



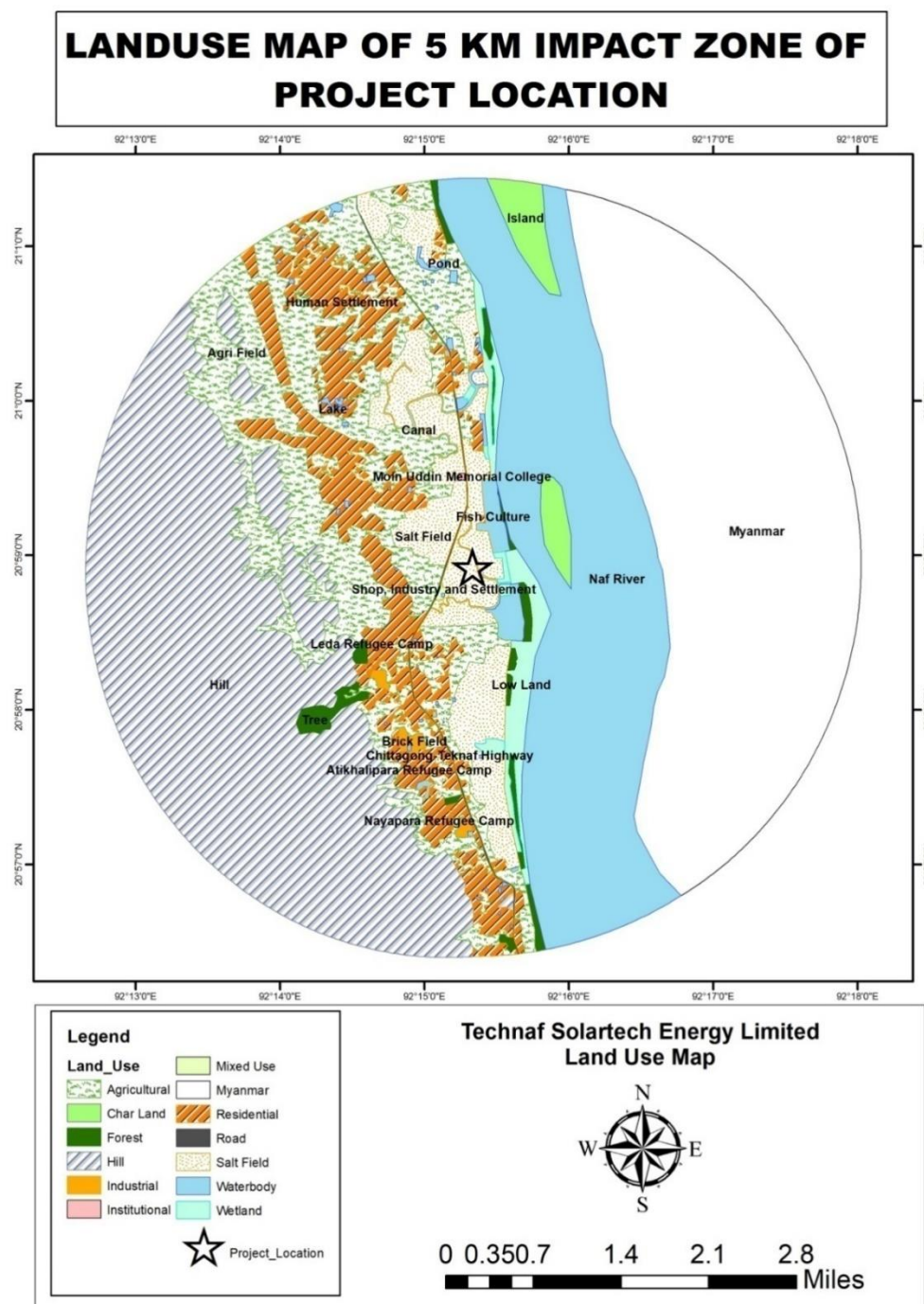
**Map 10: Means of Roadway Access to the Project Site**



**Map 11: Road Network around the Project Site (5 km Radius)**

### Air Shed of Project Area

The 5 kilometre air shed has been considered to assess the impacts of air pollutants and biodiversity. The 5-kilometre radius air shed has been shown in Map 12.



**Map 12: Project Air Shed showing Land Use for 5 km Radius of the Project Site**



## Project Layout Plan and overall process flow diagram

Figure 12 shows the layout plan including the positions of solar modules, inverter locations and road connections and figure 13 & 14 shows the process flow diagram of electricity generation from the plant.

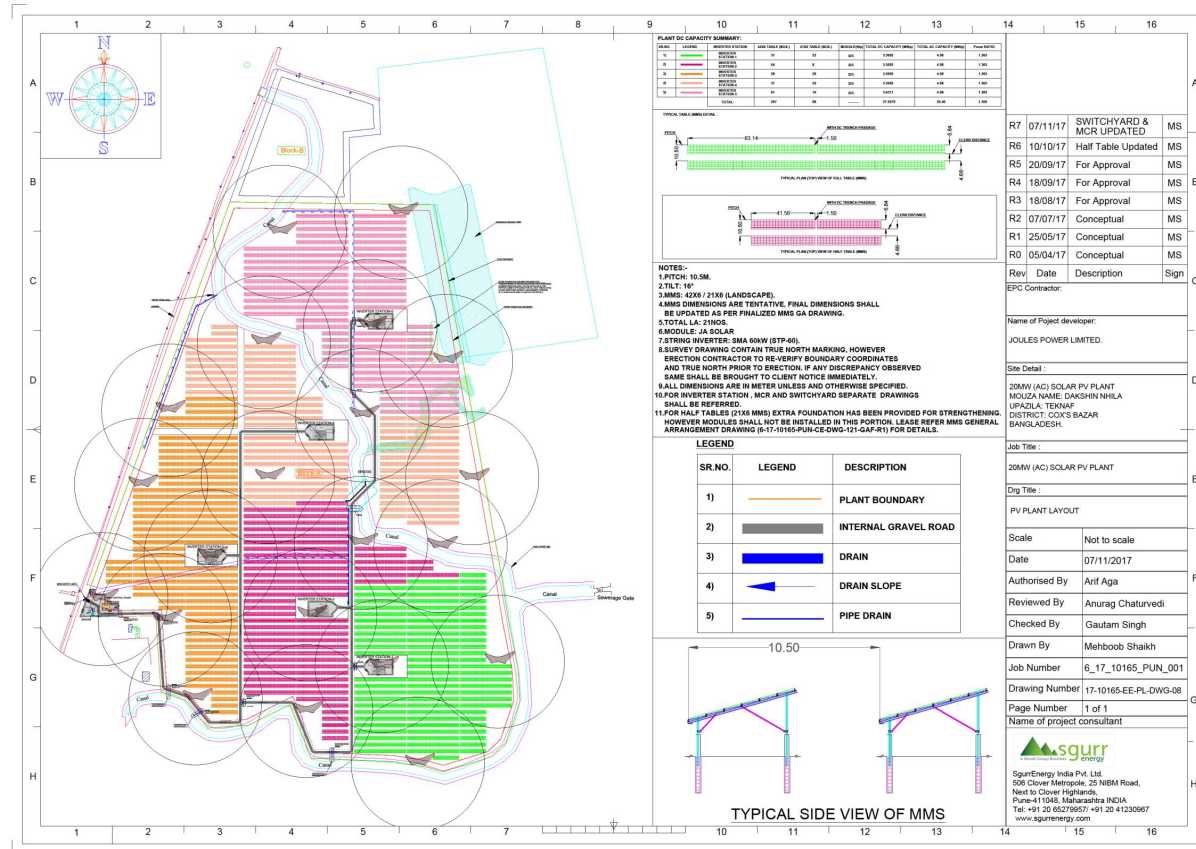


Figure 12: Project Layout Plan

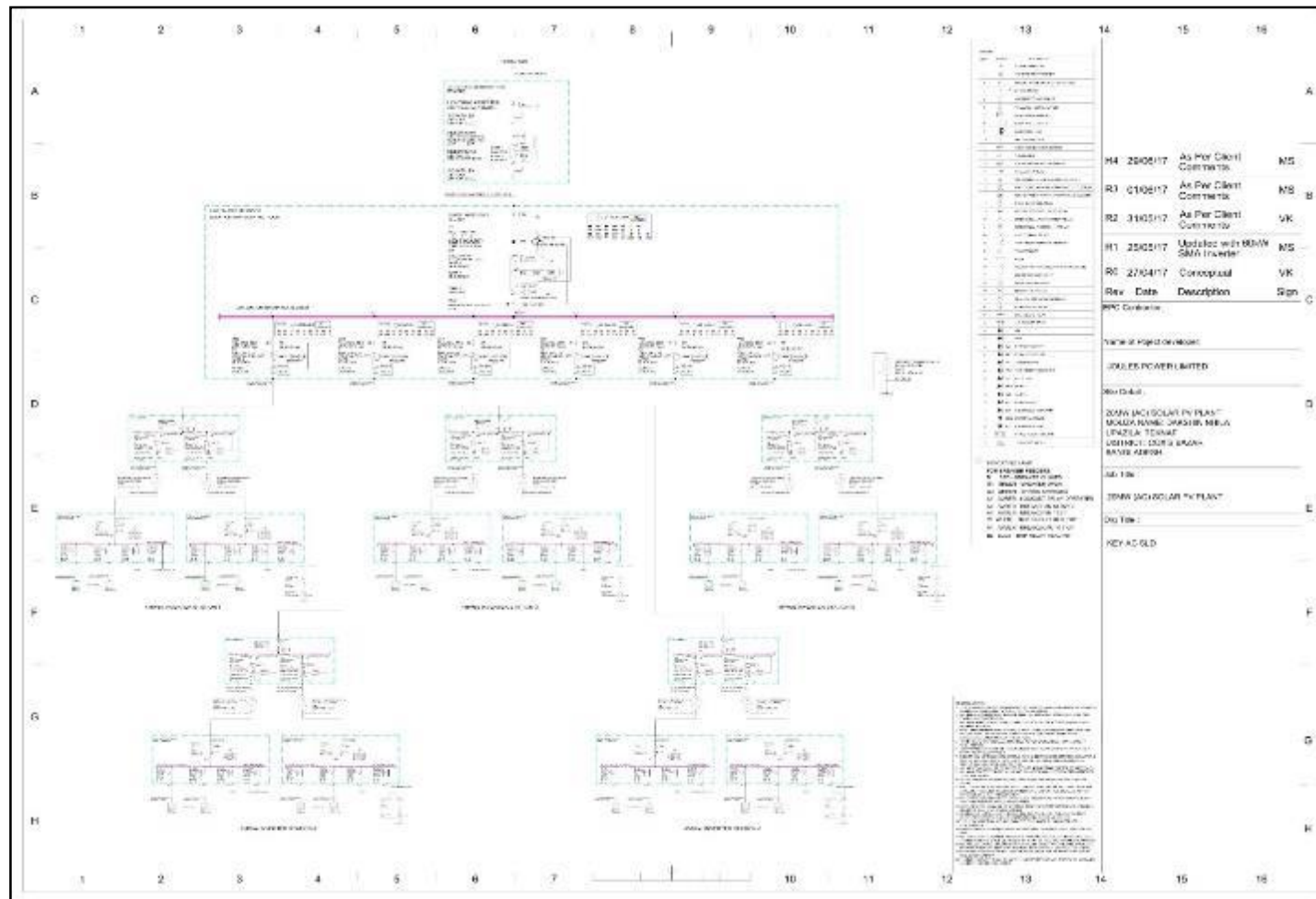


Figure 13: Process flow diagram

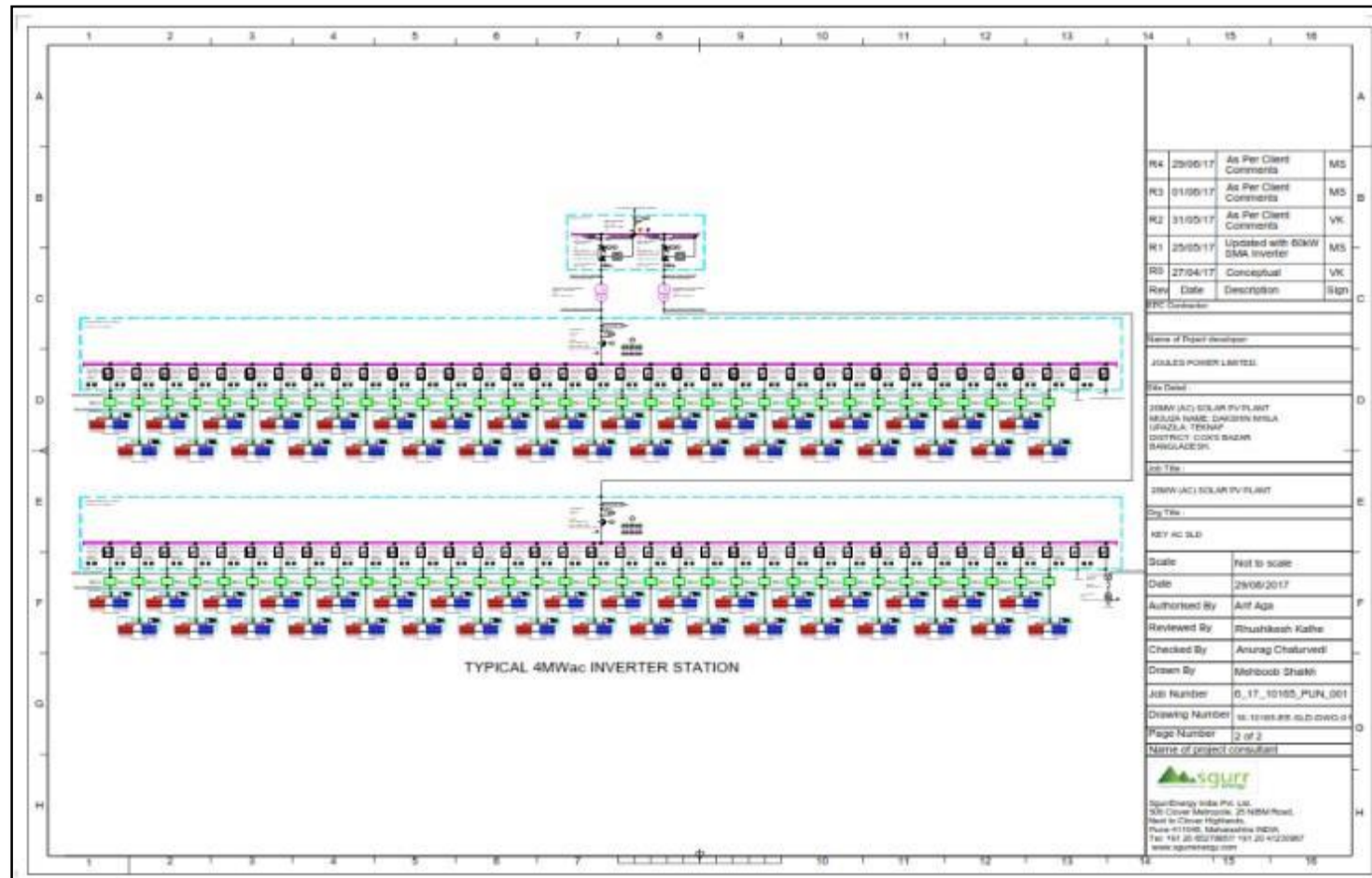


Figure 14: Process flow diagram (2)

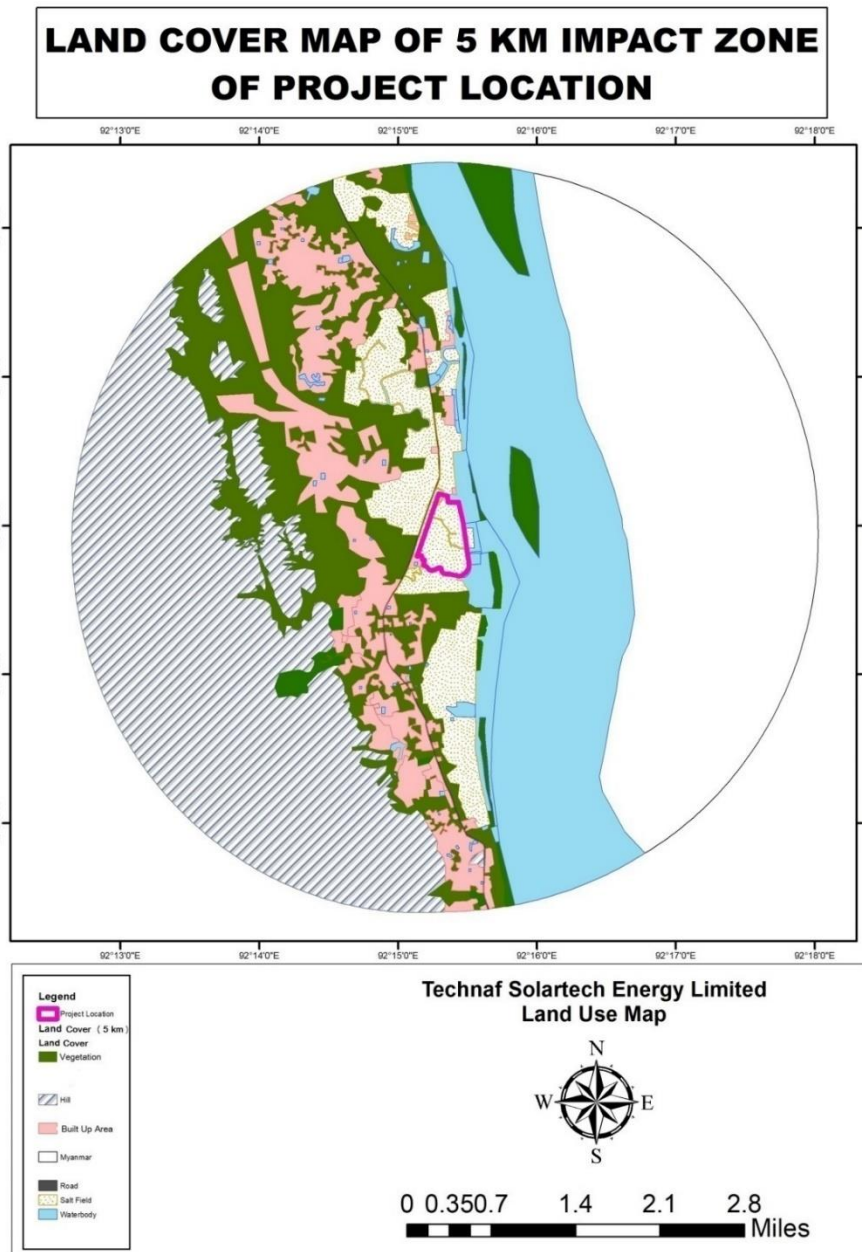




**Photo 8: Aerial view of constructed TSEL**

### Land Coverage of the Project Site

The surrounding land cover of the project area is hills, salt fields, built-up area, vegetated areas and water bodies. The land cover within 5 km radius from the project site is shown in Map 13.

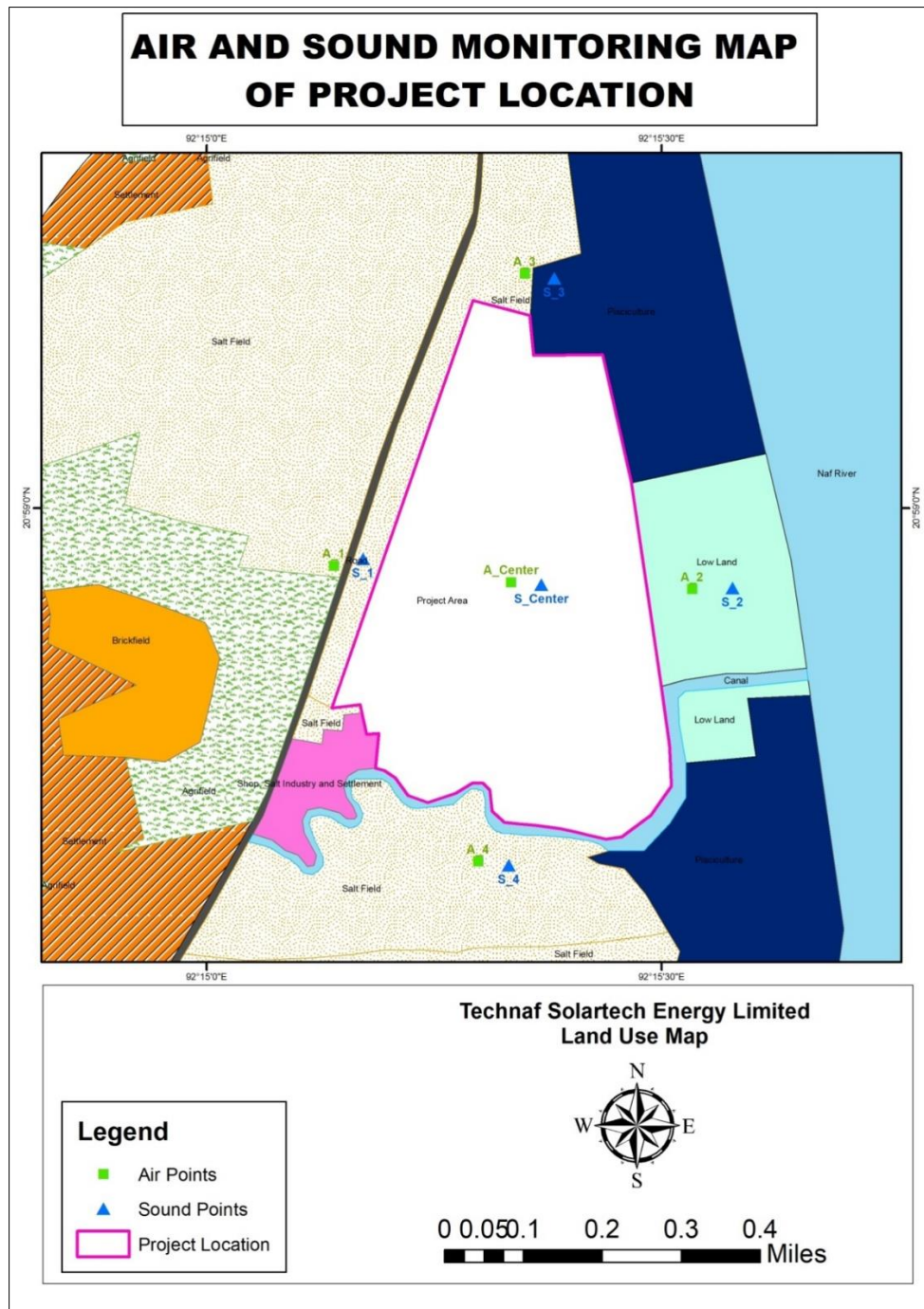


**Map 13: Land-Cover Map of the Project Area**



### Air and Noise Monitoring Points

Air and noise monitoring data was collected from 5 locations to set the baseline data. The locations are shown in Map 14.



**Map 14: Air and Sound Monitoring Points Map of the Project Location**

### Annex 3: Land Details with Owners' Name, Dag and Khatian Numbers

#### Details of land Use for Project

The Land lease activities of TSEL were started from January, 2017 and about 116.87 acres of land was taken lease for the period of 24 years at Alikhali, South Nhilla, Teknaf, Cox's Bazar. The whole land was taken as lease from willing land owners at a negotiated rate. The Land Details with Owners' Name, Dag and Khatian Numbers are shown in the following table:

**Table 13.1: Details of the Land Leased from TSEL**

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
01	Shafiqul Islam Chowdhury	10661	20.00
		10673	14.00
		10674	25.00
		10715	120.00
02	Hazi Jamal Hochon	10686	57.00
03	Ali Hossain	10723	67.33
		10715/10751	80.00
04	Saira Khatun, Asma Begum, Abdur Rahman Bodi	10723	14.00
		10715	160.00
05	Syful Karim, Md. Dolilur Rahman	10654	63.00
		10655	4.25
		10657	14.00
		10658	20.00
06	Abdul Gafur, Amir Hochon	10724	43.00
		10686	45.00
		10676	40.00
07	Delower	10735	66.66
08	Shamsun Nahar	10674	40.00
		10671	25.00
09	Mr. Jamal Hochon	10661	147.23
		10674	

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
		10688	
		10669	
		10676	
		10684	
		10689	
		10668	
		10670	
		10653/10754	
		10661	50.00
		10675	10.00
		10741	30.00
		10726	22.17
		10729/10749	4.50
		10737	40.00
10	Monju Ara Begum	10671	25.00
11	Romija Khatun, Kader Hossain, Ashraf Hossain, Farid Alom, Jafar Alam, Rashid Ahmed, Badsha Miah, Golam Azom, Md. Hochon, Jaheda Khatun, Noor Jahan, Noor Nahar.	10684	45.00
		10673	65.00
		10672	80.00
		10661	43.50
		10674	108.50
		10667/10747	70.00
12	Dil Mohammad & 5 Brothers	10659	57.00
		10660	
13	Mohammad Osman	10715	80.00
14	Mohammad Hochon	10675	107.00
		10689	5.00
		10727	40.00
		10671	7.67
15	Jamal Hochon Gong	10661	100.00
		10665	30.00
		10672	18.00

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
		10674	207.00
		10681	7.00
		10694	5.50
		10695	5.50
		10692	40.00
		10723	6.00
16	Ezahar Mia	10688	33.33
17	Jamal Hosson & Jokir Ahmed	10661	40.00
18	Chayad Alam	10623	40.00
19	Gulam Azam & Mohammad Hosson	10674	80.00
20	Farid Alam & 5 Brothers	10661	40.00
21	Farid Alam	10674	100.00
		10661	
22	Riduan Bhuiyan & 3 Brothers	10675	113.00
		10671	12.00
		10666	33.33
23	Abdur Rakim or Rahim	10661	40.00
24	Ayesha Begum represented by Soltan Ahmad	10741	35.00
		10675	25.00
		10674	
		10742	
		10738	
25	'Hazi Saleh Ahamed	10737	240.00
26	Successor of Gura Mia 'Ayesha Begum & 7 son 2 daughter	10737	180.00
27	Senuara Begum	10674	60.00
28	Halema Khatun	10674	20.00
		10661	15.00
		10684	5.00
		10694	
29	Monju Ara	10672	20.00

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
30	Khursheda Begum	10672	20.00
31	Saleha Begum	10675	70.00
32	Shah Azam	10684	52.00
		10688	8.00
		10669	5.00
		10660	54.34
		10742	40.00
		10741	40.00
		10724, 10691, 10694, 10723, 10674, 10685, 10686	186.00
33	Dr. Md. Nurul Absar Hkan, Dr. Md. Monjur Hosain, Dr. Jinnatun Nesa	10661	60.00
34	Ahmed Hochon, Jafar Alam, Ummat Ali, Aiysha Begum, Gulfaraj Begum	10741	40.00
		10674	113.33
35	Simanta Aqua Culture Limited	10674,10672, 10673,	235.87
		10673,10672	80.67
		10673,10672	34.50
		10743	80.00
		10673,10674, 10672	76.33
		10674	20.00
36	Mojaher Miah, Azaher Miah, Dolil Ahammad, Shamsul Alam, Ubaidul Hazur, Nurul Haque, Dudu Miah, Lala Bibi	10774	136.66
		10688	73.00
37	Johur Alam	10673	200.00
38	'Hazi Mokbul Ahmed	10741	40.00
39	Md Rafique son of Rashid Ahmed	10741	80.00
40	Md Yousuf Son of Dildar Ahmed	10741	25.00
		10737	15.00
41	Md. Dildar Ahmed ( Hazi Farid Ahamed)	10741	40.00
42	Nurul Huda	10661	11.00



SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
		10692	8.67
		10674	9.33
		10663	27.00
		10735/10774	21.67
		10724	5.00
		10729	11.33
43	Nurul Huda	10671	0.33
		10672	20.00
		10674	0.67
		10734	30.00
44	Gura Bibi, Shukot Ali	10674	14.67
		10661	44.00
45	Alikhali Mosque	10672	152.00
		10674	40.00
46	Jafor Alam, Jamal Hochon	10672	60.00
47	Rongikhali Darul Ulum Madrasa	10679	60.00
		10665	20.00
		10666	20.00
48	Dil Mohammad(Dost Mohammad)	10689	3.33
		10690	10.00
		10665	6.00
		10666	7.00
		10668	10.00
		10669	4.00
		10692	3.00
		10693	2.00
		10699	6.00
		10680	35.00
		10682	53.33
		10679	62.50
		10735	80.00

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
		10729	4.00
49	Mst. Nabin Sona, Yeasmin Ara, Anju Ara, Forija Begum, Nurul Amin, Nurul Aziz, Abul Hasnat, Nurul Hasnat, Ummay Shely, Jasmin Sultana	10674	50.00
		10684	58.00
		10732	15.50
		10750	15.00
		10734	6.50
		10729	4.00
		10715	400.00
50	Shahid Sarwar	10662	107.00
		10653/10754	51.00
		10661	105.33
		10742	98.72
51	Sirajul Monowar	10675	120.00
		10672	97.23
52	Hazi Saleh Ahamed , Mostak Ahamed	10725	80.00
53	Inheritance of Moulavi Soyed	10742	97.00
54	Md Aman Ullah	10693	40.00
55	Rashida	10674	30.00
	Liakat Ali	10674	30.00
56	Mohammad Kamal Uddin	10668	127.33
57	Mojaher Miah, Azaher Miah, Dolil Ahammad, Shamsul Alam, Ubaidul Hazur, Nurul Haque, Dudu Miah, Lala Bibi	10669	458.18
58	Akimunnesa , Sikder Ali, Siddique Ahammad, Lala Bibi, Patla Bibi	10692	291.33
59	Foyej Ahammad	10693	68.27
60	Mr. Afsar Kamal	10674	50.00
61	Nurul Kabir	10665	100.00
63	Dil Mohammad	10674	187.00
62	Harun KSA	10684	350.00
63	Jamal Member & Brothers (Inherritance)	10673	250.00

SL. No.	Land Owner Name	BS Dag No.	Total Land (Decimals)
64	Gojaiya	10672	400.00
65	Moulavi Shaker & Gong	10661	400.00
66	Gura Mia (Farid)	10688	300.00
67	Ashu (Molavi Rafique)	10669	150.00
68	Bodu Company	10676	80.00
69	Amanullah	10684	40.00
70	Shah Majidia Madrasha	10699	40.00
71	Moulavi Kabir	10680	80.00
72	Omar Ali	10682	160.00
73	Kamal Hossain	10679	200.00
74	Borhan	10774	120.00
75	Momtaz Hossain	10658-60	255.16
<b>Total Decimal</b>			<b>11,686.55</b>

## **Annex 4: Terms of Reference (ToR)**

### **Environmental and Social Impact Assessment (ESIA) of a Grid- tied Solar Plant Project by Teknaf Solartech Energy Limited (TSEL)**

#### **INTRODUCTION**

Teknaf Solartech Energy Limited (TSEL) is in the process to establish and operate a grid-tied solar power plant at Teknaf, Cox's Bazar spreading over about 116 acres of land. Because TSEL has been approved to implement and operate a 20 MW Solar Power Plant for supplying power to Bangladesh Power Development Board (BPDB) on an off-take basis for a contracted period of 20 years. TSEL has qualified for the bid on an unsolicited basis. The required commercial operation date for the project is 12 months from date of signing of project agreements i.e., Power Purchase Agreement and Implementation Agreement. For financing TSEL is expected to source fund from financial institutions having strong commitment on sustainable development. So, TSEL has decided to engage a qualified professional/firm to conduct a detail environmental and social impact assessment.

#### **LEGISLATIVE REQUIREMENTS**

The ESIA must include the legislative requirement of the Department of Environment (DoE), World Bank OPs (especially OP 4.03) incorporating Performance Standards (1-8), IFC EHS General Guidelines 2008 and relevant international conventions.

#### **OBJECTIVES OF THE ESIA**

The primary objectives of the ESIA are to:

- Assess the baseline environmental and social conditions in the project area (an airshed of 5 km radius);
- Identify the potential environmental, social and occupational impacts due to the project in terms of construction, operation and de-commissioning phases;
- Propose appropriate mitigation measures and monitoring plan to minimize adverse environmental, occupational and social impacts as per the DOE, WB OP 4.03, IFC EHS guidelines and relevant best practices.

#### **SCOPE OF WORK**

- The ESIA will cover the environmental, occupational and social impacts due to establishing and operating a grid-tied solar plant with capacity of 20 MW;
- Ensure that the ESIA has covered the requirement of the DOE, WB OP 4.03, IFC EHS Guidelines on General Health Safety, and relevant best practices (as applicable);

## STANDARD AND GUIDANCE

- The ESIA will comply with the **Environment Conservation Rules (ECR)**, 1997 and other relevant rules and regulations of Bangladesh government;
- World Bank Group's Performance Standards (PS 1-8); under WB OP4.03 applicable to IPFF-II project
- It will comply with the major requirements **IFC EHS General Guidelines**

## APPROACH AND METHODOLOGY

The guiding approach of the ESIA will be based on following five principles:

- Completeness: The consultant will provide all facts and figure in a complete manner;
- Consistency: All facts and figures will be presented in a consistent manner;
- Relevancy: There will be no irrelevant discussion or illustration in the ESIA;
- Accuracy: All information and description should be accurate and they are supported with the source of reference (as is possible);
- Transparency: The consultant will prepare the ESIA from a neutral and ethical position, which means that all the issues will be depicted in a transparent manner with due importance and honest judgment.

## CONTENT

The ESIA report shall contain but not limited to the following contents:

### i. Cover page

Including logo, project title, name of developer, name of consultant, date of original and date of revised versions

### ii. Table of Contents

### 1. NON-TECHNICAL SUMMARY

Should concisely discuss significant findings and recommended actions in appropriate and understandable lay language

### 2. BACKGROUND

2.1 Project justification and purpose

2.2 Project location should include maps showing project site and area of influence

2.3 Project description and associated activities, detailing the operation modes

Describing the project context (geographic, ecological, social, health and temporal) as well as additional / associated project components, such as transmission lines, access roads and water supply). Should also describe facilities and activities by third parties that are essential for successful operation of the project.

### 3. ENVIRONMENTAL POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

Presents the national policy, legal and administrative framework. Also presents obligations to international environmental and social treaties, agreements and conventions, the international standards applied to the project, other priorities and objectives for E&S performance identified by the buyer / project sponsor. Explains environmental and social requirements of the project investors.

### 4. APPROACH AND METHODOLOGY

This Chapter sets out the approach and methodology used in the ESIA and how the data and information collected has been incorporated in the findings and recommendations.

#### 4.1 General Approach

For example including flow charts depicting how the ESIA has been developed

#### 4.2 Methodology

Describe the methodology used for data gathering, including the scientific approach for the baseline studies, for example sampling methods, instrumentation etc. Describe the methodology used to categorize the significance of the environmental and social impacts identified (e.g. into high, medium and low risks).

#### 4.3 ESIA Team

Briefly outline how the ESIA work was organised, the names of the team members, their roles and their qualifications.

#### 4.4 Assumptions, uncertainties and constraints

Identify any information gaps and/or limitations to the available data.

#### 4.5 Stakeholder consultation

Describe the stakeholder consultation process and the results. This may be presented as follows (extract from the ERA template for a Stakeholder Engagement Plan):

**Table 13.2: Teplate for Stakeholder Engagement Plan**

Stakeholder Groups	Key Stakeholders	Summary of Specific Interest
International		
Governmental		
Non-government organizations		
Operational suppliers, clients and client rep		
Institutions (iniversities, think tanks)		
Internal stakeholders		
Public group		
General communities		
Other key affected parties		



## **5. ENVIRONMENTAL AND SOCIAL BASELINE STUDY**

Defines the study area delineated for the boundaries of the baseline study. Describes relevant physical, biological, socioeconomic, health and labour conditions, including any changes anticipated before the project start. Considers current and planned development activities within the project area but not directly connected to the project. Indicates accuracy, reliability and sources of the data used.

## **6. ANALYSIS OF ALTERNATIVES**

Analysis of alternatives: comparing reasonable alternatives to the proposed project technology, design, and operation in terms of their potential E&S impacts, the feasibility of mitigating these impacts, etc. The alternatives should match the alternative designs presented in the Feasibility Study. Include technical drawings, maps etc. of alternative designs. Provide the criteria for the assessment and identification of the best design option available. Identify and provide justification for the best design option.

## **7. IMPACT IDENTIFICATION AND EVALUATION**

Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures for the negative impacts, and any residual negative impacts that cannot be mitigated. Identifies and estimates the extent and quality of the available data, key data gaps, and uncertainties associated with predictions, and specified topics that do not require further attention. Evaluates impacts and risks from associated facilities and third party activities. Examines global, trans-boundary, and cumulative effects as appropriate.

## **8. MITIGATION/OPTIMISATION MEASURES AND RESIDUAL IMPACTS**

Consists of the set of mitigation and management measures to be taken during implementation of the project to avoid, reduce, mitigate or remedy for adverse social and environmental impacts. These should be prioritised on the basis of an assessment of their significance.

## **9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PROGRAMME**

Organises the mitigation and optimization measures identified in chapter 8 into a programme of overall activities. This may be made more operational through the development of specific action plans. The ESMP may be a multiple of other plans, for example Stakeholder Engagement Plan, Resettlement Action Plan etc. The ESMP may be structured as follows:

**Table 13.3: Sample Template for ESMP**

Issues/ Aspects	Location	Mitigation measures	Key verifiable indicators	Person responsible	Remarks	Cost (US)

## 10. MONITORING, EVALUATION AND REPORTING

Outline the monitoring, evaluation and reporting measures to be put in place to assess the effectiveness of the mitigation measures. Describe who will be responsible for their implementation, and whether a management system will be put in place.

## 11. CONCLUSION AND RECOMMENDATIONS

This section should present a clear statement of the conclusions and recommendations on actions to be taken to ensure that environmental issues are adequately addressed in subsequent project preparation, implementation, monitoring and evaluation phases.

## 12. APPENDICES

### 12.1 References Used

### 12.2 Technical Appendices

- Records of stakeholder engagement.
- List of stakeholders consulted or engaged. (Record of interagency and consultation meetings. Records of any other means of obtain the views of affected groups, such as surveys.)
- Terms of Reference.
- Other technical information and data, as required.
- List of ESIA report preparers – individuals and organizations
- References – written materials used in the study preparation – to be listed as follows: Author, (year), reference title, journal or publisher, page number
- Associated reports, audits and plans (e.g. resettlement action plan or indigenous peoples/natural resource dependent community plan, community health plan).
- Action plan describing actions necessary to implement the various sets of mitigation measures, prioritise these actions, timeline for implementation, and schedule for communicating with the affected communities.

## Annex 5: Technical specification of the project

### **Technical specification of Electricity Generation System Components**

TSEL is producing electricity from solar modules via photovoltaic cells and converting the generated DC current to AC current through inverters. All the detailed specification is listed below:

**Table 13.4: Detailed Specification of equipments used in TSEL**

Sr. No.	Item Description	Unit Of Material	Quantity
<b>A</b>	<b>PV Modules capacity</b>		
	<b>PV Modules of capacity 325Wp</b>	Nos	94809
	<b>RFID Tags for modules</b>	Nos	94809
<b>B</b>	<b>Module Mounting Structure (MMS)</b>		
	<b>42X6MMS Structure along with fasteners and allied</b>	Sets	350
	<b>Inverter Structure along with fasteners and allied</b>	Sets	350
<b>C</b>	<b>DC System</b>		
	<b>Connectors (MC4 Connectors)</b>		
	Male Connector	Nos.	20000
	Female Connector	Nos.	20000
	<b>String Combiner Boxes (SCB)</b>		
	String Combiner boxes (SCB) for string configuration having DC input 12 nos. & DC output – 1 no., with fuse protection.	Nos.	400
	<b>DC Cables</b>		
	Single core 4sq.mm 1.8kV DC, XLPO, Al/Copper cable, EN 50618 and TUV	m	150000
	Single core 95sq.mm, 1.5kV DC, XLPE, Ar, Al/Copper cable	m	150000
<b>D</b>	<b>String Inverters make SMA 60KW, 400V with connected accessories and peripherals and all necessary tools &amp; tackles.</b>	Nos.	400

Sr. No.	Item Description	Unit Of Material	Quantity
<b>E</b>	<b>Inverter Transformer</b>		
	<b>33/0.4, 2MVA , ONAN Transformer with off circuit tap changer.</b>	No.	12
<b>F</b>	<b>AC System</b>		
	<b>19/33KV(E) HT POWER CABLE</b>		
	3Cx185 sq.mm HT Cable (19/33kV(E), Al/Copper conductor, XLPE insulated, extruded PVC compound type ST-2 inner sheathed)	m	8000
	3Cx240 sq.mm HT Cable (19/33kV(E), Al/Copper conductor, XLPE insulated, extruded PVC compound type ST-2 inner sheathed)		4000
	3Cx300 sq.mm HT Cable (19/33kV(E),Al/Copper conductor, XLPE insulated, extruded PVC compound type ST-2 inner sheathed)		4000
	<b>1.1KV LT POWER CABLE</b>		
	1100V (E),Al/Copper conductor, XLPE insulated, Al armoured, overall PVC outer sheathed, generally conforming to IEC 60502 of following sizes.		
	3Cx35 sq.mm LT Cable	m	10000
	1C x 300 sq.mm LT Cable	m	10000
	1C x 500 sq.mm LT Cable	m	10000
	<b>1.1KV LT POWER CABLES</b>		
	4C x 10 sq.mm Al/Cu cable	m	7000
	2C x 2.5 sq.mm Al/Cu cable	m	2000
	4C x 4 sq.mm Al/Cu cable	m	1000
	3C x 2.5 sq.mm Al/Cu cable	m	1000
	1C x 2.5 sq.mm Al/Cu cable	m	1000
	4C x 25 sq.mm Al/Cu cable	m	1000
	<b>415V AC Distribution Board (415V ACDB) at MCR</b>		

Sr. No.	Item Description	Unit Of Material	Quantity
	33kV/415V,3ph,4 wire ACDB consisting of incomers for 50kVA Transformer bus couplers and TPN feeders with all control, protection, indication, other accessories & fittings as per specification and single line diagram.	Nos.	5
	<b>400V Indoor Main LT Panel as per key AC SLD (16-10165-EE-SLD-DWG-01)</b>	Nos.	12
	<b>415V AC Distribution Board (415V ACDB) at Inverter Station</b>		
	415V, 3ph, 4 wire UPS DB consisting of DP feeders as per single line diagram attached complete with all control, protection, indication, other accessories & fittings as per specification. (For inverter rooms)	Nos.	6
	415V, 3ph, 4 wire UPS DB consisting of DP feeders as per single line diagram attached complete with all control, protection, indication, other accessories & fittings as per specification. (For MCR)	Nos.	2
	<b>DP/4P Structure</b>		
	Double Pole Structure consisting of ISMC Channels and all required accessories	Set	2
	33kV Metering CT as per SLD	Nos.	4
	33kV Metering PT as per SLD	Nos.	4
	Energy meter	No.	2
	33kV, 10kA Lightning Arrestor	Nos.	4
	33kV Motorized Isolator with Earth Switch as per SLD	Set	4
<b>G</b>	<b>Allied System</b>		
	<b>Cable Termination</b>		
	Termination of following sizes of cables at equipment end including supply of required double compression cable glands, bimetallic lugs, ferrules, tag no. plates etc. for following cables		
	1C x 4 sq.mm cable/ <i>Pin type termination</i>	Lots	1
	1C x 95sq.mm cable / <i>Bimetallic Lugs</i>	Lots	1

Sr. No.	Item Description	Unit Of Material	Quantity
	3C x 35sq.mm cable/ <i>Lugs</i>	Lots	1
	3C x 240sq.mm cable/ <i>Lugs</i>	Lots	1
	1C x 300 sq.mm LT Cable/ <i>Bimetallic Lugs</i>	Lots	1
	1C x 70 sq.mm cable/ <i>Double Compression Gland</i>	Lots	1
	3C x 35sq.mm cable/ <i>Double Compression Gland</i>	Lots	1
	3C x 240sq.mm cable/ <i>Double Compression Gland</i>	Lots	1
	1C x 300 sq.mm LT Cable/ <i>Double Compression Gland</i>	Lots	1
	<b>HT Cable End Termination &amp; Straight Through Joints</b>		
	End Terminations for 33 kV earthed grade HT Cables (XLPE) for following sizes including necessary clamps / gland, lugs etc.		
	3Cx185 SQ.MM HT Cable termination kit	Nos.	50
	3Cx185 SQ.MM HT Cable termination kit for RMU	Nos.	50
	3Cx185 SQ.MM HT Cable straight through joints required	Nos.	50
	3Cx240 SQ.MM HT Cable termination kit	Nos.	50
	3Cx240 SQ.MM HT Cable termination kit for RMU	Nos.	50
	3Cx240 SQ.MM HT Cable straight through joints required	Nos.	50
	3Cx300 SQ.MM HT Cable termination kit	Nos.	50
	3Cx300 SQ.MM HT Cable termination kit for RMU	Nos.	50
	3Cx300 SQ.MM HT Cable straight through joints required	Nos.	50
	<b>1.1KV LT Cables</b>		
	2C x 4 sq.mm Al/Cu cable	Lots	1
	4C x 10 sq.mm Al/Cu cable	Lots	1
	2C x 2.5 sq.mm Al/Cu cable	Lots	1
	4C x 4 sq.mm Al/Cu cable	Lots	1

Sr. No.	Item Description	Unit Of Material	Quantity
	3C x 2.5 sq.mm Al/Cu cable	Lots	1
	1C x 2.5 sq.mm Al/Cu cable	Lots	1
	4C x 50 sq.mm Al/Cu cable	Lots	1
	<b>Cable Markers/Clamps for 33kV buried cable</b>		
	Cable markers for underground cable runs of LT Cables and 33kV inclusive of providing and fixing supports on 18 SWG enameled steel plate engraved	Nos.	200
	<b>Cable Warning tape for DC &amp; 33kV cables</b>		
	Cable warning tape for underground cable runs with letters "BURIED ELECTRIC CABLES BELOW" marked on yellow background, including necessary Civil material	m	4000
	DC trench	m	
	MV AC trench	m	4000
	<b>Cable Trays</b>		
	a) 900 x 2 x 100 mm (W x T x H) Ladder Type	m	100000
	b) 200 x 2 x 50 mm (W x T x H) Perforated Type	m	100000
	c) 100 x 2 x 50 mm (W x T x H) Perforated Type with Cover	m	100000
	d) 600 x 2 x 100 mm (W x T x H) Ladder Type	m	100000
	e) 450 x 2 x 100 mm (W x T x H) Ladder Type	m	100000
	ISMC channels, support metallic anchor fasteners for supporting cable tray supports / equipment erection .This shall also include hardware such as nut/bolts/ washers required to do mounting structure and other equipment earthing as required.	Lots	1
	<b>Safety Equipment</b>		
	Following equipment including necessary hard wares;		
	a. Shock hazard charts complete with frame and glass	Nos.	50
	b. First aid boxes	Nos.	50



Sr. No.	Item Description	Unit Of Material	Quantity
	c. Caution boards as per IEC	Nos.	50
	d. Sand bucket with stand (Each set with 5 buckets)	Nos.	50
	e. SLD with frame and glass	Nos.	50
	f. Fire extinguisher		50
	i.10kG Co2 type	Nos.	50
	ii.Foam 45 ltr capacity	Nos.	50
	iii.10kG DCP type	Nos.	50
	g. Insulated floor Mats Manufactured from highly electric resistant elastomer, conforming to IEC, upper surface is having small aberration (Anti-Skid) marks to avoid slippery effects & lower surface is plain, according to its class, 1m wide.		
	a) Type – ‘A’ for working voltage upto 3.3 KV, Thick: 2mm	m	500
	b) Type – ‘C’ for working voltage upto 33KV, Thick: 3mm	m	100
	<b>Heavy Duty HDPE pipes</b>		
	200mm diameter pipe	m	500
	<b>HDPE Conduit pipe and coupler</b>		
	Conduit pipe, 50mm ID	m	100000
	<b>Illumination System</b>		
	<b>Lighting Fixtures</b>		
	Following lighting fixtures complete with lamps and necessary control gear including supply of all connected materials like flexible conduit, clamps, supports, chains, anchor fastners, bolts, nuts and washers		
	40W Capsule LED fixture, surface / pendent mounting with all necessary accessories like suspension pipes, cover plates etc and suitable for 240V AC. Bajaj type – BICDP 40W LED / Philips / equivalent.	Nos.	500
	60W LED fixture, Outdoor type wall / structure	Nos.	500

Sr. No.	Item Description	Unit Of Material	Quantity
	mounting suitable for 240V AC. Bajaj / Philips / Wipro equivalent.		
	70W MH fixture, Outdoor type wall / structure mounting suitable for 240V AC.	Nos.	100
	<b>Internal wiring</b>		
	25 mm dia PVC Pipe	m	1000
	32A Welding Socket	Nos.	50
	2.5 sqmm Al/Cu wire	m	50000
	4 sqmm Al/Cu wire	m	20000
	6 sqmm Al/Cu wire	m	500
	230V 6A SP switch	Nos.	500
	6A Power Socket	Nos.	500
	16A Switch	Nos.	500
	16A Power Socket	Nos.	500
	16 module switchboard with 11nos 5A plate type switches with 2Nos of 5A, 3 pin 240V receptacle with safety shutter	Nos.	500
	6 module Switchboard with 1nos 16A plate type switches with 2Nos of 16A, 3 pin 240V receptacle with safety shutter	Nos.	500
	3way Junction Box	Nos.	500
	Clamps for conduits - 25 mm dia	Nos.	500
	Bends	Nos.	500
	Circular boxes/pull out boxes	Nos.	500
	Couplers	Nos.	500
	<b>Lighting Panels/ Power panels</b>		
	20kVA UPS with 4hr power backup with required battery bank	Nos.	4
	3kVA UPS with 2hr power backup with required battery bank	Nos.	10

Sr. No.	Item Description	Unit Of Material	Quantity
	<b>Street Lighting Poles</b>		
	15 Watt LED	Nos.	500
	Swaged tubular steel poles complete with base plate alongwith supply of luminaries supporting bracket and earthing materials. 3.5m high lighting pole with Supply Junction box with HRC fuse, neutral link, terminal block and 02 nos. M8 earthing stud for single arm steel pole along with mounting bracket suitable for steel pole mounting.	Nos.	500
	Following Feeder Pillar Box/Street LP with dusk to dawn controller and timer FPB with outgoing feeders for outdoor lighting. Incomer : 50A TPN ELCB, Outgoing : 3 nos 16A SPN MCB	Nos.	10
	<b>Street Lighting cables</b>		
	1.1kV grade, XLPE insulated armored Aluminum cable of size 4Cx10 sq. mm. for street light poles	m	2000
	<b>Cable band, cable ties</b>		
	100 mm aluminum tag	Lots	1
	PVC cable tie for clamping of loose solar cables with solar panel frames, Panel structure etc. The PVC cable tie shall be UV resistance.	Lots	1
	Cable Tie 300 mm UV protected black	Lots	1
	Cable Tie 100 mm UV protected black	Lots	1
	Cable Sleeve 8 mm Red	Lots	1
	Cable Sleeve 8 mm Black	Lots	1
	Ferrule 0-9 (10mm)	Lots	1
	ferrule,P,N (10mm)	Lots	1
<b>H</b>	ferrule,R,Y, B (10mm)	Lots	1
	<b>Water Pumps and other Systems</b>		
	Sump pump set 1.5HP, 3 phase, 415 volts, 50 Hz	Nos.	5
	Portable water pump set 1.5HP, 3 phase, 415 volts, 50	Nos.	5

Sr. No.	Item Description	Unit Of Material	Quantity
	Hz		
<b>I</b>	Control panel consisting of DOL starter, MCB etc	Nos.	5
	4C, 4sq. Mm, 1100V AC grade PVC insulated steel wire/ tape armored copper conductor cables as required for installation of above pump.	m	500
	<b>HT Switchgear and Battery Charger System</b>		
	Control Room 33kV, 630A VCB(7Nos.), 25kA for 3 sec, Indoor type switchgear Panel at control room, Line PT-1 No.	No.	10
	Inverter Room 33kV, 630A VCB, 25kA for 3 sec, Indoor RMU Panel at inverter room with 2 Breaker + 1LBS (Type- CVV)	Nos.	10
	48V dual FCBC battery chrger with suitable AH capacity and DCDB.	Nos.	4
	<b>Solar Field Earthing</b>		
	Following GI earthing strip / GI Wire		
	50x10mm GI flat	m	2000
	25x6mm GI Flat	m	25000
	32x6mm Cu flat	m	500
	16sq.mm Insulated Al/Cu cable ( Yellow-green for SCB grounding)	m	1500
<b>J</b>	16sq.mm Insulated Al/Cu cable Bimetallic lug for terminating with earth strip	Nos.	500
	16sq.mm Insulated Al/Cu cable ( Yellow-green for Inverter grounding)	m	2000
	16sq.mm Insulated Bimetallic Lug	Nos.	500
	60MM DIA. 3000MM LONG GI pipe electrode with salt, charcoal etc (treated pits)	Nos.	200
	ESE type lightning arrester (107 ms radial range)	Nos.	24
	18MM DIA. 3000MM LONG Cu bonded electrode with chemical powder	Nos.	100

Sr. No.	Item Description	Unit Of Material	Quantity
	<b>Weather Station and Control &amp; Monitoring</b>		
	<b>Control &amp; Monitoring Cables for PV Plant</b>		
	4x2x0.5 Sq. mm Twisted pair shielded Cable ( Type Li-2YCYv or equivalent)	km	10
	4 pair Category 6e cable consisting of 24 AWG solid copper conductors The cable shall have flexible jacket and ripcord for easy stripability	m	6000
	06F armored unitube single sheath, multimode type Fiber optics Cable with required terminations.	m	10000
	<b>LT Control Cables (1.1 kV grade, PVC insulated, armoured FRLS PVC sheathed copper conductor cables)</b>		
	4Cx2.5 Sq. mm Multistrand Al/Cu Cable	m	1000
	8Cx2.5sq. mm Multistrand Al/Cu Cable	m	1000
	12Cx2.5sq. mm Multistrand Al/Cu Cable	m	1500
	<b>SCADA Hardware/Software</b>		
	RTU Panel with I/O cards, ethernet/modbus/gateway units, FO convertors, ethernet switches.	Nos.	10
	Workstation 22"	Nos.	15
	Server with required accessories and storage	Nos.	15
	Historian server workstation with required accessories and storage	No.	10
	SLDC Communication gateway/RTU	No.	10
	GPS Clock	No.	10
	Remote monitoring license	Nos.	10
	Software License with for unlimited I/O tags	No.	10
	Others as required to commission the SCADA	Lot	10
	<b>Instruments for meteorological measurements</b>		
	Pyranometer	Nos.	10
	Ambient Temperature cum humidity measuring	No.	10

Sr. No.	Item Description	Unit Of Material	Quantity
	instrument		
	Anemometer	No.	10
	Module temperature sensor	Nos.	10
	Data logger	No.	20
	Barometer	No.	10
	Rain Gauge	No.	10
	<b>Misc Others</b>		
	Multi Sensors	Nos.	350
	Heat Detector	Nos.	350
	Fire Alarm Panel	Nos.	50
	CCTV cameras	Nos.	50
	1.5 ton Split AC	Nos.	10
	Electrical, Electronics and Mechanical Tools	Sets	50
	<p>Installation of galvanized Factory Fabricated sheet metal ducting generally as specified and completely factory fabricated with:</p> <p>a) with angle 40x40x5mm flange &amp; Stiffener Diagonal angle of 25x25x3mm all four side</p> <p>b) Galvanized companion flanges &amp; girth angles.</p> <p>c) Turning vanes- 2 nos/inverter</p> <p>d) Galvanized structural support systems for hanging of duct</p> <p>e) Single louvered Exhaust air grilles with bird mesh in aluminum construction duly Powder coated and to be fitted with Exhaust Air Ducting of each Inverter Unit.</p> <p>f) 2mm Galvanized Sheet Steel - 10 sq.mtr /per inverter</p>	Nos.	50
	Exhaust fans in Inverter rooms	Nos.	30

## Annex 6: Project Schedule

### Project Schedule of TSEL

The project is concern with construction and operation phases. It had designed a 3 months construction. Operational period designed with average 5.35 hours/Dayworking of yearly 365 days for 20 years life time. The maintenance will be in the night time of any day as it will run in the day time. The project schedule is shown below:

**Table 13.5: Project Schedule of TSEL**

Technaf Solartech Energy Limited Project Planner																																										
S/ L	ACTIVITY	DURA TION PLAN	May, 17				June, 17				July, 17				August, 17				September, 17				October, 17				November, 17				December, 17				January, 18				February, 18			
			1	2	3 0	3 1	1	2	2 7	2 8	1	2	3 0	3 1	1	2	2 9	3 0	1	2	3 0	3 1	1	2	2 9	3 0	1	2	3 0	3 1	1	2	2 9	3 0	1	2	3 0	3 1	1	2	3 0	3 1
1	Preliminary Design	90																																								
2	Preliminary Design Approval	10																																								
3	Boundary fencing works	80																																								
	Civil construction	120																																								
5	Installation	100																																								
6	Off-Grid Commissioning and Testing	45																																								
7	Grid Connection & start up	20																																								
8	On-grid Commissioning	10																																								
9	Performance Test	7																																								
10	COT	3																																								



## **Annex 7: Environmental Policy, Legislative and Institutional Framework**

### **General**

The following is the review of the relevant national legislation, regulatory and policy instrument and some international ones. The proponent of the project will conduct its infrastructural and operational activities in compliance with applicable Bangladeshi and international legislation and agreements. A comprehensive review of the legal and institutional framework within which the environmental and social assessment is to be carried out.

### **Environment Conservation Rules, 1997 (subsequent amendments in 2002 and 2003)**

The Environment Conservation Rules, 1997 are the first set of rules promulgated under the Environment Conservation Act, 1995. These Rules provide for, *inter alia*, the following:

- The national Environmental Quality Standards (EQS) for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust;
- Categorization of industries, development projects and other activities on the basis of actual (for existing industries/development projects/activities) and anticipated (for proposed industries/development projects/activities) pollution load;
- Procedure for obtaining environmental clearance;
- Requirement for undertaking IEE and ESIA as well as formulating ESMP according to categories of industries/development projects/activities; and
- Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.

Depending upon location, size and severity of pollution loads, projects/activities have been classified in the Environmental Conservation Rules (ECRs) into four categories:

1. Green,
2. Orange A
3. Orange B
4. Red

The corresponding category related to power plants is included under:

*Schedule-1, Red Category:*

- Item 6: power plants; and

The Rules also incorporate “inclusion lists” of projects requiring varying degrees of environmental investigation e.g. all new projects under the ‘red’ category generally will require a two-step assessment procedure. Firstly, an Initial Environmental Examination (IEE) will be required for site clearance, and secondly, if warranted, a full Environmental Impact Assessment

(ESIA) for technical clearance. This ESIA has been carried out following the IEE of the project and also on the basis of the Terms of Reference (ToR) for the ESIA, which were approved by DoE, in accordance with the requirements of the ECRs, toward obtaining an ‘Environmental Clearance Certificate’ for the proposed project.



### **The ESIA Guidelines for Industry, 1997**

The ESIA Guidelines is a handbook comprising procedures for preparing an ESIA and for reviewing an ESIA for the benefit of the development partners, ESIA Consultants, reviewers, and academics. While preparing these guidelines, the present environmental status as well as the need for rapid economic development of Bangladesh has been considered. These considerations have essentially resulted in simpler procedures to be followed for preparing and/or reviewing an ESIA.

Application for Environmental Clearance at A requires 60 working days to reach A1 with Site Clearance. Submission at B of ESIA as per ToR approved at AI needs another 90 working days to reach B1 with ESIA approval and Environmental Clearance Certificate (*60 working days for ESIA approval and 30 working days for ECC after the applicant/project sponsor completes the formalities as specified in the ESIA approval letter and reports to DoE*). ECC issued through such a process remains valid for 1 (one) year, after which renewal is necessary. *During stages between A and A1 and between B and B1, observations are made and the applicant may be asked for modification of his/her information/data/reports submitted to DoE for necessary clearance.*

### **Environmental Court Act, 2010**

By the Act, government can establish one or more environment court in each district. Each court will be constituted with one judge and in consultation with Supreme Court. The Govt. shall appoint an officer of judicial service of the rank of joint district judge. Each environment court will be established at district sadar. But government can relocate the locations of judiciary activities of this court at any location through issuance of general or special order in government gadget. If more than one environment court is established in one district, government will delineate jurisdiction of each court by gadget notification.

-  To fulfill the purposed of this act, government can inaugurate one or more special magistrate court at each district through gadget notification. Government, in consultation with Supreme Court, will appoint a metropolitan magistrate or a first class judicial magistrate solely or as special magistrate in addition to his/her general duty for any jurisdiction.
-  Whatever remains any other law, Director General or any person empowered by him will be able to file a case at special magistrate court. The special magistrate court will be competent to impose penalty for offences described in this Act including section 9, to confiscate an equipment or part, a transport used in the commission of such offence or

article or other thing involved with the offence and to pass order or decree for compensation in appropriate cases.

- ✚ Whatever remains any other law, all the cases received from the special magistrate will be judged and resolved at the environment court. The environment court will be competent to impose penalty for offences described in this Act including section 8(2), to confiscate an equipment or part, a transport used in the commission of such offence or article or other thing involved with the offence and to pass order or decree for compensation in appropriate cases.
- ✚ The Act has defined timeline for resolving any case under both special magistrate court and environment court.
- ✚ Aggrieved People may appear to Environment Appeal Court (established under Section 20 of this Act) for justice directly within 30 days of resolution of any case.

## Relevant International Treaties and Conventions

Bangladesh is party to a number of international environmental conventions, treaties, and agreements. The international treaties and conventions relevant to the Project and their status are detailed in the following table.

**Table 13.6: The International Treaties and Conventions Relevant To the Project**

Environment-related International convention and Treaties	Status	Applicability to Project
Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985)	02.08.90 (accessed) (entry into force)	Applicable
Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal 1987)	02.08.90(accessed) 31.10.90 (entry into force)	Applicable
London Amendment to the Montreal Protocol on substances that Deplete the Ozone Layer (London, 1990)	18.03.94 (accessed) 16.06.94 (entry into force)	Applicable
Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992	27.11.2000 (accepted) 26.2.2001 (entry into force)	Applicable
Montreal Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1997	27.7.2001 (Accepted) 26.10.2001 (Entry into force)	Applicable
Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989)	01.04.93 (accessed)	Applicable
United Nations Framework Convention	09.06.92 (signed)	Applicable

Environment-related International convention and Treaties	Status	Applicability to Project
on Climate Change, (New York, 1992)	15.04.94 (ratified)	
Convention on Biological Diversity, (Rio De Janeiro, 1992)	05.06.92 (signed) 03.05.94 (ratified)	Applicable
Convention on Persistent Organic Pollutants, Stockholm	23.5.2001 (signed) 12.03.2007 (ratified)	Applicable and use of any persistent pollutants to be prohibited
Kyoto protocol to the United Nations Framework Convention on Climate Change	21.8.2001 (accessed)	Applicable

Source: DoE, Bangladesh

### Renewable Energy Policy of Bangladesh

The renewable energy policy of Bangladesh has been approved on December 18, 2008 with the target of developing renewable energy resources. This Policy laid out the target of meeting 5% of total power demand from renewable energy sources by 2015 and 10% by 2020. The policy provides an overall guidance of

- Institutional arrangements
- Resource, technology, and program development
- Investment and fiscal incentives
- Regulatory policy

The policy promotes the appropriate, efficient and environmentally friendly use of renewable energy. It also suggests that for large biomass electricity projects (i.e., greater than 1 MW) the project developer must demonstrate that the biomass is being sustainably harvested and that no adverse social impact will result from that development. It also restricted the larger scale production and use of biofuels which may jeopardize the existing crops.

### World Bank Operational Policy/Procedure (OP/BP) 4.03 – World Bank Performance Standards for Private Sector Activities

World Bank Operational Policy / Procedure (OP/BP) 4.03 – World Bank Performance Standards for Private Sector Activities governs the World Bank requirements applicable to IPFF II. The aim of this policy is to facilitate Bank financing for private sector led economic development projects by applying environmental and social standards that are better suited to the private sector, while enhancing greater policy coherence across the World Bank Group. OP/BP 4.03, among its other provisions, stipulates the requirements for Bank-supported

projects involving Financial Intermediaries (FIs), as follows: If the Private Sector Activity involves a FI, the FI is required to:

- (a) Develop and operate an Environmental and Social Management System (ESMS) that is commensurate with the level of social and environmental risks in its portfolio, and prospective business activities;
- (b) Ensure that all subprojects supported by the Bank comply with applicable national and local laws and regulations, and, in case of higher risk subprojects involved, with the requirements of the World Bank Performance<sup>4</sup> Standards 1-8.
- (c) Apply relevant aspects of WB Performance Standard 2 to its employees.<sup>2</sup>

### **World Bank Performance Standards and Environmental, Health and Safety Guidelines**

The World Bank has set out eight Performance Standards, as listed below, in respect of various parameters pertaining to a proposed project.

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labor and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and
- Performance Standard 8: Cultural Heritage.

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<sup>2</sup>In case of IPFF II, this requirement will be applicable to the PFIs, but not BB.

A summary of the Performance Standards objectives is presented in Table 13.7.

**Table 13.7: Details of World Bank Performance Standards**

PS	Title	Objectives
1	PS1: Assessment and Management of Environmental and Social Risks and Impacts	<ul style="list-style-type: none"> <li>• To identify and evaluate environmental and social risks and impacts of the project.</li> <li>• To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,<sup>3</sup> and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.</li> <li>• To promote improved environmental and social performance of project sponsors through the effective use of management systems.</li> <li>• To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.</li> <li>• To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.</li> </ul>
2	PS2: Labor and Working Conditions	<ul style="list-style-type: none"> <li>• To promote the fair treatment, nondiscrimination, and equal opportunity of workers.</li> <li>• To establish, maintain, and improve the worker-management relationship.</li> <li>• To promote compliance with national employment and labor laws.</li> <li>• To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the project sponsor's supply chain.</li> <li>• To promote safe and healthy working conditions, and the health of workers.</li> <li>• To avoid the use of forced labor.</li> </ul>
3	PS3: Resource Efficiency and Pollution	<ul style="list-style-type: none"> <li>• To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.</li> </ul>

<sup>3</sup>Acceptable options to minimize will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate. The risk and impact mitigation hierarchy is further discussed and specified in the context of Performance Standards 2 through 8, where relevant.

PS	Title	Objectives
	Prevention	<ul style="list-style-type: none"> <li>To promote more sustainable use of resources, including energy and water.</li> <li>To reduce project-related GHG emissions.</li> </ul>
4	PS4: Community Health, Safety, and Security	<ul style="list-style-type: none"> <li>To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.</li> <li>To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.</li> </ul>
5	PS5: Land Acquisition and Involuntary Resettlement	<ul style="list-style-type: none"> <li>To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.</li> <li>To avoid forced eviction.</li> <li>To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.</li> <li>To improve, or restore, the livelihoods and standards of living of displaced persons.</li> <li>To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.</li> </ul>
6	PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	<ul style="list-style-type: none"> <li>To protect and conserve biodiversity.</li> <li>To maintain the benefits from ecosystem services.</li> <li>To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.</li> </ul>
7	PS7: Indigenous Peoples <sup>4</sup>	<ul style="list-style-type: none"> <li>To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.</li> <li>To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when</li> </ul>

<sup>4</sup>In Bangladesh, the accepted terminology for such communities is “Tribal peoples and/ or small ethnic communities”



PS	Title	Objectives
		<p>avoidance is not possible, to minimize and/or compensate for such impacts.</p> <ul style="list-style-type: none"> <li>• To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.</li> <li>• To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.</li> <li>• To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.</li> <li>• To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.</li> </ul>
8	PS8: Cultural Heritage	<ul style="list-style-type: none"> <li>• To protect cultural heritage from the adverse impacts of project activities and support its preservation.</li> <li>• To promote the equitable sharing of benefits from the use of cultural heritage.</li> </ul>

Of the above eight Performance Standards, Performance Standard 1 establishes the importance of:

- (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
- (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- (iii) The project sponsor's management of environmental and social performance throughout the life of the project.

Performance Standards 2 through 8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/offset for risks and impacts to workers, Affected Communities, and the environment.

The applicability of Performance Standard 1-8 is established during the environmental and social risks and impacts identification process described in Performance Standard 1. While all relevant environmental and social risks and potential impacts should be considered as part of the assessment, Performance Standards 2 through 8 describe potential environmental and social risks and impacts that require particular attention. Where environmental or social risks and impacts are identified, the project sponsor is required to manage them through its Environmental and Social Management System (ESMS) consistent with Performance Standard 1.

In addition to the eight Performance Standards, the IFC General Environmental, Health and Safety (EHS) Guidelines are considered pertinent to the Project. The EHS Guidelines comprise technical reference documents with general industry-specific examples of Good International Industry Practice. The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, which provide guidance to users on EHS issues in specific industry sectors. During preparation of this ESIA for the TSEL Power Plant project, the General EHS Guidelines were applied and relevant guidance in the Industry Sector Guidelines for Thermal Power Plants (dated December 19, 2008) was followed (where applicable).

The IFC *Policy on Disclosure of Information*, The Access to Information Policy is effective as of January, 2012 supersedes the IFC Disclosure of Information Policy of April 2006. The policy seeks to provide accurate and timely information regarding its activities to clients, partners and stakeholders including the Affected Communities and other interested parties.

For each proposed Category A and B project, IFC disclose as summary of its review findings and recommendations, the Environmental and Social Review Summary (ESRS). The ESRS includes:

- i) Reference to the Performance Standards and any applicable grievance mechanisms, including the CAO;
- ii) The rationale for IFC's categorization of a project;
- iii) A description of the main environmental and social risks and impacts of the project;
- iv) Key measures identified to mitigate those risks and impacts, specifying any supplemental actions that will need to be implemented to undertake the project in a manner consistent with the Performance Standards, or where required by IFC, the Environmental and Social Action Plan (ESAP);
- v) Where greater than 25,000 MT CO<sub>2</sub> equivalent, the expected GHG emissions of the project;
- vi) Electronic copies or web links, where available, to any relevant ESIA documents prepared by or on behalf of the client; and
- vii) For those projects where the verification of the Free, Prior, and Informed Consent (FPIC) of indigenous peoples is required, a description of the status of that consent process;

## **Annex 8: Safeguard Requirements of Equator Principle Financial Institutions**

The ten requirements of the Equator Principle Financial Institutions (EPFIs) correspond to the following parameters:

- *Principle 1 (Review and Categorization):* When a project is proposed for financing, the EPFI will, as part of its internal environmental and social review and due diligence, categorize it based on the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social categorization process of the IFC. Projects are classified, relating to social or environmental impacts, in Category A (significant impacts), Category B (limited impacts) and Category C (minimal or no impacts).
- *Principle 2 (Environmental and Social Assessment):* For all Category A and Category B Projects, the EPFI will require the client to conduct an assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed project (which may include the illustrative list of issues found in Exhibit II to the EPs). The Assessment Documentation should propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.
- *Principle 3 (Applicable Environmental and Social Standards):* The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. The EPFI will require that the assessment process evaluates compliance with the applicable standards as follows:

For projects located in Non-Designated Countries, the assessment process evaluates compliance with the then applicable WB Performance Standards and the World Bank Group EHS Guidelines; and

- *Principle 4 (Environmental and Social Management System and Equator Principles Action Plan):* For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree an Equator Principles Action Plan (AP). The Equator Principles AP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards;
- *Principle 5 (Stakeholder Engagement):* For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For projects with potentially

significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the project, the project's phase of development; the language preferences of the Affected Communities, their decision-making processes and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation.

To facilitate Stakeholder engagement, the client will, commensurate to the project's risks and impacts, make the appropriate Assessment Documentation readily available to the Affected Communities, and where relevant Other Stakeholders, in the local language and in a culturally appropriate manner.

The client will take account of and document, the results of the Stakeholder Engagement process, including any actions agreed resulting from such process. For Projects with environmental or social risks and adverse impacts, disclosure should occur early in the assessment process, in any event before the project construction commences, and on an ongoing basis.

EPFIs recognize that indigenous peoples may represent vulnerable segments of project affected communities. Projects affecting indigenous peoples will be subject to a process of informed Consultation and Participation, and will need to comply with the rights and protections for indigenous peoples contained in relevant national law, including those laws implementing host country obligations under international law. Consistent with the special circumstances described in WB Performance Standard 7 (when relevant as defined in Principle 3), projects with adverse impacts on indigenous people will require their Free, Prior and informed Consent (FPIC) 3.

- *Principle6 (Grievance Mechanism):* For all Category A and, as appropriate, Category B projects, the EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

The grievance mechanism is required to be scaled to the risks and impacts of the project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the Stakeholder Engagement process.

- *Principle7(Independent Review):* For all Category A and, as appropriate, Category B projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence, and assess Equator Principles

compliance. The Independent Environmental and Social Consultant will also propose or opine on a suitable Equator Principles AP capable of bringing the Project into compliance with the Equator Principles, or indicate when compliance is not possible.

- *Principle 8 (Covenants):* For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. Furthermore, for all Category A and Category B Projects, the client will covenant the financial documentation:
  - To comply with the ESMPs and Equator Principles AP (where applicable) during the construction and operation of the Project in all material respects; and
  - To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third-party experts, that i) document compliance with the ESMPs and Equator Principles AP (where applicable), and ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and
  - To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan

Where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the project back into compliance to the extent feasible. If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, as considered appropriate.

- *Principle 9 (Independent Monitoring and Reporting):* To assess project compliance with the Equator Principles and ensure ongoing monitoring and reporting after Financial Close and over the life of the loan, the EPFI will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the EPFI.
- *Principle 10 (Reporting and Transparency):* For all Category A and, as appropriate, Category B Projects:
  - The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online; and
  - The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tons of CO<sub>2</sub> equivalent annually.


## Annex 9: Stakeholder Engagement Plan

### Stakeholder consultation and Participation


Three formal meetings specifically including all categories of PAPs were held. One large public consultation meeting which included all types of people affected direct and indirectly. Representatives from the project areas, district and local administration, as well as other community representatives including prominent local people, lawyers, journalists, academicians and the representative from Technaf Solartech Energy Limited (TSEL).

The following table shows the type of stakeholders consulted during the study period.



**Table 13.8: List of Stakeholders for information dissemination and disclosure**


SN.	Stakeholder	Issues and concerns discussed
1	Ward Member	<p>Nurul Huda Member 8 no. Ward, Nhilla Union Parishad Teknaf, Cox's Bazar</p>  <ul style="list-style-type: none"> <li>✚ As a Member I request you to help the affected people by giving jobs in the power plant. We expect disturb free environment which will be appreciable from us.</li> <li>✚ To provide continuous help to the Mosque, Madrasha and other social institutions</li> <li>✚ To provide first aid and employ a doctor for treatment the affected people</li> <li>✚ To provide clothes to the vulnerable people during winter season</li> <li>✚ To create tree plantation to check the heat</li> <li>✚ Public nuisance should reduce as much as possible</li> <li>✚ To pay the Land lease to the actual land owner</li> <li>✚ Be careful when the heavy vehicle move in the road so that the road structure may not damage</li> </ul>




		<ul style="list-style-type: none"> <li>✚ The land owner who have lost their total land please provide them by giving a job based on their skill or provide them some fund or training on small enterprise and fund</li> <li>✚ In a nutshell, my request is the company should keep the social environment for living friendly</li> </ul>
2.	Moin Uddin Memorial College	<p>A N M Touhidul Mashek Acting Principal Moin Uddin Memorial College Alikhali, Teknaf Mobile: 01816-910883</p>  <p><b>Discussion</b></p> <ul style="list-style-type: none"> <li>✚ As the Principal of the Moin Uddin Memorial College which is not very far from it, I request you to keep the heat in limit. We expect disturb free environment which will be appreciable from us.</li> <li>✚ It will be nice place to live in the future and will be a good place to work as there will be many educated person in the project.</li> <li>✚ If possible please take our boys in the work as much as possible</li> <li>✚ We can help you finding the best person as we know the educated ones</li> <li>✚ To create tree plantation to check the heat</li> <li>✚ Public nuisance should reduce as much as possible</li> <li>✚ Be careful when the heavy vehicle move in the road so that the road structure may not damage and if possible please develop the approach road.</li> </ul> <p>In a nutshell, my request is the company should keep the environment for living friendly</p>




3	(Community Leader)	<p>Nurul Huda President Leda Camp Bazar Committee, Leda Teknaf, Cox's Bazar</p>  <ul style="list-style-type: none"> <li>✚ As a guardian I request you to help the affected people by giving jobs in the power plant. We expect disturb free environment which will be appreciable from us.</li> <li>✚ To provide continuous help to the Mosque, Madrasha and other social institutions</li> <li>✚ If there's any help then it would be equal for the two ward's population.</li> <li>✚ To provide first aid and employ a doctor for treatment the affected people</li> <li>✚ To provide clothes to the vulnerable people during winter season</li> <li>✚ To create tree plantation to check the heat</li> <li>✚ Public nuisance should reduce as much as possible</li> <li>✚ To pay the Land lease to the actual land owners</li> <li>✚ Be careful when the heavy vehicle move in the road so that the road structure may not damage</li> <li>✚ The land owner who have lost their total land please provide them by giving a job based on their skill or provide them some fund or training on small enterprise and fund</li> </ul> <p>In a nutshell, my request is the company should keep the social environment for living friendly</p>
4	FGD with Salt Farmer Group	<p>Zafor Alom, Alikhali Md. Ashraf Ali, Alikhali Kader Hoshen, Alikhali Golam Azam, Alikhali Mohammad Hossain, Alikhali</p> 

		<p>Rashid Ahmed, Alikhali Farid Alam, Alikhali Badsha Mia, Alikhali Foyez Ahmed, Alikhali Helal Uddin, Alikhali Jamal Ahmed, Alikhali Jakir Ahmod, Alikhali Hafez Ahmod, Alikhali</p> <p><b>Discussion</b></p> <ul style="list-style-type: none"> <li>They were very much concern about how they can live in their father resident where they have been living from generation to generation and now it is going to turn into an industrial zone.</li> <li>They make concern about heat which can damage their serene life.</li> <li>Their main concern was that many person become unemployed as they worked in salt field, so if there's any opportunity please take them in your daily works.</li> <li>They want work opportunity in the plant site as the land is getting lower day by day and the amount of production of the land.</li> <li>Meaningful community development in the affected areas was demanded.</li> </ul>
5	FGD with Landowners Group	<p>Shahjahan, Alikhali Nurul Haq, Alikhali Ejhar Mia, Alikhali Md. Yousuf, Alikhali Monsur Rahman, Alikhali Liakat Ali, Alikhali Showkat Ali, Alikhali Mohammad Ali, Alikhali Abdur Rahim Shikder, Alikhali Jolal Ahmod, Alikhali Sorowar Kamal Shikder, Alikhali Jashim Uddin, Alikhali Sorowar Kamal Shikder, Alikhali</p> 

		<p>Abul Monzur Shikder , Alikhali</p> <p><b>Discussion</b></p> <ul style="list-style-type: none"> <li>✚ They were very much concern about how they can live in their father resident where they have been living from generation to generation and now it is going to turn into an industrial zone.</li> <li>✚ They asked the authority to keep their land same as before at the end of the contract period.</li> <li>✚ They make concern about heat which can damage their serene life.</li> <li>✚ Their main concern was that many person become unemployed as they worked in salt field, so if there's any opportunity please take them in your daily works.</li> <li>✚ They want work opportunity in the plant site as the land is getting lower day by day and the amount of production of the land.</li> <li>✚ They also urges for the development of a hospital as the plant authority told about that.</li> <li>✚ They also told about the future development of the area which can be circulated as commercial zone.</li> <li>✚ Meaningful community development in the affected areas was demanded.</li> </ul>
6	FGD with Farmer Group	<p>Md. Ashraf Ali, Alikhali</p> <p>Kader Hoshen, Alikhali</p> <p>Badsha Mia, Alikhali</p> <p>Jakir Ahmod, Alikhali</p> <p>Nurul Hakim, Alikhali</p> <p>Shahjahan, Alikhali</p> <p>Ejhar Mia, Alikhali</p> <p>Jashim Uddin, Alikhali</p> <p>Ramiz Ahmed, Alikhali</p> <p>Md. Rasel, Alikhali</p> <p>Farid Alam, Alikhali</p> <p>Meher Ali, Alikhali</p> 

		<p><b>Discussion</b></p> <ul style="list-style-type: none"> <li>✚ They were very much concern about how they can live in their father resident where they have been living from generation to generation and now it is going to turn into an industrial zone.</li> <li>✚ They make concern about heat which can damage their serene life.</li> <li>✚ They told that it is a good news for them that there's a power plant and it is solar technology.</li> <li>✚ They are also happy as there would a place for community gatherings and a bazar can be formed beside it.</li> <li>✚ Their main concern was that many person become unemployed as they worked in salt field, so if there's any opportunity please take them in your daily works.</li> <li>✚ They want work opportunity in the plant site as the land is getting lower day by day and the amount of production of the land.</li> <li>✚ Meaningful community development in the affected areas was demanded.</li> </ul>
7	Fire Service and Civil Defense, Cox's Bazar.	<p>Mr. Kiriti Barua Station Officer (SO) Fire Service and Civil Defense, Teknaf, Cox's Bazar Mobile: 01813-963241</p> <ul style="list-style-type: none"> <li>✚ Hidden point must be installed</li> <li>✚ Water reservation is necessary</li> <li>✚ Hose drill must be installed</li> <li>✚ Extinguisher at around 500m2</li> <li>✚ must be placed with CO, heat detector and other accessories</li> <li>✚ First aid, fix alarm system, PA system, Springer system is needed</li> <li>✚ Every 6 month interval a training to the staff on fire equipment is needed</li> </ul>

	<ul style="list-style-type: none"> <li>✚ Self-arrangement of all equipment is the best arrangement</li> <li>✚ Heat detector is needed</li> <li>✚ Panel board system should be installed properly and which will be operational during fire disaster</li> <li>✚ The door should be in two hour protected type</li> <li>✚ Foam tender transit will be needed for the emergency period especially for the power cutting off.</li> <li>✚ A staff training on six moth basis by the fire station is needed.</li> </ul>	
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A stakeholder consultation meeting on Social and Environmental Impact Assessment (ESIA) of the Technaf Solartech Energy Limited was organized by BCAS at the plant premise on 3rd October, 2017. Total 24 local people from Alikhali, South Nhilla belonging to different occupational groups (e.g. businessman, service holder, labor, farmer etc.) attended the consultation meeting. The participation list is presented in the following table.

**Table 13.9: List of People who participated in the Consultation Meeting**

S.N.	Name of the Participant	Area	Mobile Number	Occupation
1	H K Anwar	Alikhali	01746458844	Chairman
2	Jamal Hossain	Alikhali	01819994172	Farmer
3	Zafor Alam	Alikhali	01814480551	Service Holder
4	Zakir Ahmed	Alikhali	01811821350	Farmer
5	Zafor Alam	Alikhali	01829258376	Farmer
6	Rashid Ahmed	Alikhali	No	Labour
7	Momtaz Hossain	Alikhali	01854005702	Business
8	Ejhar Mia	Alikhali	No	Farmer
9	Kadir Hossain	Alikhali	No	Farmer
10	Shafiqul Islam Chy.	Alikhali	01819519472	Business
11	Ahmad Hossain	Alikhali	01876221328	Business
12	Helal Uddin	Alikhali	01720298421	Business
13	Ali Hossain	Alikhali	01877550891	Business

S.N.	Name of the Participant	Area	Mobile Number	Occupation
14	Liakot Ali	Alikhali	01854425548	Business
15	Ummat Ali	Alikhali	01748213400	Farmer
16	Nurul Huda	Alikhali	01883014267	Farmer
17	Dalilur Rahman	Alikhali	01826577180	Farmer
18	Selim Ullah	Alikhali	01818416453	Farmer
19	Osman	Alikhali	01854423300	Labour
20	Rashed	Alikhali	01715611836	Farmer
21	Md. Rafique	Alikhali	01715694548	Farmer
22	Dildar Ahmad	Alikhali	01710807730	Farmer
23	Kamal Uddin	Alikhali	01820536528	Business
24	Mr. Rafique	Alikhali	01517385166	Farmer
25	Md. Imtiaz Sharif	BCAS	01716640994	Service Holder
26	Azmari Akhter	BCAS	01716640994	Service Holder
27	Md. Saifullahil-Azom	BCAS	01717004105	Service Holder
28	Mahmudul Hasan	TSEL	01618555801	Service Holder
29	Mainul Haque	TSEL	01684854035	Service Holder
30	Abdullah Al Aziz	TSEL	01812342070	Service Holder



## Stakeholder Engagement Plan

### Introduction

Stakeholders are the entities those have stake or share of a project and who are affected directly or indirectly by a project. Generally individual, group, any organization or community within a particular projects influence area are considered as stakeholders of the project. The World Bank Operational Policies suggests that, the operating company should have a Stakeholder Engagement Plan (SEP) for better development practices.

According to IFC Stakeholder Engagement Practice Book, a good Stakeholder Plan should be:

- ✓ Well targeted towards its stakeholders
- ✓ Should properly inform about the actions and key concerns
- ✓ Gender inclusive that ensures proper participation of women representatives
- ✓ Free from biasness
- ✓ Meaningful to its objectives and strategies
- ✓ Properly documented
- ✓ Continuous

### The Project

Technaf Solartech Energy Limited (TSEL) is developing a 20 MW Solar based plant at Alikhali, South Nhillia, Teknaf, Cox's Bazar. Since the required land for the project was bought from the willing sellers, and the economic use of the land parcels use not that effective, no negative impact has been observed from the view point of the former land owners – rather the landowners have been found be doing better with the money received through selling the lands to TSEL. Since, the land parcels were not productive, there was neither any sharecropper nor any agricultural laborer working in those land parcels. However, the neighboring residents of the plant are going to be affected both during the construction phase due to noise, dust etc. and during operation phase due to noise and emissions. Hence, Good Industrial Practice (GIP) refers that a stakeholder engagement plan is required to minimize or mitigate the adverse impacts of the project PAHs and the neighboring community.

### Objectives of Stakeholder Engagement Plan

Stakeholder Engagement Plan is considered to be a useful tool for maintaining communications between the project authority and its stakeholders. It will help to improve and facilitate decision making of the local community and will create an atmosphere in such a way so that the stakeholder groups are provided with sufficient opportunities to improve their livelihood.

The objectives for the Stakeholder Engagement Plan should be:



- ✓ To disseminate the SEP to the community and the PAHs.
- ✓ To provide a proper guidance for stakeholder engagement in such a way so that it meets the international standards
- ✓ To identify and monitor the project stakeholders through the SEP
- ✓ To identify and resolve the grievances in an efficient way
- ✓ To engage with the stakeholders on community development activities to be executed by TSEL and also on environmental and social issues
- ✓ To establish a respectful and long lasting relationship with the community and stakeholders

### **Stakeholder Engagement Process**

The following flowchart represents the major components of Stakeholder Engagement Process:



**Figure 15: Flowchart of the major components of Stakeholder Engagement Process**

## **Identification of Stakeholders**

Identification of different level of stakeholders is the primary requirement for the engagement plan. For a large scale project like TSEL there can be different level of stakeholders. From the analysis of project planning, the stakeholders can be classified into the four following categories:

### **Project Affected Households (PAH)/Groups**

As mentioned earlier, the required land for the project was taken as lease from the willing land owners, and the economic use of the land parcels use not that effective, no negative impact has been observed from the view point of the land owners – rather the landowners have been found be doing better with the money received through leasing the lands to TSEL. The land parcels were basically salt fields, in which local day laborers used to work for only three months in a year. About 100 day laborers were employed at the project site formerly. TSEL confirmed engagement of at least 100 local laborers during the whole project tenure

It is to be noted that very few neighboring residents of the plant area are going to be affected during the construction phase due to noise, dust, outsider labor involvement etc. So along with vulnerable households, the neighboring community will also be considered as important stakeholder groups and the early engagement strategy should be applied for them.

### **Interested Group**

Generally, community people including local elites, politicians, civil society, businessmen, sub-contractors or general community representatives will be considered as the interested group of stakeholders.

### **Strategic Partners**

Since the very inception to smooth operational level, this project will engage several types of entities who will work as strategic partners for the project. The major strategic partners for TSEL are:

- ✓ The Engineering, Procurement and Construction (EPC) Contractor (if engaged)
- ✓ Design, Supervision and Monitoring Consultants (if engaged)
- ✓ Social & Environmental Consultants
- ✓ Social & Environmental Monitoring/Auditing Consultants
- ✓ NGOs: Social service delivery (if required)

### **Government Entities**

Government entities include National and Local Government Officials including Teknaf Upazila Parishad, 2 No. (South) Nhilla Union Parishad, Department of Environment, BPDB, REB, Fire Service, Police Stations etc. and different license authorities.

## Stakeholder Profiling

An effective stakeholder engagement plan can be attained when it is properly documented and is aware about each and every individual stakeholder. To do so, profiling of stakeholders can be the key to better SEP. The following template can be used for future level stakeholder profiling.

**Table 13.10: Template of future level stakeholder profiling**

Type of Stakeholders	Influence and Risk Level					Key Information				
Affected Households (AHs)	<i>Influence Level:</i>					<b>Name of Household Head:</b>				
	High					Address:				
	Medium					Occupation:				
	Low					Contact:				
						Engagement Method:				
						<i>Socio-Economic Information</i>				
<i>Risk Level:</i>						<b>Name of Family Member</b>	<b>Age</b>	<b>Education</b>	<b>Occupation</b>	<b>Key Concerns</b>
1	2	3	4	5						
Interested Group	<i>Influence Level:</i>					<b>Type of Group:</b>				
	High					Address:				
	Medium					Key Concerns:				
	Low					Engagement Method:				
	<i>Risk Level:</i>									
	1	2	3	4	5					
Strategic Partners	<i>Influence Level:</i>					<b>Type of Partners:</b>				
	High					Address:				
	Medium					Key Concerns:				
	Low					Engagement Method:				
	<i>Risk Level:</i>									
	1	2	3	4	5					
Government Entities	<i>Influence Level:</i>					<b>Type of Entity:</b>				
	High					Address:				
	Medium					Key Concerns:				
	Low					Engagement Method:				
	<i>Risk Level:</i>									
	1	2	3	4	5					

## **Disclosure of Project Information**

The main aim of the stakeholder engagement is to disclose project information as clearly as possible. The technical issues should be communicated in a manner that is comprehensible to the stakeholders and should reflect transparency accountability.

## **Consultation and Participation**

World Bank Operational Policy (OP) 4.12 states that, affected persons should be meaningfully consulted and should have opportunities to participate in planning and implementing development programs. So to ensure meaningful consultation, the project will initiate some consultation strategies which may include Focus Group Discussion (FGD), structured and semi structured questionnaire, meeting, Participatory Rural Appraisal (PRA), Rapid Rural Appraisal (RRA), visit, Key Informant Interview (KII), Community Mapping, assessment which will be determined based on the requirements of the Project. Most importantly, proper documentation of the consultation events should be regularly maintained and updated.

## **Negotiation and Partnership**

Good Industrial Practice suggests that, project within a community should be people intensive. Stakeholder's involvement within project by creating opportunities of partnership is required to be considered with great importance. Community Engagement strategies such as engagement of community people as representatives in committees, involvement within various events led by project will enhance peoples right in the decision making process.

## **Grievance Redress Management**

Grievance Redress management is an important task for the implementation of Stakeholder Engagement. From the land lease process, and then construction to operation, various grievances can be raised from the community, particularly for environmental and social aspects. So, to address and resolve grievances properly, the Company should have a Grievance Redress Plan or Mechanism. The plan will describe grievance address procedure, channel of communication, responsible authority to resolve and timeframe for mitigation any grievances which will be raised by the community, will be referred either to Joint Committee for Community Relations (JCCR) or to GRC-Plant based on the type of the grievances. If the GRC-Plant fails to resolve the grievance within one month or deems to transfer, it will be transferred to GRC-Corporate for better outcomes.

## **Preparation and Implementation of Corrective Action Plans**

Corrective Action Plans are the initiatives that take place as an outcome of the consultations and engagement. For TSEL, GRM, Environmental and Social Impact Assessment and Legal Register will be used as guiding documents for making the corrective action plan.

## Monitoring and Reporting

The SEP of TSEL should have provisions of monitoring and reporting of stakeholder engagement activities. The engagement strategies, timeline, stakeholder categories, newly engaged stakeholders, public consultations, and grievance status, major concerns should be properly addressed and outcomes should be documented. In addition to the activities, One Yearly Monitoring Report should be prepared and submitted to the lender/financier mentioning the status and updates of Stakeholder Engagement.

## Responsible Departments/Personnel

Following departments or personnel should be responsible for the implementation of Stakeholder Engagement Plan for TSEL.

TSEL Site Office for Site level assistance or TSEL Corporate Office for corporate level assistance

- ✓ Designated personnel for site level assistance during construction
- ✓ TSEL EHS Personnel for direct engagement
- ✓ Local NGO (if engaged) assigned by TSEL for social service delivery
- ✓ Any other parties assigned by TSEL

The following template will be used for Stakeholder Engagement and will be updated regularly.

**Table 13.11: Stakeholder Engagement Process for Project Affected Household/Groups**

Stakeholder Type	Engagement Process/Strategy	Discussed/ Raised Issues	Issues referred to the GRC or JCCR	Action Taken	Timeline
Landowners	Meeting				
	FGD				
	Personal Interview				
	KII				
Neighboring Community	Meeting				
	FGD				
	Personal Interview				
	KII				
School Authority	Meeting				
	FGD				
	Personal Interview				
	Visit				

**Table 13.12: Stakeholder Engagement Process for Others**

Stakeholder Type	Engagement Process	Discussed/Raised Issues	Action Taken	Timeline
NGO (if engaged)	Service Delivery to community people			
	Visit to NGO office			
	Meeting			
JCCR	Meeting			
	Visit			
Local Subcontractors (if engaged)	Meeting			
Local elites /politicians	FGD			
	Meeting			
Plant staff and workers	Grievance lodged			
	Meeting			
	Plant visit			

### Plan for Further Consultation and Community Participation during Project Implementation

The proposed plan for future public consultations is as follows:

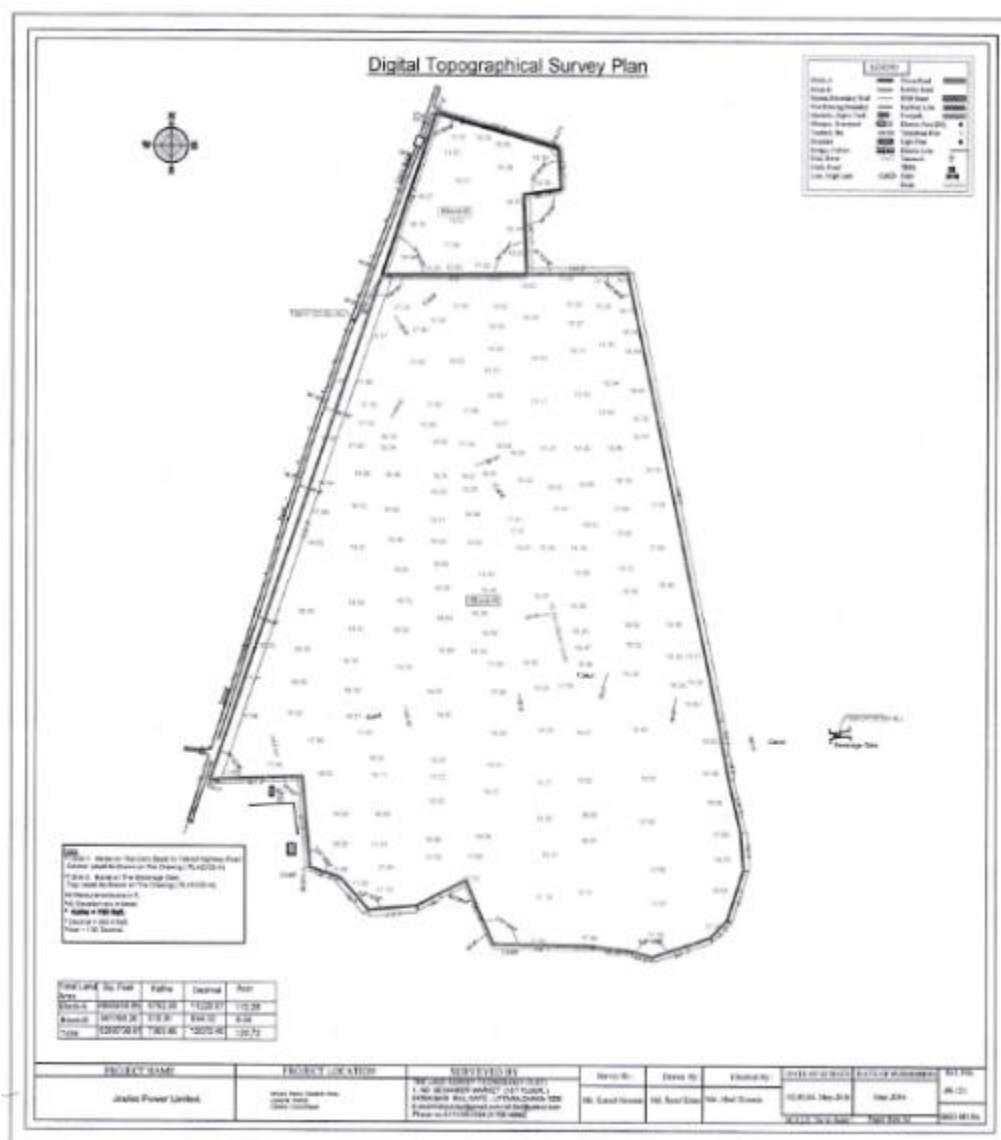
**Table 13.13: The proposed plan for future public consultations**

Sl No	Phase	Issues	Timeline
1	Detailed/Check survey	Public Meeting and individual affected household survey will be carried out as per the monitoring programs.	In every six month
2	Construction Phase	Localized group meetings, Distribution of information leaflets and brochures, Public display	Throughout construction period
3	Operation Phase	Information brochures, Operation field offices in the affected localities, Monitoring and providing response to public enquiries, Press releases	Continuous during Project operations

## Annex 10: The Topographic Survey Report of the Project Site and Elevation of the Project Command Area

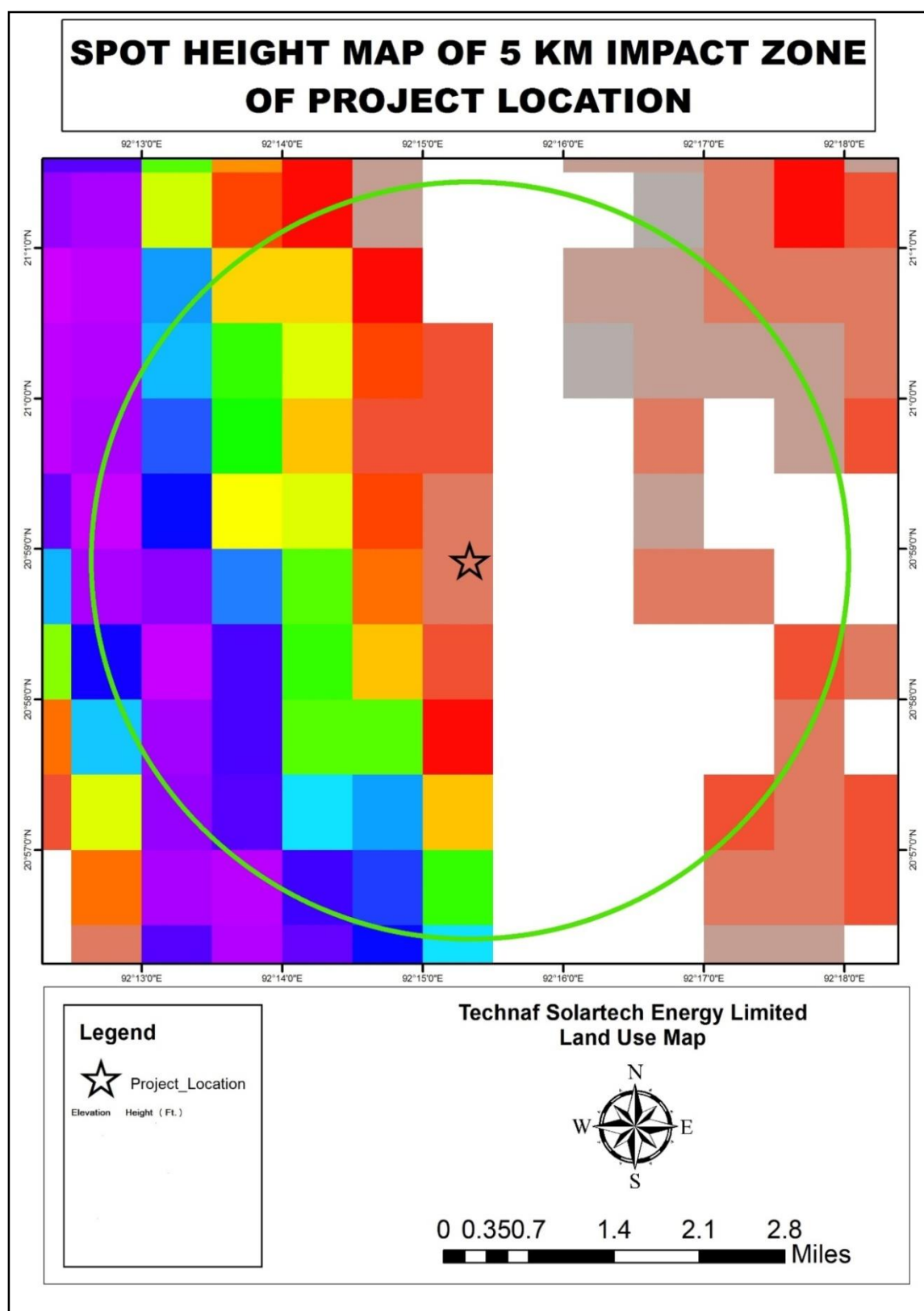
## Landscape and Topography of the Project Site

This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins which are neutral to slightly acidic in reaction. General soil types include predominantly Grey Floodplain soils. Organic matter content is low in ridges and moderate in basins. The Topographic Survey Report of the Project Site and Elevation of the Project Command Area are shown in Figure 16 & Map 15 respectively.



### Figure 16: Topographic Survey Report of the Project Site





Map 15: Elevation of the Project Command Area

## Annex 11: Data Collection on Biodiversity within the impact zone of TSEL project

### Terrestrial Flora

The plant species recorded from the impact zone (5 km radius) of the TSEL along with their IUCN status are given in Table 13.14 below:

**Table 13.14: List of Plant Species Recorded from the Impact Zone of the TSEL, Alikhali, South Nhilla, Teknaf, Cox's Bazar.**

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
1	Jack Fruit	Katal	<i>Artocarpus heterophyllus</i>	Tree	LC
2	Ladies Finger/Okra	Verendi/dheros	<i>Abelmoschus esculentus</i>	Shrub	LC
3	Giant Bulrush	Kasuru	<i>Actinoscirpus grossus</i>	Herb	LC
4	Gum Arabic Tree	Babla	<i>Acacia nilotica</i>	Tree	LC
5	Silk Trees	Koroi	<i>Albizia richardiana</i>	Tree	LC
6	Wood Apple	Bhel	<i>Aegle marmelos</i>	Tree	LC
7	Bombay Hemp	Agacha	<i>Agave cantula</i>	Herb	LC
8	Bailly Great Weed	Ochunti	<i>Ageratum conyzoides</i>	Herb	LC
9	Chinese Evergreens	Pata Bahar	<i>Aglaonema marantifolium</i>	Herb	LC
10	Garlic	Peaj	<i>Allium sativum</i>	Herb	LC
11	Giant Taro	Mankachu	<i>Alocasia macrorrhizos</i>	Herb	LC
12	Red Amaranth	Lal Shak	<i>Amaranthus gengeticus</i>	Herb	LC
13	Green Amaranth	Data Shak	<i>Amaranthus viridis</i>	Herb	LC
14	Walking Fern	Dhekia Shak	<i>Ampelopteris prolifera</i>	Herb	LC
15	Pea Nt	Badam	<i>Arachis hypogaea</i>	Herb	LC
16	Betel Palm	Supari	<i>Areca catechu</i>	Tree	LC
17	Monkey Fruit	Deaua	<i>Artocarpus lacucha</i>	Tree	LC
18	Star fruit	Kamranga	<i>Averrhoa</i>	Tree	LC

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
			<i>carambola</i>		
19	Margosa/Neem Tree	Neem Tree	<i>Azadirachta indica</i>	Tree	LC
20	Burmese Grape	Lot-Kon	<i>Baccaurea ramiflora</i>	Tree	LC
21	Dwarf Bacoba	Brammi	<i>Bacopa monieri</i>	Herb	LC
22	Indian Timber Bamboo	Bash	<i>Bambusa tulda</i>	Shrub	LC
23	Spinach	Pui Shak	<i>Basella alba</i>	Herb	LC
24	Ash Gourd/White Gourd/Winter Gourd	Chal Kumra	<i>Benincasa hispida</i>	Herb	LC
25	Sugar Palm	Tal	<i>Borassus flabellifer</i>	Tree	LC
26	Paper Flower	Kagoj Phool	<i>Bougainvillea peruviana</i>	Shrub	LC
27	Rape	Sarisha	<i>Brassica napus</i>	Herb	LC
28	Water grass	Ghash	<i>Bulbosatylis barbata</i>	Herb	LC
29	Cane	Beta	<i>Calamus rotang</i>	Shrub	LC
30	Soap Bush	Ghash	<i>Calibanus hookeri</i>	Herb	LC
31	Crown Flower	Akondo	<i>Calotropis gigantea</i>	Shrub	LC
32	Chili Peppers	Morich	<i>Capsicum annum</i>	Shrub	LC
33	Pepper	Morich	<i>Capsicum frutescens</i>	Shrub	LC
34	Papaya	Pepe	<i>Carica papaya</i>	Tree	LC
35	Cassia Tree	Minjiri	<i>Cassia siamea</i>	Tree	LC
36	Indian Pennywort	Thankuni	<i>Centella asiatica</i>	Herb	LC
37	Lemon	Lebu	<i>Citrus aurantifolia</i>	Shrub	LC
38	Pomelo	Jambura	<i>Citrus grandis</i>	Tree	LC
39	Ivy Gourd	Telakucha	<i>Coccinia cordifolia</i>	Herb	LC
40	Coconut Tree	Narikel	<i>Cocos nucifera</i>	Tree	LC
41	Garden Croton	Pata Bahar	<i>Codiaeum variegatum</i>	Shrub	LC

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
42	Common Coleus	Pata Bahar	<i>Coleus Scutellarioides</i>	Herb	LC
43	Taro	Kochu	<i>Colocasia esculenta</i> Black	Herb	LC
44	Taro	Kochu	<i>Colocasia esculenta</i> White	Herb	LC
45	Jute	Deshi Pat	<i>Corchorus capsularis</i>	Shrub	LC
46	Coriander	Dhonia	<i>Coriandrum sativum</i>	Herb	LC
47	Pumpkin	Misti Kumra	<i>Cucurbita maxima</i>	Herb	LC
48	Indian Bread Root	Lata Kosturi	<i>Cullen corylifolium</i>	Herb	EN
49	Turmeric	Holud	<i>Curcuma longa</i>	Herb	LC
50	Nabhali	Ghash	<i>Cyanotis cristata</i>	Herb	LC
51	Bermuda Grass	Dūrvā Grass	<i>Cynodon dactylon</i>	Herb	LC
52	Flat-Sedge	Chanch	<i>Cyperus compressus</i>	Herb	LC
53	Thorn Apple	Dhutura	<i>Datura metel</i>	Shrub	LC
54	Elephant Apple	Chalta	<i>Dellenia indica</i>	Tree	LC
55	Royal Poinciana/Flamboyant	Krisnochura	<i>Delonix regia</i>	Tree	LC
56	Malabar Ebony/Pale Moon Ebony	Gaub	<i>Diospyros perigrina</i>	Tree	LC
57	Edible Fern	Dhekia Shak	<i>Diplazium esculentum</i>	Herb	LC
58	Water Hyacinth	Kochuripana	<i>Eichhornia crassipes</i>	Herb	LC
59	Ladyfinger Cactus	Cactus	<i>Echinocereus pentalophus</i>	Herb	LC
60	Cylon Olive/Indian Olive	Jalpai	<i>Elaeocarpus robustus</i>	Tree	LC
61	Chinease Water Chestnut	Pānaphala	<i>Eleocharis dulcis</i>	Herb	LC
62	Long Coriander	Bon Dhonia	<i>Eryngium foetidum</i>	Herb	NE

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
63	Gum Trees	Eucalyptus	<i>Eucalyptus camaldulensis</i>	Tree	NE
64	Bean	Sheem	<i>Lablab purpureus</i>	Herb	LC
65	Bottle Gurd	Lau	<i>Lagenaria siceraria</i>	Herb	LC
66	Wood Apple/Elephant Apple	Bael	<i>Limonia acidissima</i>	Tree	LC
67	Tomato	Tomato	<i>Lycopersicon esculentum</i>	Herb	LC
68	Indian Banyan	Baut	<i>Ficus bengalensis</i>	Tree	LC
69	Hairy Fig/Devil Fig	Kakdumur/Dumurr	<i>Ficus hispida</i>	Tree	LC
70	Pipal/Bo-Tree/Peepul Tree	Ashwath/Pipul	<i>Ficus religiosa</i>	Tree	LC
71	Jasmine	Gandharaj	<i>Gardenia jasminoides</i>	Tree	LC
72	Sunflower	Surjamukhi	<i>Helianthus annuus</i>	Herb	LC
73	Indian Heliotrope	Hatisur	<i>Heliotropium indicum</i>	Herb	LC
74	China Rose	Joba	<i>Hibiscus rosa-sinensis</i>	Shrub	LC
75	False Rubber Tree	Kurchi	<i>Holarrhena floribunda</i>	Tree	LC
76	Water Spinach	Kolmishak	<i>Ipomoea aquatica</i>	Herb	LC
77	Sweet Potato	Misti Alu	<i>Ipomoea batatas</i>	Herb	LC
78	Pink Morning Glory	Dhol Kolmi	<i>Ipomoea fistulosa</i>	Herb	LC
79	West Indian Jasmine	Rangan	<i>Ixora chinensis</i>	Shrub	CD
80	Arabian Jasmine	Beli	<i>Jasminum duplex</i>	Shrub	LC
81	Gendarussa	Jagatmadan	<i>Justicia gendarussa</i>	Shrub	LC
82	Green Kayllinga	Ghash	<i>Kayllinga brevifolia</i>	Herb	LC
83	Henna Tree	Mehedi	<i>Lawsonia</i>	Shrub	LC

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
			<i>inermis</i>		
84	Honey weed/Siberian Motherwort	Roktodron	<i>Leonurus sibiricus</i>	Herb	LC
85	Common Leucas	Shetodron	<i>Leucas ciliata</i>	Herb	LC
86	Litchi/Liechee	Litchu	<i>Litchi chinensis</i>	Tree	LC
87	Kamala Tree	Soto Bura	<i>Mallotus roxburghianus</i>	Tree	LC
88	Nodding Malvaviscus	Soto Joba	<i>Malvaviscus arboreus</i>	Shrub	LC
89	Mango Tree	Aam	<i>Mangifera indica</i>	Tree	LC
90	Sapodilla/Chiku	Sofeda	<i>Manilkara achras</i>	Tree	LC
91	Malabar Melastome	Bon Tejpatha	<i>Melastoma malabathricum</i>	Herb	LC
92	Lacy Fern	Fita Dhekia	<i>Microlepia speluncea</i>	Herb	LC
93	Sleepy Plant/Dormilones/Shy Plant	Lajjabati	<i>Mimosa Pudica</i>	Herb	LC
94	Spanish Cherry/ Medlar/Bullet Wood	Bokul	<i>Mimusops elengi</i>	Tree	LC
95	Bitter Melon/Bitter Gourd/Bitter Squash	Karolla/Uchhe/Us ta	<i>Momordica charantia,</i>	Herb	LC
96	Flowering Banana/Ornamental Banana	Kala	<i>Musa ornata</i>	Tree	LC
97	Banana Plan	Kancha Kala	<i>Musa paradisiaca</i>	Tree	LC
98	Banana Plant	Kala	<i>Musa sapientum</i>	Tree	LC
99	Holy Basil	Tulshi	<i>Ocimum sanctum</i>	Shrub	LC
100	Paddy	Dhan	<i>Oryza sativa</i>	Herb	LC
101	Creeping Woodsorrel/Sleeping Beauty	Amrul	<i>Oxalis corniculata</i>	Herb	LC
102	Skunkvine/Chinese Fever Vine	Gandhabhaduli	<i>Paederia foetida</i>	Herb	LC

No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
103	Pepperwort	Panimarich	<i>Persicaria hydropiper</i>	Herb	LC
104	Chir Pine	Pine	<i>Pinus longifolia</i>	Tree	LC
105	Silver Date Palm/Sugar Date Palm	Khajur/Khejur	<i>Phoenix sylvestris</i>	Tree	LC
106	Betel	Pan	<i>Piper betle</i>	Herb	LC
106	Indian Long Pepper	Pipul/Pipla	<i>Piper longam</i>	Herb	LC
108	Wild Betel	Bon Pan	<i>Piper sylvaticum</i>	Herb	LC
109	Knotweed/Knotgrass/Bistort/Tear thumb	Biskatali/Panimarich	<i>Polygonum tomentosum</i>	Herb	LC
110	Frangipani/Red-Jasmine/Temple Tree	Gorur Champa/Dalan Phul	<i>Plumeria acuminata</i>	Tree	LC
111	Guava/Lemon Guava	Payra	<i>Psidium guajava</i>	Tree	LC
112	Chinese Brake/Chinese Ladder Brake	Dhekia Shak	<i>Pteris vittata</i>	Herb	LC
113	Low Flat-Sedge	Ghash	<i>Pycnus pumilus</i>	Herb	LC
114	Cursed Buttercup/Celery-Leaved Buttercup	Palik/Podika/Kandir	<i>Ranunculus scleratus</i>	Herb	LC
115	Rose	Golap	<i>Rosa centrifolia</i>	Shrub	LC
116	Rain Tree	Rain Tree	<i>Samanea saman</i>	Tree	LC
117	Viper's Bowstring Hemp/Snake Plant	Pata Bahar	<i>Sansevieria trifasciata</i>	Herb	NE
118	Sugarcane	Aakh	<i>Saccharum officinarum</i>	Herb	CD
119	Bur Tree/Canary Wood/Yellow Cheesewood	Kodom	<i>Sarcocephalus cordatus</i>	Tree	LC
120	Eggplant	Begun	<i>Solanum menlongena</i>	Shrub	LC
121	Garden Huckleberry	Tit Begun	<i>Solanum nigrum</i>	Shrub	LC
122	Potato	Alu	<i>Solanum tuberosum</i>	Herb	LC
123	Phakphet	Marhatitiga	<i>Spilanthes paniculata</i>	Herb	LC
124	Spinach	Palong Shak	<i>Spinacia</i>	Herb	LC



No.	Common Name	Bangla Name	Scientific Name	Type	IUCN Status*
			<i>oleracea</i>		
125	Golden Apples	Amra	<i>Spondias pinnata</i>	Tree	LC
126	West Indian Mahogany	Mahogany	<i>Swietenia mahagoni</i>	Tree	LC
127	Chivit/Civit	Civit	<i>Swintonia floribunda</i>	Tree	LC
128	Black Plum	Jam	<i>Syzygium cumini</i>	Tree	LC
129	Java Apple/Wax Jambu	Jamrul	<i>Syzygium samarangense</i>	Tree	NE
130	French Marigold	Gada	<i>Tagetes patula</i>	Herb	LC
131	Tamarind	Tetul	<i>Tamarindia indica</i>	Tree	LC
132	Peacock Feathers	Thuja	<i>Thuja orientalis</i>	Shrub	LC
133	Yellow Or Chebulic Myrobalan	Horitoki	<i>Terminalia chebula</i>	Tree	LC
134	Bengal Arum	Ghet Kachu	<i>Typhonium trilobatum</i>	Herb	LC
135	Madagascar Periwinkle/Rosy Periwinkle	Noyon Tara	<i>Vinca rosea</i>	Shrub	LC
136	Rough Cocklebur/Common Cocklebur	Ghagra/Lehra/Bic haphal	<i>Xanthium indicum</i>	Shrub	LC
138	Corn	Bhutta	<i>Zea mays</i>	Herb	CD
139	Chinese Date/Chinese Apple/ Indian Jujube	Boroi/Kul	<i>Zizyphus mauritiana</i>	Tree	LC

\*LC = Least Concern, NE= Not Evaluated, CD= Conservation Dependent according to IUCN Bangladesh (2000).

### Terrestrial Fauna

There are 42 species of amphibian species, 157 reptilian species, 124 species of mammals and 718 bird species reported from Bangladesh (Khan 2010, Sarker and Sarker 1988). However, in the current study, a total of 9 amphibians, 17 reptiles, 10 mammals and 43 birds were identified in the impact zone of the project.

A total of 9 amphibian species were identified in the present project area (Table 4.3). On the basis of frequency of occurrence or relative abundance, Common Toad, Skipper Frog, Indian Bull Frog and Cricket Frog were commonly (55.55%) found and less common (33.33%)

species were Pierries Cricket Frog, Nepal Cricket Frog etc. Furthermore, Ornate Narrow-mouthed Frog was rare. Species found on the impact areas were Least Concern (LC) on the basis of IUCN-Bangladesh (2000) threatened category. Although Cricket Frogs have not been evaluated by IUCN Bangladesh yet but the species of cricket frog found in the impact areas were not subject to any threats. Table 13.15 depicts the List of Amphibian species identified in the impact zone of the TSEL, Alikhali, South Nhilla, Teknaf, Cox's Bazar.

**Table 13.15: List of Amphibian species identified in the impact zone of the TSEL, Alikhali, South Nhilla, Teknaf, Cox's Bazar.**

No	Order	Family	Species	English Name	Local Name	IUCNStatus*
1	Anura	Bufonidae	<i>Duttaphrynus melanostictus</i>	CommonToad	Kuno Bang	LC
2		Dicroglossidae	<i>Euphlyctis cyanophylctis</i>	Skipper Frog	Kotkoti Bang	LC
3			<i>Euphlyctis hexadactylus</i>	Green Frog	Sabuj Bang	EN
4			<i>Fejervarya syhadrensis</i>	Syhadris Cricket Frog	Syhadrir Jhijhi Bang	LC
5			<i>Fejervarya teraiensis</i>	Terrei Cricket Frog	Terrei Jhijhi Bang	NE
6			<i>Fejervarya pierrei</i>	Pierries Cricket Frog	Pierrei's Jhijhi Bang	NE
7			<i>Fejervarya nepalensis</i>	Nepal cricket frog	Choto Jhijhi Bang	NE
8			<i>Hoplobatrachus tigerinus</i>	Indian BullFrog	Sona Bang	NE
9		Microhylidae	<i>Microhyla ornata</i>	Ornate Narrow-mouthed Frog	China Bang	LC

\*VU = Vulnerable; EN = Endangered; CR = Critically Endangered, DD=Data Deficient, NE=Not Evaluated, according to IUCN Bangladesh, 2000.

A total of 17 reptiles species were identified in the present study area (Table 13.16). On the basis of frequency of occurrence or relative abundance Common Garden Lizard, Common skink, Yellow-bellied House Gecko, Bengal Monitor, Common Smooth Water Snake, Checkered Keelback Water Snake, Common Smooth Water Snake and Spectacled Cobra were found as common (41.18%). Among them Tokay Gecko, Oriental Leaf- Toed Gecko,

Common Wolf Snake and Indian Rat Snake/Western Rat Snake were less common species (23.53%). Indian Roofed Turtle, Vine Snake, Striped Keelback, Monocellate Cobra and Common Indian Krait were found as rare species (35.29%). On the other hand, according to IUCN-Bangladesh (2000) Red list Threatened category Monocellate Cobra, Common Indian Krait species were Vulnerable and Common Smooth Water Snake was endangered.

**Table 13.16: List of Reptilian species identified in the impact zone of the TSEL, Alikhali, South Nhill, Teknaf, Cox's Bazar.**

No	Order	Family	Species	English Name	Local Name	IUCN Status*
1	Testudines (Chelonia)	Bataguridae/ Geoemydidae	<i>Pangshura tecta</i>	Indian Roofed Turtle	Kori Kaitta	LC
2	Squamata	Agamidae	<i>Calotes versicolor</i>	Common Garden Lizard	Roktochusha	LC
3		Scincidae	<i>Mabuya carinata</i>	Common skink	Anjon/Anchil	LC
4		Gekkonidae	<i>Gekko gekko</i>	Tokay Gecko	Takkok	VU
5			<i>Hemidactylus brookii</i>	Oriental Leaf-Toed Gecko	Choto Tiktiki	LC
6			<i>Hemidactylus flaviviridis</i>	Yellow-bellied House Gecko	Goda Tiktiki	LC
7			<i>Hemidactylus frenatus</i>	Common House Lizard	Dakchara Tiktiki	LC
8		Varanidae	<i>Varanus bengalensis</i>	Bengal Monitor	Painna Shap	LC
9		Colubridae	<i>Ahaetulla nasuta</i>	Vine Snake	Sutanoli Shap	LC
10			<i>Amphiesma stolatum</i>	Striped Keelback	Dora-shap	LC
11			<i>Enhydryis enhydryis</i>	Common Smooth Water Snake	Paina-shap	EN
12			<i>Lycodon aulicus</i>	Common Wolf Snake	Shadaraon Gharginni Shap	VU
13			<i>Xenocrohis piscator</i>	Checkered Keelback Water Snake	Dhora Shap	LC
14			<i>Ptyas mucosus</i>	Indian Rat Snake/Western Rat Snake	Daraj Shap	VU

No	Order	Family	Species	English Name	Local Name	IUCN Status*
15		Elapidae	<i>Naja kaouthia</i>	Monocellate Cobra	Gokhra Shap	VU
16			<i>Naja naja</i>	Spectacled Cobra	Khoia Gokhra Shap	VU
17			<i>Bungarus caeruleus</i>	Common Indian Krait	Kalkeotey	VU

\*VU = Vulnerable; EN = Endangered; CR = Critically Endangered, DD=Data Deficient, NE=Not Evaluated, according to IUCN Bangladesh, 2000.

A total of 10 mammalian species were identified in the impact area (Table 13.17). On the basis of frequency of occurrence or relative abundance Bengal Fox, Indian Grey Mongoose and House Rat were commonly (30%) found in the study area. Golden Jackal, Mole Rat, Greater Bandicoot Rat, Indian Flying Fox and Asian House Shrew were not common or less common (50%) in the study area. Rare (20%) species found in this area were Jungle cat and Five-Stripped Palm Squirrel. On the other hand according to IUCN-Bangladesh (2000) Red list Threatened category Jungle Cat categorized as endangered.

**Table 13.17: List of Mammals identified in the impact zone of the TSEL, Alikhali, South Nhilla, Cox's Bazar.**

No	Order	Family	Species	English Name	Local Name	IUCN Status*
1	Carnivora	Canidae	<i>Canis aureus</i>	Golden Jackal	Pati Shial/Shial	VU
2			<i>Vulpes bengalensis</i>	Bengal Fox	Khek Shial	VU
3		Felidae	<i>Felis chaus</i>	Jungle cat	Ban Biral	EN
4		Herpestidae	<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Beji	VU
5	Rodentia	Muridae	<i>Bendicota bengalensis</i>	Mole Rat	Indur	LC
6			<i>Bendicota indica</i>	Greater Bandicoot Rat	Dhari indur	LC
7			<i>Rattus rattus</i>	House Rat	Indur	LC
8		Sciuridae	<i>Funambulus pennanti</i>	Five-Stripped Palm Squirrel	Katbirali	LC
9	Chiroptera	Pteropodidae	<i>Pteropus giganteus</i>	Indian Flying Fox	Bara badur	LC
10	Soricomorpha	Soricidae	<i>Suncus murinus</i>	Asian House Shrew	Chika	LC

\*VU = Vulnerable; EN = Endangered; CR = Critically Endangered, DD=Data Deficient, NE=Not Evaluated, according to IUCN Bangladesh, 2000.

A total of 39 birds species were found in the project area (Table 13.18). On the basis of frequency of occurrence or relative abundance commonly (66.67%) found species were Red Jungle fowl, Burmes Hoopoe, Common Kingfisher, Pied Kingfisher, Asian Cuckoo, House swift, Rock Pigeon, Spotted Dove, Little Cormorant, Great Cormorant, Indian Pond Heron, House Crow, Grey Drongo, White-rumped Shama, Jungle Myna, Common Myna, House sparrow etc. Bar-headed Duck, Red headed Bay Woodpecker, Black-rumped Flameback, Barn Owl, Brahminy Kite, Little egret, Hill Myna and Forest wagtail were not so common or less common (20.51%). Greylag Goose, Black-hooded Oriole, Rose-ringed Parakeet, Crested Goshawk and Blue-throated Barbet were found as rare species (12.82%). On the other hand according to IUCN-Bangladesh (2000) Red list Threatened category most of the species found in the impact area were categorized as Least Concern.

**Table 13.18: List of Birds identified in the impact zone of the TSEL, Alikhali, South Nhill, Cox's Bazar.**

No	Order	Family	Species	English Name	Local Name	IUCN Status*
1	Galliformes	Phasianidae	<i>Gallus gallus</i>	Red Junglefowl	Bon Morog/Murgi	LC
2	Anseriformes	Anatidae	<i>Anas poecilorhyncha</i>	Spotbill Duck	Pati hans	LC
3			<i>Anas indicus</i>	Bar-headed Duck	Raj hans	NE
4			<i>Anas anser</i>	Greylag Goose	Raj hans	NE
5	Piciformes	Picidae	<i>Blythipicus pyrrhotis</i>	Red headed Bay Woodpecker	Lalmatha kathtokra	LC
6			<i>Chrysocolaptes guttacristatus</i>	Greater Flameback	Baro-kathtokra	LC
7			<i>Dinopium bengalensis</i>	Black-rumped Flameback	kathtokra	NE
8		Megalaimidae	<i>Megalaima asiatica</i>	Blue-throated Barbet	Basanta Bauri	NE
9	Upupiformes	Upupidae	<i>Upupa epops</i>	Burmes Hoopoe	Hudhud Pakhi	LC
10	Coraciiformes	Alcedinidae	<i>Alcedo atthis</i>	Common Kingfisher	Sotto Machhranga	LC
11			<i>Ceryle rudis</i>	Pied	Pakra-	LC

No	Order	Family	Species	English Name	Local Name	IUCN Status*
				Kingfisher	Machhrnga	
12	Cuculiformes	Cuculidae	<i>Eudynamys scolopaceus</i>	Asian Cuckoo/Koel	Kokil	LC
13	Psittaciformes	Psittacidae	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Tia	LC
14	Apodiformes	Apodidae	<i>Apus nipalensis</i>	House swift	Ababil	LC
15	Strigiformes	Tytonidae	<i>Tyoto alba</i>	Barn Owl	Laxmi Pencha	NE
16	Columbiformes	Columbidae	<i>Columba livia</i>	Rock Pigeon	Jalali Kobutor	LC
17			<i>Stigmatopelia chinensis</i>	Spotted Dove	Tila Ghughu	LC
18	Falconiformes	Accipitridae	<i>Accipiter trivigathus</i>	Crested Goshawk	Baj	NE
19			<i>Haliaster indus</i>	Brahminy Kite	Shankho Cheel	NE
20	Podicipediformes	Phalacrocoracidae	<i>Microcarbo niger</i>	Little Cormorant	Paan-Kowri	LC
21			<i>Phalacrocorax carbo</i>	Great Cormorant	Brihat Paankowri	LC
22		Ardeidae	<i>Ardeola grayii</i>	Indian Pond Heron	Kani Bok	LC
23			<i>Egretta intermedia</i>	Little egret	Chhoto Bok	NE
24	Passeriformes	Corvidae	<i>Corvus leuallantii</i>	Jungle Crow	Daar Kak	LC
25			<i>Corvus splendens</i>	House Crow	Pati Kak	LC
26			<i>Oriolus xanthornus</i>	Black-hooded Oriole	Holdey Pakhi	LC
27			<i>Dicrurus macrocercus</i>	Grey Drongo	Fingey	LC
28		Muscicapidae	<i>Copsychus malabaricus</i>	White-rumped Shama	Shama	LC
29			<i>Copsychus saularis</i>	Oriental Magpie	Doel	LC
30		Sturnidae	<i>Sturnus contra</i>	Asian Pied Starling/Myna	Go Shalik	LC
31			<i>Sturna malabarica</i>	Chestnut-tailed Starling	Kath Shalik	LC

No	Order	Family	Species	English Name	Local Name	IUCN Status*
32			<i>Acridotheres fuscus</i>	Jungle Myna	Jhuti Shalik	LC
33			<i>Acridotheres grandis</i>	Bank Myna	Gang Shalik	LC
34			<i>Acridotheres tristis</i>	Common Myna	Bhat Shalik	LC
35			<i>Gracula religiosa</i>	Hill Myna	Moyna	LC
36		Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Bangla Bulbuli	LC
37		Passeridae	<i>Passer domesticus</i>	House sparrow	Chorai	LC
38		Ploceidae	<i>Ploceus philippinus</i>	Baya Weaver	Babui	LC
39		Motacillidae	<i>Dendronanthus indicus</i>	Forest wagtail	Bon-Kanjon	LC

\*VU = Vulnerable; EN = Endangered; CR = Critically Endangered, DD=Data Deficient, NE=Not Evaluated, according to IUCN Bangladesh, 2000.

#### Aquatic Fauna/Fish

The fish species recorded from the impact zone (5 km radius) of the TSEL along with their IUCN status are given in Table 13.19 below:

**Table 13.19: Fish species identified in the impact zone of the TSEL, Alikhali, South Nhilla, Teknaf, Cox's Bazar.**

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
1.	<i>Hypophthalmichthys molitrix</i> (Valenciennes in Cuvier and Valenciennes, 1844)	Silver carp	Silver carp	-
2.	<i>Hypophthalmichthys nobilis</i> (Richardson, 1845)	Bighead carp	Bighead carp	-
3.	<i>Ctenopharyngodon idella</i> (Valenciennes in Cuvier and Valenciennes, 1844)	Grass carp	Grass carp	-
4.	<i>carpio</i> (Linnaeus, 1758)	Common carp	Common carp	-
5.	<i>Cyprinus carpio</i> var <i>specularis</i> (Lacepède, 1803)	Mirror carp	Mirror carp	-



	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
6.	<i>Oreochromis mossambicus</i> (Peters, 1852)	Mozambique mouth-breeder	Tilapia	-
7.	<i>Pangasius hypophthalmus</i> (Sauvage, 1878)		Thai pangas	-
8.	<i>Clarias gariepinus</i> (Burchell, 1822)		African magur	-
9.	<i>Barbonymus gonionotus</i> (Bleeker, 1850)		Thai sarputi	-
10.	<i>Pisodonophis boro</i> (Hamilton, 1822)	Rice paddy eel	Kharu, Hijra	NO
11.	<i>Congresox telabonoides</i> (Bleeker, 1852)	Indian pike conger	Kamila	NO
12.	<i>Monopterusuchia</i> (Hamilton, 1822)	Cuchia, Rice eel	Kuchia, Kuicha, Kunche	VU
13.	<i>Tetraodon cutcutia</i> (Hamilton, 1822)	Ocellated puffer fish	Tepa, potka	NO
14.	<i>Chelanodon patoca</i> (Hamilton, 1822)	Milk spotted puffer	Potka, Fotka	NO
15.	<i>Xenentodon cancila</i> (Hamilton, 1822)	Freshwater garfish, Silver needlefish	Kakila, Kaikka	NO
16.	<a href="#"><i>Hyporhamphus limbatus</i></a> (Valenciennes in Cuvier and Valenciennes, 1847)	Congaturi halfbeak	Ek Thuita, Ek Thota	-
17.	<i>Aplocheilus panchax</i> (Hamilton, 1822)	Blue Panchax	Techoukka, Kanpona	NO
18.	<i>Aplocheilus panchax</i> (Hamilton, 1822)		Bechi, Kanpona	DD
19.	<i>Channa striata</i> (Bloch, 1793)	Stripped snakehead	Shol	NO
20.	<i>Channa marulius</i> (Hamilton, 1822)	Great snakehead	Gajar	EN
21.	<i>Channa punctata</i> (Bloch, 1793)	Green snakehead	Taki, Lata, Lati, Okol, Chaitan	NO
22.	<i>Channa orientalis</i> (Bloch and Schneider, 1801)	smooth-breasted snakefish, Walking snakehead	Gachua, Raga, Cheng	VU
23.	<i>Securicula gora</i> (Hamilton, 1822)		Ghora chela	NO
24.	<i>Salmostoma phulo</i> (Hamilton, 1822)	Finescale razorbelly monnow	Fulchela	NO

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
25.	<i>Salmostoma bacaila</i> (Hamilton, 1822)	Large razorbelly monnow	Katari, Narkalichela	NO
26.	<i>Esomus danricus</i> (Hamilton, 1822)	Flying barb	Dankina, Danrika, Darka, Dadhika	DD
27.	<i>Chela cachius</i> (Hamilton, 1822)		Chep Chela	DD
28.	<i>Aspidoparia morar</i> (Hamilton, 1822)		Morari, Morar	DD
29.	<i>Bengala elanga</i> (Hamilton, 1822)	Engala barb	Along, Sephatia	EN
30.	<i>Rasbora rasbora</i> (Hamilton, 1822)	Darkina	Gangetic scissortail rasbora	EN
31.	<i>Rasbora daniconius</i> (Hamilton, 1822)	Slender rasbora	Darkina	-
32.	<i>Barilius barna</i> (Hamilton, 1822)		Koksa, Bani koksa	DD
33.	<i>Barilius bendelisis variety cosca</i> (Hamilton, 1822)			EN
34.	<i>Danio rerio</i> (Hamilton, 1822)		Anju	-
35.	<i>Amblypharyngodon mola</i> (Hamilton, 1822)	Mola carplet	Mola, Molongi, Moya	NO
36.	<i>Chagunius chagunio</i> (Hamilton, 1822)	Chaguni	Jarua, Utti	DD
37.	<i>Osteochilus hasseltii</i> (Valenciennes, 1842)			-
38.	<i>Labeo gonius</i> (Hamilton, 1822)	Karia labeo	Ghainna, Goni, Kurchi	EN
39.	<i>Labeo calbasu</i> (Hamilton, 1822)	Orange fin labeo	Kalibaus, Baus, Kalia	EN
40.	<i>Labeo rohita</i> (Hamilton, 1822)		Rui, Rou	NO
41.	<i>Labeo bata</i> (Hamilton, 1822)		Bara	EN
42.	<i>Cirrhinus cirrhosus</i> (Bloch, 1795)	Mrigal	Mrigal, Mirka	NO
43.	<i>Cirrhinus reba</i> (Hamilton, 1822)		Bhagna, Raik, Tatkini, Bata, Laacho	VU
44.	<i>Puntiussarana</i> (Hamilton, 1822)	Olive barb	Sarpunti, Sarnaputi, Saralpunti	CR

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
45.	<i>Puntius chola</i> (Hamilton, 1822)	Swamp barb	Chala punti	NO
46.	<i>Puntius guganio</i> (Hamilton, 1822)	Glass barb	Mola punti	NO
47.	<i>Puntius phutunio</i> (Hamilton, 1822)	Spotted barb	Phutani punti	NO
48.	<i>Puntius conchoni</i> (Hamilton, 1822)	Rosy barb	Kanchan punti, Taka punti	NO
49.	<i>Puntius ticto</i> (Hamilton, 1822)	Two-spot barb	Tit punti	VU
50.	<i>Puntius gelius</i> (Hamilton, 1822)	Golden barb	Gilipunti	DD
51.	<i>Puntius sophore</i> (Hamilton, 1822)	Pool barb	Punti, Jat punti, Vasipunti	NO
52.	<i>Puntius terio</i> (Hamilton, 1822)	Onespot barb	Teri punti	NO
53.	<i>Gibelion catla</i> (Hamilton, 1822)	Catla	Catla, Katal	NO
54.	<i>Acanthocobitis botia</i> (Hamilton, 1822)	Mottled loach	Bilturi, Natwa, Balichata	-
55.	<i>Pangio pangia</i> (Hamilton, 1822)		Panga	NO
56.	<i>Lepidocephalus guntea</i> (Hamilton, 1822)	Guntea loach	Gutum	NO
57.	<i>Clarias batrachus</i> (Linnaeus, 1758)	Walking catfish	Magur	NO
58.	<i>Wallago attu</i> (Bloch and Schneider, 1801)	Freshwater shark	Boal	NO
59.	<i>Ompok bimaculatus</i> (Bloch, 1794)	Butter catfish	Kani pabda, Boali pabda, Pupta, Pafta	EN
60.	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Stinging catfish	Shingi, Shing	NO
61.	<i>Plotosus canius</i> (Hamilton, 1822)	Grey eel-catfish	Gang magur	VU
62.	<i>Silonia silonia</i> (Hamilton, 1822)	Silond catfish	shillong	EN
63.	<i>Ailia coila</i> (Hamilton, 1822)	Gangetic ailia	Kajuli, Baspata	NO
64.	<i>Pseudeutropius atherinoides</i> (Bloch, 1794)	Indian potasi	Batasi	NO
65.	<i>Sperata aor</i> (Hamilton, 1822)	Long whiskered catfish	Ayre	VU
66.	<i>Sperata seenghala</i> (Sykes, 1839)	Giant river catfish	Guizza, Guizza air	EN
67.	<i>Mystus cavasius</i> (Hamilton, 1822)	Gangetic mystus	Kabashi-tengra, Golsha-tengra, golsha	VU
68.	<i>Mystus bleekeri</i> (Day, 1877)	Day's mystus	Tengra, Golsha-	NO

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
			tengra	
69.	<i>Mystus tengara</i> (Hamilton, 1822)		Bajari-tengra, Ghuitta-tengra	NO
70.	<i>Mystus gulio</i> (Hamilton, 1822)	Long whiskers catfish	Nuna-tengra	DD
71.	<i>Gangra viridescens</i> (Hamilton, 1822)		Gang tengra	-
72.	<i>Megalops cyprinoides</i> (Broussonet, 1782)	Indo-pacific tarpon		DD
73.	<i>Chitala chitala</i> (Hamilton, 1822)	Featherback, Clown knife fish	Chital	EN
74.	<i>Notopterus notopterus</i> (Pallas, 1769)	Asiatic knifefish, Bronze feather back	Foli	VU
75.	<i>Colia dussumieri</i> (Valenciennes, 1848)	Gold spotted grenadier anchovy	Olua	-
76.	<i>Setipinna phasa</i> (Hamilton, 1822)	Gangetic hairfin anchovy	Phasa	NO
77.	<i>Setipinna taty</i> (Valenciennes, 1848)	Scaly hairfin anchovy	Teli phasa	NO
78.	<i>Gudusia chapra</i> (Hamilton, 1822)	India river shad	Chapila	NO
79.	<i>Tenualosa ilisha</i> (Hamilton, 1822)	Hilsa shad	Ilish	NO
80.	<i>Tenualosa toil</i> (Valenciennes, 1848)	Toil shad	Chandana	NO
81.	<i>Corica soborna</i> (Hamilton, 1822)	Ganges river sprat	Kachki	NO
82.	<i>Pellona ditchela</i> (Valenciennes, 1848)	Indian pellona	Choukka	NO
83.	<i>Nematalosa nasus</i> (Bloch, 1795)	Bloch's gizzard shad	Barang	NO
84.	<i>Macrognathus aculeatus</i> (Bloch, 1786)	Elephant trunk fish. Lesser spiny eel	Tara baim	VU
85.	<i>Mastacembelus armatus</i> (Lacepède, 1800)	Zig-zag eel, Spiny eel	Baim, Bam, Sal baim	EN
86.	<i>Macrognathus pancalus</i> (Hamilton, 1822)	Indian mastacembelid eel	Guchi, Baim, Pankal, turi, Chirka	NO
87.	<i>Polynemus paradiseus</i> (Linnaeus, 1758)	Paradise threadfin	tapasi	NO

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
88.	<i>Rhinomugil corsula</i> (Hamilton, 1822)	Corsula	Khorsula, Bata, Khalla, Arwari, Halla, Hira, Khor, Urul	NO
89.	<i>Sicamugil cascasia</i> (Hamilton, 1822)	Yellow tail mullet	Kachki	NO
90.	<i>Trichogaster chuna</i> (Hamilton, 1822)	Dwarf gourami	Chuna khailsha	-
91.	<i>Colisa fasciata</i> (Bloch and Schneider, 1801)	Banded gourami	Khailsha, Khaila, Cheli, Chopra, Khoksa	NO
92.	<i>Colisa lalia</i> (Hamilton, 1822)	Doarf gourami	Lal Khailsha, Boicha, Ranga Khailsha	NO
93.	<i>Ctenops nobilis</i> (McClelland, 1844)	Frail gourami	Neftani	EN
94.	<i>Pseudosphromenus cupanus</i> (Cuvier and Valenciennes, 1831)	Spike tail paradise fish	Koi bandi	-
95.	<i>Anabas testudineus</i> (Bloch, 1792)	Climbing perch	Koi	NO
96.	<i>Eleotris lutea</i> (Day, 1878)	Lutea sleeper	Kuli	NO
97.	<i>Eleotris fusca</i> (Bloch and Schneider, 1801)	Dusky sleeper	Kuli, Budh Bailla	NO
98.	<i>Pseudapocryptes elongates</i> (Cuvier, 1816)		Chewa, Chiring	-
99.	<i>Apocryptes bato</i> (Hamilton, 1822)		Chiring	NO
100.	<i>Parapocryptes batoides</i> (Day, 1878)		Dali chewa	NO
101.	<i>Boleophthalmus boddari</i> (Pallas 1770)	Bodddart's goggle-eyed goby	Dahuk	NO
102.	<i>Periophthalmus koelreuteri</i> (Pallas, 1770)		Dahuk	NO
103.	<i>Periophthalmodon schlosseri</i> (Pallas, 1770)		Dahuk	NO
104.	<i>Glossogobius giuris</i> (Hamilton, 1822)	Tank goby	Bele, Bailla	NO
105.	<i>Odontamblyopus rubicundus</i> (Hamilton, 1822)		Lal chewa	NO
106.	<i>Platycephalus indicus</i> (Linnaeus, 1758)		Mur bailla	DD
107.	<i>Sillaginopsis panijus</i> (Hamilton,	Flathead sillago	Tular dandi	NO

	Scientific Name	English/Common Name	Local/Bangla Name	IUCN status *
	1822)			
108.	<i>Nandus nandus</i> (Hamilton, 1822)		Meni, Bheda	VU
109.	<i>Badis badis</i> (Hamilton, 1822)		Koi Bandi	EN
110.	<i>Otolithoides pama</i> (Hamilton, 1822)		Poa	-
111.	<i>Johnius coitor</i> (Hamilton, 1822)		Koitor	NO
112.	<i>Panna microdon</i> (Bleeker, 1849)	Panna croaker		-
113.	<i>Pseudambassis ranga</i> (Hamilton, 1822)	Indian glass fish	Chanda, Ranga-chanda, Lal chanda	VU
114.	<i>Pseudambassis baculis</i> (Hamilton, 1822)		Chanda	DD

\*Status DD=data deficient, CR=critically endangered, EN= endangered, VU= vulnerable and NO=not threatened are based on IUCN Bangladesh, 2000.

## Annex 12: Wind Speed and Directions

The maximum wind speed varies from 86 and 98 knots (Meteorological Department). The prevailing wind direction is south and south-east in most part of the year. The following table shows the round year wind speed and its directions for the year of 2012-2016:

Table 13.20: Wind Speed And Its Directions For The Year Of 2012-2016

Months	2016		2015		2014		2013		2012	
	wind Speed (Knots)	Wind Direction	wind Speed (Knots)	Wind Direction	wind Speed (Knots)	Wind Direction	wind Speed (Knots)	Wind Direction	wind Speed (Knots)	Wind Direction
<b>Jan</b>	2.4	West	3.3	West	2.4	West	2.2	West	2.9	North - West
<b>Feb</b>	3	West	4.1	West	3	West	2.4	West	3.3	West
<b>Mar</b>	2.5	South	4	West	2.5	South	3.8	South	3.8	South
<b>Apr</b>	2.6	South	4.1	South	2.6	South	2.4	South	4.1	South
<b>May</b>	2.5	South	3.8	South	2.5	South	3	South	3.7	South
<b>Jun</b>	3	South	3.1	South	3	South	2.7	South-East	3	South
<b>Jul</b>	2.3	South-East	4.3	South-East	2.3	South-East	2.4	South-East	2.4	South
<b>Aug</b>	2.5	South-East	2.8	South	2.5	South-East	2.4	South-East	2.2	South
<b>Sep</b>	2.2	South-East	4.2	South-East	2.2	South-East	2.6	South-East	2.6	South-East
<b>Oct</b>	2.1	North- west	2.3	East	2.1	North- West	2	North-West	2	North-East
<b>Nov</b>	2.2	West	2.8	North	2.2	West	2.3	West	2.9	North
<b>Dec</b>	2.3	South-East	2.4	North-West	2.3	South-East	2.1	North-West	2.4	North



### Annex 13: Ambient Air Temperature

In the summer (April to September) the temperature of the country varies with the amount of rainfall. During this period maximum temperature raise 39.6 degree Celsius which was observed in April 2009 where the average minimum temperature was 8.2 degree Celsius in January 2012. The following table shows the month-wise mean, maximum and minimum temperature for the year of 2007-2016.

**Table 13.21: The Month-Wise Mean, Maximum And Minimum Temperature For The Year Of 2007-2016**

Year	Parameters	Months											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	Mean temp (°C)	12.4	18.4	20.9	24.8	25.9	23.1	26.6	25.5	26.8	25.6	18.9	17.8
	Max temp (°C)	25.3	31.2	33.2	33.7	33.7	32.3	32.3	32.5	31.9	32.2	29.6	26.8
	Min temp (°C)	15.32	23.4	23.23	19.32	26.34	26.43	23.33	32.43	26.43	24.3	23.44	23.44
2015	Mean temp (°C)	25.3	23.4	23.23	19.32	26.34	26.43	23.33	32.43	26.43	24.3	23.44	23.44
	Max temp (°C)	32.1	31.2	33.2	33.7	33.7	32.3	32.3	32.5	31.9	32.2	29.6	26.8
	Min temp (°C)	15.32	19.4	21.9	23.8	24.9	26.1	26.6	26.5	25.8	24.6	19.9	15.8
2014	Mean temp (°C)	22.4	24.45	24.55	26.43	24.44	25.43	23.45	24.33	25.4	23.45	18.12	19.55
	Max temp (°C)	24.5	29.1	32.2	34.4	33.2	33.4	31.4	32	32.7	30.5	29	27
	Min temp (°C)	14.1	18.3	22.4	24.1	24.2	26.8	25.8	26.6	26	24.3	19.8	15.6
2013	Mean temp (°C)	14.5	19.8	25.6	28.3	28.8	28.8	29.6	29.5	28.8	26.9	23.1	17.8
	Max temp (°C)	29	34.2	37.3	37.9	36.9	35.8	35.1	35.1	34	35.7	33.2	29.7
	Min temp (°C)	9.6	12	18.4	20.8	21.3	23.2	25.3	25	24.8	21.5	16.6	11
2012	Mean temp (°C)	14.2	19.8	24	26.4	27.6	29.1	29.2	29	29	27.4	21.9	16.8
	Max temp (°C)	27.8	31	34.5	35.8	35.3	36	35.4	35	36.2	34.5	32.4	30
	Min temp (°C)	8.2	13	16	20.2	21.3	23.2	23.9	24.5	23.7	22	17.2	11

Year	Parameters	Months											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	Mean temp (°C)	15.6	19.2	23.2	26.7	29.3	28.5	28.5	29.3	28.3	26.8	23.1	17.4
	Max temp (°C)	28.8	30.8	36.7	35.9	37.5	35.9	34.8	35.9	34.9	35.6	31.8	28.2
	Min temp (°C)	9.6	12.6	15	18.1	22.3	22	23.4	24.2	24.5	19.5	16.8	11.3
2010	Mean temp (°C)	16.7	18	24.3	27	27.9	28.4	28.8	28.6	28.7	26.3	22.1	19.1
	Max temp (°C)	29	30.6	34.6	36.9	36.7	35.4	34	36	34.8	34.8	32.3	29
	Min temp (°C)	10.5	10.8	16.5	19.6	20.3	22.5	24.6	23.6	24.4	18	16.3	13
2009	Mean temp (°C)	17	20.4	23.9	27.2	27.6	29.8	29.6	28.9	29.3	26.5	22.2	17.3
	Max temp (°C)	28.1	33.9	36	39.6	37.8	36.5	35.7	34.3	35.3	35.8	33.9	29
	Min temp (°C)	11.1	12.2	15.8	20.4	21.6	22.6	24.4	24.3	24.5	20.6	15.2	11.4
2008	Mean temp (°C)	22.4	24.45	24.55	26.43	24.44	25.43	23.45	24.33	25.4	23.45	18.12	19.55
	Max temp (°C)	24.5	29.1	32.2	34.4	33.2	33.4	31.4	32	32.7	30.5	29	27
	Min temp (°C)	14.1	18.3	22.4	24.1	24.2	26.8	25.8	26.6	26	24.3	19.8	15.6
2007	Mean temp (°C)	15.32	23.4	23.23	19.32	26.34	26.43	23.33	32.43	26.43	24.3	23.44	523.44
	Max temp (°C)	25.3	31.2	33.2	33.7	33.7	32.3	32.3	32.5	31.9	32.2	29.6	26.8
	Min temp (°C)	13.4	19.4	21.9	23.8	24.9	26.1	26.6	26.5	25.8	24.6	19.9	15.8

Source: BMD

The monthly average temperature variation in Cox's Bazar District has remained largely uniform over the last 10 years. There have been hotter days in some years but it had negligible effect on the average the temperature over this period. Therefore, constancy of the ambient temperature is crucial for fixing the design of the generators whose efficiency depends on ambient temperature and the design of the radiative cooling design.

## Annex 14: Estimation of GHG emission using IFC CEET

### Estimation of GHG emission using IFC CEET

Carbon Emissions Estimator Tool (CEET) by IFC is a tool to estimate the GHG emission from a particular project. Here a simplified calculation (from IFC CEET Worksheet) have been shown to compare the zero emission from 20 MW solar plant and GHG emission from 20 MW HFO based power plant.

#### Estimate IFC Gross Project Emissions

This estimate of gross annual GHG emissions applies to the first year at full production

Use the blue hyperlinks to navigate the worksheet

Operational Phase:	Industry Sectors (Scope 1):	Other:
<b>Scope 1:</b>	<a href="#">Cement Production</a> <a href="#">Electronics</a>	<a href="#">Other Calculations</a>
<a href="#">Fuel Consumption</a>	<a href="#">Metal Industry</a> <a href="#">Geothermal Gases</a>	
<a href="#">Refrigeration /AC</a>	<a href="#">Reservoirs and Dams</a>	
<a href="#">Waste</a>	<a href="#">Forestry</a>	
<a href="#">Wastewater Operations</a>	<a href="#">Land Use</a>	
<a href="#">Other Process Emissions</a>	<a href="#">Livestock</a>	
<a href="#">Gas Flaring</a>	<a href="#">Chemicals</a>	

**Key**

Common Source of Emissions

**Note:**  
Common sources of emission for specific sectors are highlighted in yellow. These are suggested emission sources and IFC staff should consider any non-typical emission sources beyond these as necessary. To include other emission sources, expand these by "clicking" on the + ahead of emission Sources not highlighted in yellow.

Scope 2:	<a href="#">Glass Production</a>	
<a href="#">Electricity Consumption</a>	<a href="#">Lime Production</a>	
	<a href="#">Oil and Mining</a>	

Fuel Consumption	(Scope 1 Emissions)					
Record the type of fuel and annual consumption, by volume or weight, used in stationary combustion (do not double count fuel used in mobile vehicles).						
Fuels Consumed during Stationary Combustion	By Weight:					
Type of Fuel	Annual Fuel Consumption (tonnes)	CO2 (t CO2 per t of fuel)	CH4 (t CH4 per t of fuel)	N2O (t N2O per t of fuel)	t CO2-eq. per year	<b>Note:</b> - Available unit of measure are in tonnes (by weight, all fuel types), TJs (by calorific consumption, all fuel types), and Liters (volume, for liquids only) - Volume measurement for gases is not available as density and volume of gases vary significantly based on quality.
Residual Fuel Oil (Tangential Firing)	25288.8	3.127	0.000032	0.000012	79001	
				Total	79001	

## Annex 15: Operation and Maintenance (O&M) Activities of Solar PV Plant

It is important to define the parameters for the operation and maintenance of a PV project during its life. These conditions must, as a minimum, cover the maintenance requirements.

Maintenance can be broken down as follows:

- ***Scheduled or preventative maintenance*** – Planned in advance and aimed at preventing faults from occurring, as well as keeping the plant operating at its optimum level.
- ***Unscheduled maintenance*** – Carried out in response to failures.

### **Scheduled/Preventative Maintenance**

The scheduling and frequency of preventative maintenance is dictated by a number of factors. These include the technology selected, environmental conditions of the site, warranty terms and seasonal variances. The scheduled maintenance is generally carried out at intervals planned in accordance with the manufacturers' recommendations, and as required by the equipment warranties. Scheduled maintenance should be conducted during non-peak production periods and, where possible, at night.

Although scheduled maintenance will both maximize production and prolong the life of the plant, it does represent a cost to the project. Therefore, the aim should be to seek the optimum balance between cost of scheduled maintenance and increased yield through the life of the system.

Specific scheduled maintenance tasks are detailed out in the following table:

**Table 13.22: Specific Scheduled Maintenance Task Details**

Tasks	Description
Module Cleaning	<ul style="list-style-type: none"> <li>The frequency of module cleaning will depend on local site conditions (for example, prevalence of dust or rain) and the time of year. However, it is generally recommended to clean the modules at least twice annually.</li> <li>When scheduling module cleaning, consideration should be given to the following: <ul style="list-style-type: none"> <li>✚ Environmental and human factors (for instance, autumn fall debris and soiling from local agricultural activities)</li> <li>✚ Weather patterns: cleaning during rainy periods is less likely to be required.</li> <li>✚ Site accessibility based upon weather predictions</li> <li>✚ Availability of water and cleaning materials</li> </ul> </li> <li>If the system efficiency is found to be below the expected efficiency, then module cleaning should be scheduled as necessary. The benefit of cleaning should be seen in an improved performance ratio due to the lower soiling loss—and resultant increase in revenue.</li> </ul>
Module Connection Integrity	<ul style="list-style-type: none"> <li>Checking module connection integrity is important for systems that do not have string level monitoring. This is more likely for central inverter systems for which no string monitoring at the junction/combiner boxes has been designed.</li> <li>In such cases, faults within each string of modules may be difficult to detect. Therefore, the connections between modules within each string should be checked periodically (this may include measuring the string current).</li> </ul>
Junction or String Combiner Box	<ul style="list-style-type: none"> <li>All junction boxes or string combiner boxes should be checked periodically for water ingress, dirt or dust accumulation and integrity of the connections within the boxes. Loose connections could affect the overall performance of the PV plant. Any accumulation of water, dirt or dust could cause corrosion or short circuit within the junction box.</li> <li>Where string level monitoring is not used, periodic checks on the integrity of the fuses in the junction boxes, combiner boxes and, in some cases, the module connection box should be conducted.</li> </ul>
Hot Spots	<ul style="list-style-type: none"> <li>Potential faults across the PV plant can often be detected through thermography. This technique helps identify weak and loose connections in junction boxes and inverter connections. It can also detect hot spots within inverter components and along strings of modules that are not performing as expected.</li> <li>Thermography should be conducted by a trained specialist using a thermographic camera.</li> </ul>

Tasks	Description
Inverter Servicing	<ul style="list-style-type: none"> <li>• Generally, inverter faults are the most common cause of system downtime in PV power plants. Therefore, the scheduled maintenance of inverters should be treated as a centrally important part of the O&amp;M strategy.</li> <li>• The maintenance requirements of inverters vary with size, type and manufacturer. The specific requirements of any particular inverter should be confirmed by the manufacturer and used as the basis for planning the maintenance schedule.</li> <li>• The annual preventative maintenance for an inverter should, as a minimum, include: <ul style="list-style-type: none"> <li>✚ Visual inspections &amp; Cleaning/replacing cooling fan filters</li> <li>✚ Removal of dust from electronic components</li> <li>✚ Tightening of any loose connections</li> <li>✚ Any additional analysis and diagnostics recommended by the manufacturer</li> </ul> </li> </ul>
Structural Integrity	<ul style="list-style-type: none"> <li>• The module mounting assembly, cable conduits and any other structures built for the PV plant should be checked periodically for mechanical integrity and signs of corrosion.</li> <li>• This will include an inspection of support structure foundations for evidence of erosion from water run-off.</li> </ul>
Tracker Servicing	<ul style="list-style-type: none"> <li>• Tracking systems also require maintenance checks. In general, the checks will include inspection for wear and tear on the moving parts, servicing of the motors or actuators, checks on the integrity of the control and power cables, servicing of the gearboxes and ensuring that the levels of lubricating fluids are suitable.</li> <li>• The alignment and positioning of the tracking system should also be checked to ensure that it is functioning optimally. Sensors and controllers should be checked periodically for calibration and alignment.</li> </ul>
Balance of Plant	<ul style="list-style-type: none"> <li>• The remaining systems within a PV power plant, including the monitoring and security systems, auxiliary power supplies, and communication systems should be checked and serviced regularly.</li> <li>• Communications systems within the PV power plant and to the power plant should be checked for signal strength and connection.</li> </ul>
Vegetation Control	<ul style="list-style-type: none"> <li>• Vegetation control and ground keeping are important scheduled tasks for solar PV power plants since there is a strong likelihood for vegetation (for example, long grass, trees or shrubs) to shade the modules.</li> <li>• The ground keeping can also reduce the risk of soiling (from leaves, pollen or dust) on the modules.</li> </ul>










## **Unscheduled Maintenance**

Unscheduled maintenance is carried out in response to failures. As such, the key parameter when considering unscheduled maintenance is diagnosis, speed of response and repair time. Although the shortest possible response is preferable for increasing energy yield, this should be balanced against the likely increased contractual costs of shorter response times. Depending on the type of fault, an indicative response time may be within 48 hours, with liquidated damages if this limit is exceeded.









The majority of unscheduled maintenance issues are related to the inverters. This can be attributed to their complex internal electronics, which are under constant operation. Depending on the nature of the fault, it may be possible to rectify the failure remotely – this option is clearly preferable if possible.

Other common unscheduled maintenance requirements include:

-  Tightening cable connections that have loosened.
-  Replacing blown fuses.
-  Repairing lightning damage.
-  Repairing equipment damaged by intruders or during module cleaning.
-  Rectifying SCADA faults.
-  Repairing mounting structure faults.
-  Rectifying tracking system faults.

## **Spares**

In order to facilitate a rapid response, a suitably stocked spares inventory is essential. The numbers of spares required will depend on the size of the plant and site-specific parameters. Adequate supplies of the following components should be held:

-  Mounting structure pieces.
-  Junction/combiner boxes.
-  Fuses.
-  DC and AC cabling components.
-  Communications equipment.
-  Modules (in case of module damage).
-  Spare inverters (if string inverters are being used).
-  Spare motors, actuators and sensors should also be kept where tracking systems are used.

It is important that spares stock levels are maintained. Therefore, when some spares are been used, the stocks should be replenished as soon as possible. This arrangement will reduce the time gap between the identification of the fault and replacement of the nonoperational component. This can be of particular relevance for remote locations with poor accessibility and adverse weather conditions. Consultation with manufacturers to detail the spare parts inventory, based upon estimated component lifetimes and failure rates, is recommended.

### **Performance Monitoring, Evaluation and Optimization**

To optimize system performance, there is a need to ensure that the plant components function efficiently throughout the lifetime of the plant. Continuous monitoring of PV systems is essential to maximize the availability and yield of the system. A SCADA system is able to monitor the real-time efficiency and continuously compare it with the theoretical efficiency to assess if the system is operating optimally.

**Annex 16: Labor Assessment Report**

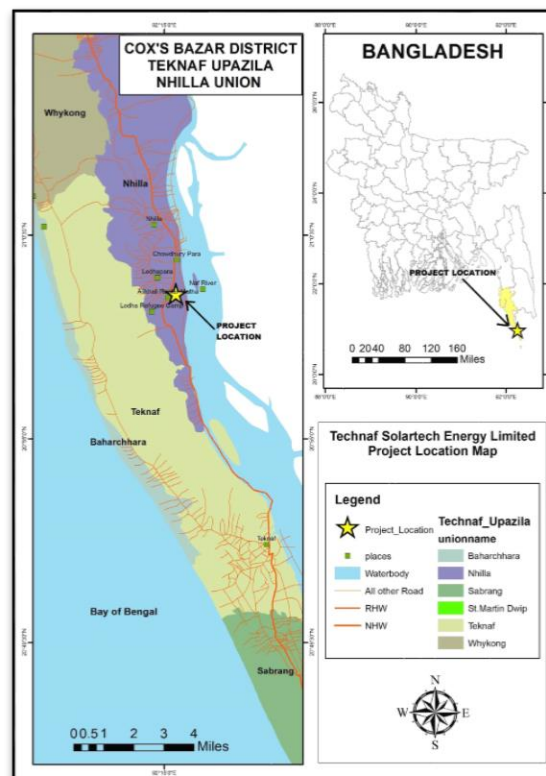
# **Labor Assessment Report**

## 1. Introduction

### 1.1. Brief Project Description

Power generation and supply is one of the vital issues in Bangladesh to enhance its ongoing development efforts. Having 149.8 million people, electricity demand is increasing day by day but the generation of electricity is not increasing as expected. The industrial production which is the driven force of economy is being hampered due to inadequate power supply. Thus foreign and local investment are being discouraged and impeded. The Sixth Five Year Plan contains information on demand-supply gap for electricity, source of electricity supply, use of different types of energy, electricity generation program and strategy for power generation.

The Renewable Energy Policy envisions that 5% of total energy production will have to be achieved by 2015 and 10% by 2020. To achieve this target, GOB is looking for various options preferably Renewable Energy resources. Government has already launched '500MW Solar Power Mission' to promote the use of Renewable Energy to meet the increasing demand of electricity. Considering the immense opportunities, Technaf Solartech Energy Limited (TSEL) has established a solar based power plant at Alikhali, South Nhilla, Cox's Bazar with 20 MW capacities as a 20 years facility to BPDB.



**Figure 17: Location Map of the Proposed Solar Power Plant Project**

The site of the project is located at South Nhilla Alikhali village of 2 no. Nhilla Union, Teknaf Upazila of Cox's Bazar district. The boundaries of the plant location are: salt cultivation land on the north, north-west, east and south side of the project site, few low land parcels have been found on the north-east, south-east and south-west boundaries, a salt factory and a brick field are situated along the south-west boundary of the project site, River Naf flows along the eastern side of the project site. A bituminous carpeting road has passed through the western boundary of the project site.

It is further to be noted that most of the land of this project was previously used for salt cultivation, for which the landowners dug a private canal to bring saline water inside their lands. The canal inside the project boundary is completely owned by the concerned landowners – the canal is not on any khas land. TSEL has decided to conserve the canal.

**Table 13.23: Brief description of the company**

<b>Company Name</b>	Technaf Solartech Energy Limited (TSEL)
<b>Corporate Office Address</b>	Technaf Solartech Energy Limited, 2nd Floor, Colloid Center, 206/A, Tejgaon Industrial Area, Dhaka 1208.
<b>Plant Address</b>	Technaf Solartech Energy Limited, Village: Dakhxin Nhilla Alikhali, Union: 2 No. Nhilla, Upazila: Teknaf, Zilla: Cox's Bazar
<b>Type of Business</b>	Electricity generation and distribution to gridline
<b>Plant Type and Capacity</b>	20 MW electricity generation
<b>Plant Installation area</b>	116 acres of Land
<b>Electricity Coverage Area</b>	Transmission to the National Grid
<b>No. of beneficiaries</b>	All over Bangladesh
<b>Major Equipment</b>	Solar modules (Poly crystalline), grid-tie string inverters.
<b>Installation and Supervision</b>	Installation by TSEL and Supervision by Sgurr Energy India Pvt. Ltd
<b>Operation and Maintenance</b>	TSEL

*Source: TSEL ESMS Document*

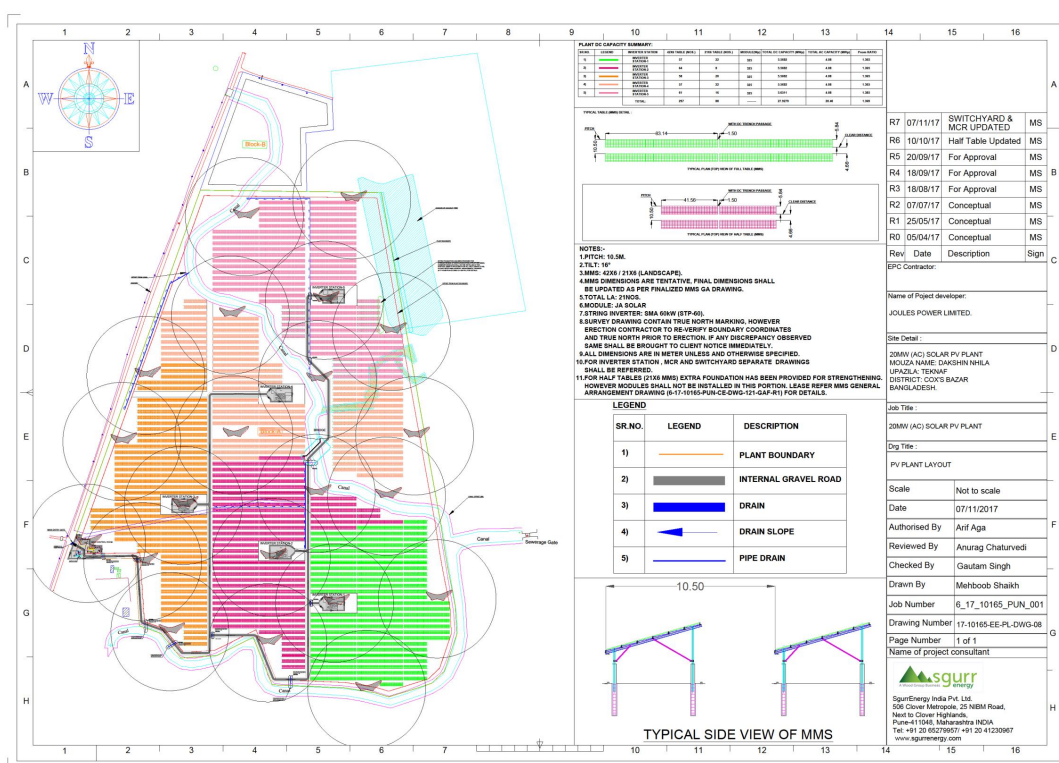


Figure 18: Project Layout Plan

## 1.2 Background of Labor Audit for TSEL

The Environmental and Social Action Plan (ESAP) for TSEL identified the necessity for undertaking labor audit covering own and subcontractor workers of TSEL to assess compliance with the national laws and World Bank PS2 requirements. In this regard, TSEL hired Bangladesh Centre for Advanced Studies for carrying out the labor audit.

## 1.3 Objectives and Scope of Work

The prime objective of the labor audit was to undertake labor audit covering own and subcontractor workers of the plant to assess compliance with the national laws and WB PS2 requirements, and then suggest corrective action plans for ensuring improved labor conditions at the plant. The scope of work for the labor audit was as follows:

- Review of Bangladesh Labor Law 2015 and World Bank's Performance Standard 2;
- Review of all HR policies and practices of TSEL;
- Review of the labor employment documents;
- Review of working hours and overtime documents of the labors;
- Review of wages and overtime payment documents of the labors;
- Check whether wages and overtime amount paid to the labors comply with the minimum wages and overtime amount defined by Bangladesh Government;
- Review the practices of non-discrimination, prohibition of child and forced labor, retrenchment, labors' organization and grievance mechanism;

- Review the documents and observe the practices of TSEL regarding workers' health and safety;
- Review the contractor management system of TSEL;
- Prepare labor audit report confirming compliance, and if not, recommend corrective actions as appropriate to the Project during Operation phase.

#### **1.4 Limitations of the Audit**

The Labor Audit was associated with the following limitations:

- EPC Contractors were not covered under the Labor Audit due to lack of record maintenance by the EPC contractor and also the contract phase of the EPC contractor is already over and they have left 1 year back.
- Supply chain assessment was not possible as most of the machineries and equipment were imported from abroad. For the construction phase, local supplies comprised of sand, brick, cement and steel, which were purchased from many different sources. Therefore, it was not feasible to audit all the suppliers.

#### **1.5 Labor Audit Team**

The Labor Audit Team comprised of the following members from BCAS:

1. Dr. Moinul Islam Sharif, Team Leader.
2. Nahid Akhter Katha, Junior Consultant
3. Md. Billal Hossain, Social & OHS Consultant

#### **1.6 Layout of this Report**

This report has been prepared in the following layout:

Chapter 1	Introduction: Brief Project Description, Background of Labor Audit for TSEL, Objectives and Scope of Work, Limitations of the Audit, Labor Audit Team and Layout of this Report
Chapter 2	Labor and Working Conditions: Human Resources Policies and Procedures, Working Conditions and Terms of Employment, Labors' Organization, Non-discrimination and Equal Opportunity, Retrenchment, Grievance Mechanism, Protecting the Work Force – Child Labor & Forced Labor, Workers' Health and Safety, Contractor Management System
Chapter 3	Conclusion



## **2. Labor and Working Conditions in TSEL**

### **2.1 Human Resources Policies and Procedures**

#### **2.1.1 HR Policy of TSEL**

TSEL will review their HR policy. TSEL, while reviewing its HR policy, may consider the following aspects for inclusion:

- Roles and responsibilities associated with various positions need to be mentioned;
- Non-discrimination policy should be mentioned;
- HIV/ AIDS non- discrimination should also be spelt out;
- Working with Suppliers and contractors and non-employee workers may also be referred to;
- Non-tolerance of child labor and forced labor not only for employee, but for the non-employee workers if any
- Anti- Sexual Harassment Policy may be explicitly captured.

All contractors and sub-contractors within the consortium should be required to apply the principles of the TSEL HR Policy document and also ensure that their internal procedures follow local and international standards.

### **2.2 Working Conditions and Terms of Employment**

#### **2.2.1 Terms of Employment**

All the staffs working in TSEL are permanent staff and employed by the mother company Joules Power LTd (JPL). As the plant generates electricity through solar modules and does not required labor or workers to operate, there were no labors/ workers from external contractor or sub-contractor during the reporting period.

The company has provided ID cards to the staffs. During labor audit, all employees were found to be wearing ID card. Each employee has been provided with their own personal protective equipment (PPEs) such as helmet, safety jacket, shoes, etc.

#### **2.2.2 Working Hour and Overtime**

According to contemporary labor law of Bangladesh (Bangladesh Labor Law 2006, last amended in 2013), each labor should enjoy a paid weekly holiday after maximum 6 days of continuous works. This implies, there should be maximum 26/27 working days per worker per month, while the worker should be receiving the salary of the whole month. By law, daily working hour is 8 hours and daily overtime should not exceed 2 hours. Maximum working hours including overtime is 60 hours per week, but on the average this should not be more than 56 hours per week (according to Bangladesh Labor Law) per year. This means, average

maximum overtime per week is 8 hours. Maximum overtime per month should not exceed 48 hours in 4 (four) weeks.

Employees of TSEL have the provision of one day weekly holiday. A regular permanent employee can enjoy 20 days of earned leave, 10 days of casual leave and 14 days of sick leave. TSEL employees do not require to work overtime. Working hour of TSEL staff is followed as per Bangladesh Labor Law. TSEL staffs are not required to work overtime as it is one shift production facility.

### 2.2.3 Payment of Salary

The policy maintained by TSEL for payment of salary and overtime are listed in the following table:

**Table 13.24: Details of payment of salary and overtime for TSEL Staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019			Recommended for Approval
		Policies	Eligibility & Criterion	Present Status	
01	Monthly Gross Salary	60% Basic salary; 30% House rent allowance; 10% Personal allowance	All employees	Continuing	In general, monthly gross salary will be: Basic salary = 60% House rent = 30% Personal allowance = 10%
02	Over Time Allowance	-	For non-management level employees	Not effective now	As per Bangladesh Labor Law

### 2.2.4 Employment and Accommodation of Workers

Since, the construction phase is over, no labor camp for local workers is required any more.

In the operation phase, TSEL provides accommodation facility for the both permanent and contractual non-local bachelor staffs stationed at project site.

### 2.2.5 Festival Bonus, Provident Fund and Gratuity

All the permanent staffs of TSEL are entitled to festival bonus, provident fund and gratuity, while the contractual staffs are not entitled to provident fund and gratuity. The policy maintained by TSEL for Festival Bonus, Provident Fund and Gratuity are listed in the following table:

**Table 13.25: Details of Festival Bonus, Provident Fund and Gratuity for TSEL Staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019		
		Policies	Eligibility & Criterion	Present Status
01	Festival Bonus	1 Basic salary per festival	For both management and non- management staff including contractual staff Will be provided for 2 festivals per year	Continuing
02	Provident Fund	As per Expo Group Policy	For permanent staff only Considered after commercial operation starts	Effective from July 2019
03	Gratuity	As per Expo Group Policy	For permanent staff only Considered after commercial operation starts	Effective from the day of Incorporation

**2.2.6 Other Benefits provided by TSEL**

The followings are the additional compensation & benefits of TSEL employees:

**Table 13.26: Details of additional compensation & benefits of TSEL staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019		
		Policies	Eligibility & Criterion	Present Status
01	Group Health Insurance	Insurance coverage for self, spouse and 2 children (as per job grade)	For both management and non- management staff including contractual staff	Continuing
02	Group Life Insurance	For self only (insurance amount varies per job grade)	For both permanent and contractual non-management staff including contractual staff	Continuing
03	Station allowance	BDT 6000/ month	For both management and non- management staff only For staff stationed at project site only to cover for food expenses	Continuing
04	TA, DA and other allowance for travel	At actual	At actual	At actual

## 2.3 Workers' Organization

Rule 183 (1) of the Bangladesh Labor Rules, 2015: The owner of each company, where at least fifty permanent workers work, will form a participating committee within 3 months of starting operations. On the other hand, the occupier of the factory is required to set up a “Worker Participation Fund” and “Worker Welfare Fund” in accordance to the provisions of the Bangladesh Labor Law 2006.

As the number of TSEL permanent staff is less than 50, TSEL does not required to set up any participation committee or worker welfare fund.

## 2.4 Non-discrimination and Equal Opportunity

TSEL should ensure non-discrimination and equal opportunity through its HR Policy as well as in practice. It was observed that there is no female among the existing TSEL staffs at the plant. However this is mainly attributed to unavailability of competent female candidates capable of handling the designated chores in the power plant.

## 2.5 Grievance Mechanism

Although internal grievance is recorded in a register book, a formal internal grievance redress mechanism is yet to be developed. Internal grievance box for the staff is provided at the main gate. Till 28<sup>th</sup> January 2020, all the grievance received and redressed are shown in the following table:

**Table 13.27: Grievance records of TSEL staff**

Sl. No.	Complain Details	Name of Complaint	Receiving Date	Closing Date	Remarks
01	Transportation- TSEL technician team asked for two bicycle to use inside the plant	Md. Shamol Ali, TSEL	03.03.2019	13.04.2019	TSEL management has provided two bicycle for the use inside the plant
02	Safety Items- TSEL staff requested for new safety items (Safety shoes, helmet, etc.) as the old ones were damaged	Md. Altaf Hossain, TSEL	09.03.2019	20.04.2019	New safety gears were purchased and distributed to the TSEL staff
03	Recreation options for Ansar- security force at TSEL	Md. Inul Haque, TSEL	10.03.2019	10.05.2019	For the entertainment purpose, TSEL management has provided one 32'' LED TV for the Ansar Camp.

## **2.6 Protecting the Work Force – Child Labor & Forced Labor**

TSEL should place adequate system to ensure prohibition of child labor and forced labor. Worker below 18 years of age should not be recruited by TSEL or its contractors on any sub-contractor. During employing staffs/workers directly or through sub-contractors, child labor engagement should be strictly avoided, and National ID Card of each worker should be checked and copy of the same is to be kept in the file.

During the reporting period, no grievance has been received from any plant staff or contractor's workers regarding forced labor.

## **2.7 Workers' Health and Safety**

### **2.7.1 Policy and Plan for Workers' Health and Safety**

TSEL has established Occupational Health Protection and Safety Policy for all the employees. The plant manager maintains the EHS records and EHS personnel keeps close monitoring of EHS practices.

### **2.7.2 Work Permits**

The EHS Plan has clearly articulated the provision of work permit for all sorts of routine and non-routine jobs at the construction site with the vision of protecting the workers from occupational injuries, and it is practiced accordingly.

### **2.7.3 Job Hazard Analysis and Hazard Identification and Risk Assessment Control**

For all the operation activities, potential risk hazards are mentioned and communicated with the workers. Proper use of PPEs are mentioned in the work permit as well.

Concerned personnel have been made aware of the potential hazards and risks through provision of relevant trainings. Use of necessary PPEs are ensured and necessary measures are taken to control potential risks.

### **2.7.4 Personal Protective Equipment**

A Personal Protective Equipment (PPE) Matrix has been developed for ensuring workers' safety for different types of jobs. All the personnel/workers are bound to use mandatory PPEs i.e. safety helmet and safety shoes as well as wear or use job/site specific other PPEs i.e. safety shield, safety gloves, safety goggles, safety mask, gum boots, safety harness/belt etc. On-job-training is being imparted by EHS personnel of TSEL regarding usage of PPEs and its importance. In any case of non-compliances, work is stopped immediately and remedial actions are taken.

## 2.7.5 Health Facilities for the Labors

First aid boxes are available with adequate first aider. Contact details of the first aider is displayed with photograph. While checking a sample first aid box, updated list of medicines was found and the medicines inside the box were well maintained. A register logbook is also maintained.



Photo 9: First Aid Box with First Aider's Details

TSEL MCR 1 <sup>st</sup> FLOOR		FIRST AID REGISTER				
S.No	NAME	DESIGNATION	NAME OF	INCIDENT	TREATMENT	STATUS
01	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
02	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
03	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
04	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
05	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
06	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
07	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
08	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
09	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK
10	Mr. Suresh Kumar	Supervisor	Mr. Suresh Kumar	Hand Injury	First Aid	OK

List of Medicine in First Aid Box					
S.No	Name of Medicine	Manufacturing Date	Expiry Date	Quantity	Remarks
01	Aspirin 100mg	06/2018	06/2020	10	
02	Paracetamol 500mg			10	
03	First Aid Kit			10	
04	First Aid Kit			10	
05	First Aid Kit			10	
06	First Aid Kit			10	
07	First Aid Kit			10	
08	First Aid Kit			10	
09	First Aid Kit			10	
10	First Aid Kit			10	



**Photo 10: Register book and medicine list of First Aid Box**

For any injury or medical help, the patient will be sent to Upazila Health Complex. Emergency contact details of the health complex and ambulance services are detailed in the front security office of TSEL.

#### **2.7.6 Accident/Incident Investigation**

Accident & Incident Register is in place. No accident took place during the reporting period.

#### **2.7.8 Environment, Health and Safety Trainings**

Training Calendar and mock drill calendar for 2020 is in place and also displayed and communicated with the staffs and workers.

Training Register shall be developed in a tabular format (e.g. on MS Excel) depicting the names of all staffs in one column, names of trainings for each month on different columns in chronological manner. The register should be able to clearly depict which staff should go for which training on which month. It should also depict whether the concerned staffs participated and successfully completed the trainings. This means, the Training Register shall have to be updated on regular basis.

#### **2.7.9 Plant Visit Observations on Workers' Health and Safety**

Overall workers' health and safety arrangement of TSEL is satisfactory. The plant staffs have been found to be using the necessary PPEs as and when needed.





**Photo 11: Usage of PPEs**

It is recommended that TSEL should ensure display of abstract of the key provisions of the Bangladesh Labour Rule 2015 in Bangla at the main entrance of the factory. The plant layout plan marking the dangerous or hazardous zones and routes for emergency evacuation should also be displayed.

Designated area for assembly point in case for fire hazard has been set-up and water hose pipes are also for fire emergencies.



**Photo 12: Designated Assembly Point for Fire Hazard and Fire Hydrant**

Proper LOTO (Lockout-tagout) system is ensured so that dangerous machines are properly shut off and not started up again prior to the completion of maintenance or servicing work.



**Photo 13: Practice of Lockout-tagout (LOTO) System**

All over the plant, various cautions signs are posted to ensure worker's safety from potential risks and hazards. Few of them had faded away which needs to be reposted. In restricted area such as Transformer zone, oil storage etc., "DO NOT ENTER" or "RESTRICTED ENTRY" signs may added for the safety of workers and visitors.





**Photo 14: Caution Signs In Restricted Places inside the Plant**



**Photo 15: Faded Sign Board that needs to be replaced**

## **2.8 Contractor Management System**

TSEL shall have to develop a SOP for contractor management system. Auditing of the contractors or sub-contractors did not take place before on EHS issues. Health/injury/life insurance of the contractors' or sub-contractors' workers is highly essential for those who will be engaged in risky or hazardous jobs.

### **3. Conclusion**

Operation of a solar power plant is not that much labor intensive. At TSEL, about 12 employees work at a times. TSEL ensures that Bangladesh Labor law is strictly followed. TSEL provides various compensation & benefits to their permanent and contractual employees. Internal grievance mechanism is in place for the TSEL staff. No child labor is accepted or encouraged in TSEL. TSEL focuses on their worker's health and safety. Adequate training on various safety related issues, use of PPEs, emergency preparedness and job hazards are arranged frequently.

Given the nature of the project, the BCAS Team recommends that labor audit should be carried out half yearly monitoring for at least two consecutive years of operation.

**Annex 17: E&S Audit Report**

# **1<sup>st</sup> Environmental and Social (E&S) Audit Report**



## **1. Executive Summery**

Technaf Solartech Energy Limited (TSEL) has been established with the capacity of 20 MW electricity generation using solar photovoltaic modules. The plant is situated at Alikhali, South Nhilla, Teknaf, Cox's Bazar.

This was the first audit to be carried out for TSEL. The primary objective of this assignment was to assess the compliance status of the Project and its various components with respect to the agreed ESAP, Operations Phase Environmental & Social Management & Monitoring Plan (ESMMP) of the ESIA, and applicable Performance Standards of World Bank.

BCAS Team was mobilized at TSEL from 12 January to 13 January, 2020. TSEL was asked to furnish required documents by one week. The first audit will cover 6 months – May, 2019 to October, 2019.

The power plant runs for 8 hours a shift. Employees of TSEL have the provision of one day weekly holiday. TSEL staffs are not required to work overtime as it is one shift production facility. All the permanent staffs of TSEL are entitled to festival bonus, provident fund and gratuity, while the contracted staffs as well as casual staffs of TSEL are not entitled to provident fund and gratuity.

Although a complain box is provided and internal grievance is recorded in a register book, a formal internal grievance redress mechanism is yet to be developed. There is an adequate system in place to ensure prohibition of child labor and forced labor.

For all the operation activities, potential risk hazards are mentioned and communicated with the workers. Proper use of PPEs are mentioned in the work permit as well. All the personnel/workers are bound to use mandatory PPEs i.e. safety helmet and safety shoes as well as wear or use job/site specific other PPEs i.e. safety shield, safety gloves, safety goggles, safety mask, gum boots, safety harness/belt etc. On-job-training is being imparted by EHS personnel of TSEL regarding usage of PPEs and its importance.

First aid boxes are available with adequate first aid kit. Contact details of the first aid kit are displayed with photograph. While checking a sample first aid box, updated list of medicines was found and the medicines inside the box were well maintained. A register logbook is also maintained. For any major injury or medical help, the patient will be sent to Upazila Health Complex. Emergency contact details of the health complex and ambulance services are detailed in the front security office of TSEL.

TSEL has been found to be continually updating the legal register for maintaining of all legal compliances of the project. Currently, TSEL have environmental clearance certificate, factory license, trade license from Union Parishad and fire license and all are up to date. The licenses are also displayed in the front gate office. A legal Register is maintained for all the certificates and licenses with the issue date, expiry date and next renewal date.

TSEL has engaged an EHS personnel responsible for the monitoring of EHS Plan and other ESMMP implementations.

TSEL has developed an Environmental and Social Management System (ESMS) which includes all the issues regarding Environmental Care, Health and Safety, Documentation



System, Management Responsibility, Resource Management, Customer Related Processes, Supply and Contract Work Management and scopes for improvement. The whole system is documented and kept in both hard and soft copy in a well-organized order with a TOC. It should have the signature of the designated authority. All the required pages have to be signed by designated authority.

Based on the ESMS, an Environmental, Health, Safety (EHS) Plan has been developed in tabular format with tasks, references, timeline requirements, timelines and status. This monitoring plan will be an integral part of monthly health & safety inspection and be included in the health & safety inspection report accordingly and shall also be discussed in the monthly EHS meetings.

An internal environmental and social monitoring program is not yet in place. Internal audit team should follow up the activities mentioned in the third party audits. Operation activities at TSEL do not cause any air emission, noise disturbance and wastewater generation. Internal monitoring team should monitor any activities that can cause pollution.

Training Calendar and mock drill calendar for 2020 is in place and also displayed and communicated with the staffs and workers.

TSEL has prepared an Emergency Response Plan (ERP) as per mentioned in the ESIA report. Based on the QRA and updated ERP and procedure, the plant layout plan marking the dangerous or hazardous zones and routes for emergency evacuation should be displayed. Potential risks should be disclosed to neighboring community people. Necessary awareness should be made among neighboring community people in case of any emergency situation. They should also be made part of the mock drills.

A detailed Stakeholder Engagement Plan (SEP) will be developed by TSEL and Engagement records will be maintained. SEP should include stakeholder profiling, key concerns, expectations, impact and influence, and risk rating of various stakeholder groups. It should include details on engagement strategy, disclosure, monitoring, reporting etc. The SEP should be subsequently updated with engagement records. External grievance redress mechanisms for the neighboring community are not established. A complain box has been set up for the local community and a proper external redress mechanism has to be set.

Greenbelt development has been done quite satisfactorily. As the plant boundary cannot have large trees due to shading problem in the panels, TSEL has planted medium and low height plants.

Out of 19 ESAP items, 7 items have been observed that need further improvement to comply efficiently. Besides, BCAS Team has identified 19 out of 54 World Bank PS items in which TSEL should start working on improvement.

Since, this was the first environmental and social audit for TSEL, attempts were made to observe as many items as possible in an overall or gross perspective. BCAS Audit Team will endeavor to observe various environmental, social, health and safety issues in further detail during the future audits.

## 2. Introduction and Background of the Audit

### 2.1 Brief Project Description

Technaf Solartech Energy Limited (TSEL) is in the process to establish and operate a grid-tied solar power plant at Alikhali, South Nhilla, Teknaf, Cox's Bazar beside Arakan Road, around 0.5 km from the bank of Naf River, 2 km from Teknaf PBS-2, 33/11 kV sub-station at Ledha, Teknaf. The total area of the project site is about 116 acres. Because TSEL has been approved to implement and operate a 20 MW Solar Power Plant for supplying power to Bangladesh Power Development Board (BPDB) on an off-take basis for a contracted period of 20 years.

**Table 13.28: Brief description of the company**

<b>Company Name</b>	Technaf Solartech Energy Limited (TSEL)
<b>Corporate Office Address</b>	Technaf Solartech Energy Limited, 2nd Floor, Colloid Center, 206/A, Tejgaon Industrial Area, Dhaka 1208.
<b>Plant Address</b>	Technaf Solartech Energy Limited, Village: Dakhxin Nhilla Alikhali, Union: 2 No. Nhilla, Upazila: Teknaf, Zilla: Cox's Bazar
<b>Type of Business</b>	Electricity generation and distribution to gridline
<b>Plant Type and Capacity</b>	20 MW electricity generation
<b>Plant Installation area</b>	116 acres of Land
<b>Electricity Coverage Area</b>	Transmission to the National Grid
<b>No. of beneficiaries</b>	All over Bangladesh
<b>Major Equipment</b>	Solar modules (Poly crystalline silicon), grid-tie string inverters.
<b>Installation and Supervision</b>	Installation by TSEL and Supervision by Sgurr Energy India Pvt. Ltd
<b>Operation and Maintenance</b>	TSEL

Source: TSEL ESMS Document

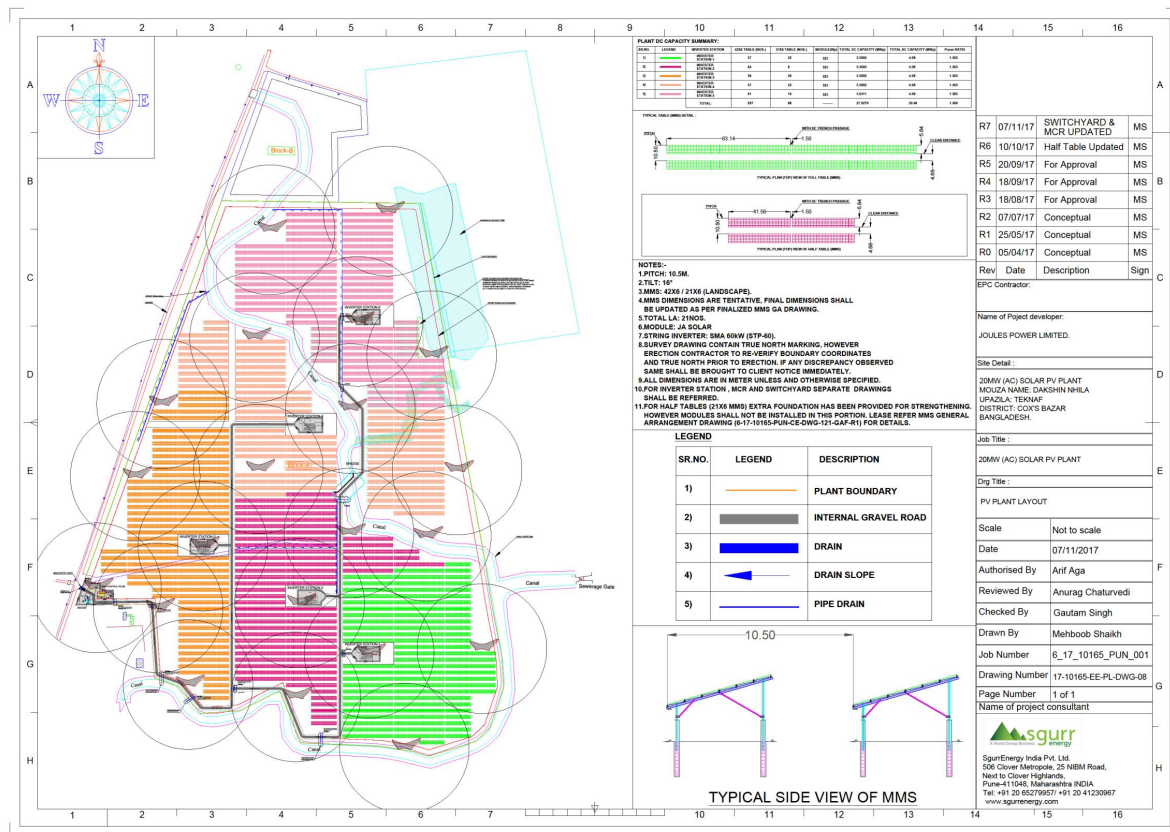


Figure 19: Project Layout Plan

## 2.2 Update on the Status of the Design/Construction/Operation Activities

The construction phase is over and the commissioning date was 15 September 2018.

## 2.3 Key Developments and any Major Changes in Location and Design

There were no new major developments or changes in the location and design of the project.

## 2.4 Reporting Period Covered by this Audit Report (month/year)

BCAS Team was mobilized at TSEL from 12 January to 13 January, 2020. TSEL was asked to furnish required documents by one week. Although BCAS is supposed to carry out quarterly audit, the first audit will cover 6 months (May 2019 to October 2019).

## 2.5 Environmental and Social Auditing Team

The Environmental and Social Monitoring Team comprised of the following members from BCAS:

1. Dr. Moinul Islam Sharif, Environmental & Social Specialist
2. Nahid Akhter Katha, Junior Consultant
3. Md. Billal Hossain, OHS Specialist

## **2.6 Limitations**

The report is based on information provided to BCAS before, during the site visit and post the site visit. The findings and observations made herein are based on application of professional judgment. The findings should be viewed in the context of the applicable scope and objectives of the study and the limitation on time and resources made available to the consultants for the successful completion of the study. The Assessment was based on readily available information/ documentation, visual reconnaissance, and management interviews in course of site visit.

Since, this was the first environmental and social audit for TSEL, attempts were made to observe as many items as possible in an overall or gross perspective. BCAS Audit Team will endeavor to observe various environmental, social, health and safety issues in further detail during the future audits.

### **3. Audit Scope and Objective**

#### **3.1 Scope**

The audit shall be carried out on existing facilities which focuses broadly on two elements:

- (a) Compliance of existing facilities and operations with relevant environmental (including occupational health and safety) and social laws, regulations, and applicable IFC and World Bank policies (namely, World Bank Performance Standards); and
- (b) The nature and extent of environmental and/or social impacts, including contamination to soils, groundwater, and structures, as a result of past/ on-going activities and proposed transactions.

#### **3.2 Objective**

The objectives of environmental and social audit are to appraise project activities, specially taking into account environmental and social regulatory frameworks, environmental standards, environmental health and safety measures and sustainable use of natural resources. The objectives are:

- I. to ensure compliance with the World Bank and DOE environmental and social requirements as identified in IPFF II E&S Policy;
- II. to identify any environmental and social issues associated with a particular project/ operation;
- III. to identify and evaluate the financial implications related to environmental and social issues;
- IV. to minimize exposure to financial risks associated with these issues;
- V. to maximize opportunities for environmental or social benefits and minimize the potential for adverse environmental and social impacts (such as pollution or accidents) associated with project;
- VI. to facilitating management control of environmental practices
- VII. to exploring improvement opportunities

#### **4. Description of Audit Approach and Methodology**

The overall approach and method for conducting E&S audit can be categorized into three segments of activities- pre-audit, on-site audit and post audit.

##### **4.1 Pre-audit activities**

The pre audit activity aims to develop an audit plan for the on-site activities and to make the necessary preparation and arrangements for the on-site audit. The tasks at this stage are to:

- a) Indicate the objective, scope and criteria of the audit;
- b) Develop an audit plan for the on-site activities;
- c) Prepare audit questionnaire;
- d) Review background information
  - Site layout plan(s), Site history, use and activities;
  - Organizational structure at audit site;
  - Internal environmental policies, procedures and guidelines.
- e) Review operational information
  - Operational activities and process description;
  - Management system policies, procedure and program documentation;
  - Relevant records (compliance, monitoring, training, maintenance, calibration etc.);
  - Other relevant information pertaining to environmental management practices.
- f) Conduct initial site visit
  - Meet with officer-in-charge to explain purpose of audit;
  - Assess whether background information gathered is up to date and accurate;
  - Follow-up on the list of preliminary audit impressions;
  - Identify and request additional site information as necessary;
  - Confirm thoroughness of audit scope;
  - Establish adequacy of resources for audit.
- g) Develop on-site questionnaire and audit protocols
- h) Review Audit Plan and arrange logistics
  - Audit scope;
  - Audit schedule;
  - Audit protocols;
  - Allocated resources.

##### **4.2 On-site Audit Activities**

The on-site audit objectives should reflect those of the environmental and social audit, which are:

- a) Verification of legislative and regulatory compliance
- b) Assessment of internal policy and procedural conformance
- c) Establishment of current practice status
- d) Identification of improvement opportunities
- e) Conduct on-site meeting
  - Present audit scope and objectives;
  - Outline the audit approach and methodology;
  - Address questions or concerns of site personnel;
  - Rally staff support and assistance.

- f) Document Review
  - Management policy and Management system documentation;
  - Operational procedures;
  - Records (utility, inventory, monitoring, calibration, transportation, training etc.);
  - Previous audit reports.
- g) Conduct detailed site inspections with aid of on-site audit protocols to look for evidence on:
  - Verification of legislative and regulatory compliance;
  - Assessment of internal policy and procedural conformance;
  - Establishment of current practice status;
  - Identification of improvement opportunities;
  - Status of operational practice;
  - Staff participation in management system.
- h) Conduct Staff Interview to obtain information on
  - Actual practices (current and past);
  - Compliance with/or deviation from statutory and departmental requirements;
  - Awareness of requirements and expectations.
- i) Review Audit Evidence to ensure adequacy of audit evidence at the conclusion of onsite audit by:
  - Reviewing information gathered;
  - Collecting additional information as needed;
  - Substantiating audit findings;
  - Summarizing and documenting all findings and observations;
  - Identifying issues requiring immediate attention/mitigation
  - Noting outstanding issues requiring follow-up.
- j) Conduct closing meeting: The closing meeting provides an opportunity at the conclusion of on-site audit to:
  - Debrief the senior site management;
  - Summarize the audit activities and findings;
  - Highlight system strengths and weaknesses;
  - Discuss preliminary findings and recommended corrective action;
  - Bring up findings requiring immediate attention;
  - Clarify any outstanding issues and Address staff questions or concerns.

#### **4.3 Post audit activities**

The post audit activity aims to produce an Audit Report with audit findings and recommendations and to contribute towards formulation of an Action Plan for continual performance improvement. The activities will be as follows:

- a) Collate information and follow up outstanding issues - should include
  - Completed pre-audit questionnaire, operational document checklists;
  - Completed on-site survey questionnaires, on-site audit protocols;
  - All relevant correspondence, memoranda, reports, diagrams and drawings;
  - Copies of records, photographs, and other information collected during the site visit;
  - Detailed inspection and interview notes and summaries.



## 5. Summary of Audit Finding

### 5.1 Assessment and Management of Environmental and Social Risks and Impacts

#### 5.1.1 Operational & EHS Performances

The summary of the project operational status and EHS performance for May 2019 to October 2019 have been presented in Table 13.29 and 13.30 below respectively:

**Table 13.29: Operational Performance – May 2019 to October 2019**

Sl. No.	Particular	May	June	July	August	Sep	Oct
1	Gross Generation (MWH)	3331.22	2966.42	2108.62	2948.62	2532.22	3378.59
2	Auxiliary Consumption (MWH)	2.93	5.16	8.29	6.45	7.24	8.28
3	Total Export (MWH)	3331.22	2966.42	2108.62	2948.62	2532.22	3378.59
4	Total Import (MWH)	2.93	5.16	8.29	6.45	7.24	8.28
5	Availability (%)	100.00	97.21	99.12	99.76	98.43	96.74
6	Plant Factor (%)	16.65	6.86	10.18	14.22	12.22	16.31

Source: TSEL

**Table 13.30: EHS Performance– May 2019 to October 2019**

Sl. No.	Particular	May	June	July	August	Sep	Oct
<b>A</b>	<b>Environment</b>						
1	No. of environmental accidents	0	0	0	0	0	0
<b>B</b>	<b>Health &amp; Safety</b>						
1	Fatality	0	0	0	0	0	0
2	Lost Time Accident (LTA)	0	0	0	0	0	0
3	First Aid Cases	0	0	0	0	0	0
4	Near Miss	0	1	0	0	0	0
5	Days since LTA	259	289	320	351	381	412

Source: TSEL

### 5.1.2 Legal Register

Currently, TSEL have environmental clearance certificate, factory license, trade license from Union Parishad and fire license and all are up to date. The licenses are also displayed in the front gate office.



Photo 16: Display of Licences

LEGAL REGISTER						
S. NO.	NAME OF THE LICENSE/CERTIFICATE	ISSUED BY GOVERNMENT AGENCY	ISSUE DATE	EXPIRY DATE	STATUS	PERSON RESPONSIBLE FOR RENEWAL
01	AOC	Union Parishad	30/05/2019		updated	Mr. Shamsul Islam, Asst. Manager, Admin.
02	Env. Clearance Certificate	Department of Environment, Bangladesh	11/03/2019		updated	Mr. Shamsul Islam, Asst. Manager, Admin.
03	Factory License	Department of Industries, Bangladesh	20/04/19	30/06/2020	updated	Mr. Shamsul Islam, Asst. Manager, Admin.
04	Fire License	Fire Service BD	01/07/19	30/06/2020	updated	Mr. Shamsul Islam, Asst. Manager, Admin.
05	Trade License	Union Parishad	01/07/19	30/06/2020	updated	Mr. Shamsul Islam, Asst. Manager, Admin.
06	Environmental Clearance Certificate	Dept. of Environment, Bangladesh	01/07/19	30/06/2020	updated	Mr. Shamsul Islam, Asst. Manager, Admin.

Photo 17: Updated License Register Book

A legal Register is maintained for all the certificates and licenses with the issue date, expiry date and next renewal date. The list of certificate and licenses of TSEL are shown Table 13.31.

**Table 13.31: EHS License/Permit Compliance Status for TSEL**

Name of the License/Certificate	Issued by government agency	Status	Issue Date/ Renewal Date	Expiry Date
Factory License	Department of Inspection for Factories and Establishments (DIFE), Bangladesh	Complied	25 <sup>th</sup> March 2019	30 <sup>th</sup> June 2020
Fire License	Fire service & civil defense Bangladesh	Complied	1 <sup>st</sup> July 2019	30 <sup>th</sup> June 2020
Site Clearance certificate	Department of Environment Bangladesh	Complied	17 <sup>th</sup> September 2017	
Environmental Clearance Certificate	Department of Environment Bangladesh	Complied	6 <sup>th</sup> August 2019	16 <sup>th</sup> July 2020
Trade License	Union Parishad	Complied	1 <sup>st</sup> July 2019	30 <sup>th</sup> June 2020
NOC	Union Parishad	Complied	20 <sup>th</sup> September 2016	

### 5.1.3 Environment, Health and Safety

TSEL has developed an Environmental and Social Management System (ESMS) which includes all the issues regarding Environmental Care, Health and Safety, Documentation System, Management Responsibility, Resource Management, Customer Related Processes, Supply and Contract Work Management and scopes for improvement. The whole system is documented and kept in both hard and soft copy in a well-organized order with a TOC.

It should have the signature of the designated authority. All the required pages have to be signed by designated authority.

Based on the ESMS, an Environmental, Health, Safety (EHS) Plan has been developed in tabular format with tasks, references, timeline requirements, timelines and status. This monitoring plan shall have to be an integral part of monthly health & safety inspection and shall be included in the health & safety inspection report accordingly and shall also be discussed in the monthly HSE meetings.

TSEL has engaged an EHS personnel responsible for the monitoring of EHS Plan and other ESMMP implementations.

The keynotes of the Environmental, health and safety and social policies displayed at the entrance gate, in front of the central control building as well as administrative building of TSEL would be more effective.

#### **5.1.4 Emergency Preparedness and Response for Operation Phase**

TSEL should develop an Emergency Response Plan (ERP) into a consolidated document with:

- Identification of, including risks associated with all project components;
- Key community and environmental sensitivities (such as village settlements, ponds, etc.) and the potential of offsite consequences along with mitigation measures;
- A common communication and emergency response process flow for onsite emergencies as well as their communication to authorities offsite;
- Disclosure to communities in the vicinity of the project on the emergency readiness of the company in case of any incidents.

#### **5.1.5 Training of TSEL Staff and Contractors' Staff on ESMMP and EHS**

Training Calendar and mock drill calendar for 2020 is in place. However, this should be displayed and communicated with the staffs and workers.

Training Register shall be developed in a tabular format (e.g. on MS Excel) depicting the names of all staffs in one column, names of trainings for each month on different columns in chronological manner. The register should be able to clearly depict which staff should go for which training on which month. It should also depict whether the concerned staffs participated and successfully completed the trainings. This means, the Training Register shall have to be updated on regular basis.

#### **5.1.6 Stakeholder Engagement**

A detailed Stakeholder Engagement Plan (SEP) will be developed by TSEL and Engagement records will be maintained.

SEP should include stakeholder profiling, key concerns, expectations, impact and influence, and risk rating of various stakeholder groups. It should include details on engagement strategy, disclosure, monitoring, reporting etc. The SEP should be subsequently updated with engagement records.

During the site visit, BCAS team has a stakeholder consultation with a group of land owners who have leased their lands to TSEL. Keynotes of the consultation is shown in the following table:

**Table 13.32: Details of Stakeholder Consultation**

<b>Stakeholder group</b>	Land Owners
<b>Participants</b>	Kalo Mia, Jafar Alam, Osman Goni, Fayes Ahmed, Yezhar Mia, Mohammad Ali
<b>Key discussions</b>	<ul style="list-style-type: none"> <li>• In 2017, the land owners have leased their lands to TSEL for 24 years.</li> <li>• Before construction of TSEL, the lands were used for salt cultivation.</li> <li>• Every year the land owners are getting the lease amount on time and they have no complain about it.</li> <li>• Before TSEL, they have no idea about solar plant and how clean the operation is. There is no air pollution and noise problem.</li> <li>• The operation of TSEL does not affect the community in any ways.</li> <li>• The participants expressed their opinion on their current energy access situation. Before due to load shading, their business activities were hampered. But now, there is almost 24 hours electricity access to the local people.</li> </ul>



**Photo 18: Stakeholder consultation**



## 5.2 Labor and Working Conditions

### 5.2.1 Working Conditions and Terms of Employment

#### 5.2.1.1 Terms of Employment

Under Director Operations of TSEL, Head of Plant is responsible for plant operation. To support him, there are Technical department and General Admin & support operation department to help in regarding all the plant activities in operation phase. Table 5.4 below depicts TSEL manpower at the plant:

**Table 13.33: TSEL Manpower at the Plant**

S. No	Designation	Number
1	Head of Plant	01
Technical Department		
2	Lead Engineer, Electrical	01
3	Asst. Engineer/ Engineer	05
4	Foreman	01
5	Technician	03
General Admin & Support Operation Department		
6	Assistant Store	01
7	Admin & Cashier	01
8	Admin Assistant	01
9	Security Supervisor	01
10	Asst. Security Supervisor	01
11	Platoon Commander	01
12	Asst. Platoon Commander	01
12	Ansar	24
Auxiliary Support Staff		
13	Driver	01
14	Cook	02
15	Cleaner	01

Source: TSEL Site Officials

TSEL will review their HR policy. TSEL, while reviewing its HR policy, may consider the following aspects for inclusion:

- Roles and responsibilities associated with various positions need to be mentioned;
- Non-discrimination policy should be mentioned;
- HIV/ AIDS non- discrimination should also be spelt out;
- Working with Suppliers and contractors and non-employee workers may also be referred to;
- Non-tolerance of child labor and forced labor not only for employee, but for the non-employee workers if any
- Anti- Sexual Harassment Policy may be explicitly captured.



All contractors and sub-contractors within the consortium should be required to apply the principles of the TSEL HR Policy document and also ensure that their internal procedures follow local and international standards.

### 5.2.1.2 Working Hour and Overtime

According to contemporary labor law of Bangladesh (Bangladesh Labor Law 2006, last amended in 2013), each labor should enjoy a paid weekly holiday after maximum 6 days of continuous works. This implies, there should be maximum 26/27 working days per worker per month, while the worker should be receiving the salary of the whole month. By law, daily working hour is 8 hours and daily overtime should not exceed 2 hours. Maximum working hours including overtime is 60 hours per week, but on the average this should not be more than 56 hours per week (according to Bangladesh Labor Law) per year. This means, average maximum overtime per week is 8 hours. Maximum overtime per month should not exceed 48 hours in 4 (four) weeks.

Employees of TSEL have the provision of one day weekly holiday. A regular permanent employee can enjoy 20 days of earned leave, 10 days of casual leave and 14 days of sick leave. TSEL employees do not require to work overtime. Working hour of TSEL staff is followed as per Bangladesh Labor Law. TSEL staffs are not required to work overtime as it is one shift production facility.

### 5.2.1.3 Payment of Salary and Overtime

The policy maintained by TSEL for payment of salary and overtime are listed in the following table:

**Table 13.34: Details of payment of salary and overtime for TSEL staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019			Recommended for Approval
		Policies	Eligibility & Criterion	Present Status	
01	Monthly Gross Salary	60% Basic salary; 30% House rent allowance; 10% Personal allowance	All employees	Continuing	In general, monthly gross salary will be: Basic salary = 60% House rent = 30% Personal allowance = 10%
02	Over Time Allowance	-	For non-management level employees	Not effective now	As per Bangladesh Labor Law

#### 5.2.1.4 Accommodation of Staffs

Since, the construction phase is over, no labor camp for local workers is required any more.

In the operation phase, TSEL provides accommodation facility for the both permanent and contractual non-local bachelor staffs stationed at project site.

#### 5.2.1.5 Festival Bonus, Provident Fund and Gratuity

All the permanent staffs of TSEL are entitled to festival bonus, provident fund and gratuity, while the contractual staffs are not entitled to provident fund and gratuity. The policy maintained by TSEL for Festival Bonus, Provident Fund and Gratuity are listed in the following table:

**Table 13.35: Details of Festival Bonus, Provident Fund and Gratuity for TSEL Staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019		
		Policies	Eligibility & Criterion	Present Status
01	Festival Bonus	1 Basic salary per festival	For both management and non- management staff including contractual staff Will be provided for 2 festivals per year	Continuing
02	Provident Fund	As per Expo Group Policy	For permanent staff only Considered after commercial operation starts	Effective from July 2019
03	Gratuity	As per Expo Group Policy	For permanent staff only Considered after commercial operation starts	Effective from the day of Incorporation

#### 5.2.1.6 Other Benefits Provided by TSEL

The followings are the additional compensation & benefits of TSEL employees:

**Table 13.36: Details of additional compensation & benefits of TSEL staff**

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019		
		Policies	Eligibility & Criterion	Present Status
01	Group Health Insurance	Insurance coverage for self, spouse and 2 children (as per job grade)	For both management and non- management staff including contractual staff	Continuing

Sl. No.	Policy List	As per benefits schedule of JPL and TSEL amended on 25/07/2019		
		Policies	Eligibility & Criterion	Present Status
02	Group Life Insurance	For self only (insurance amount varies per job grade)	For both permanent and contractual non-management staff including contractual staff	Continuing
03	Station allowance	BDT 6000/ month	For both management and non- management staff only For staff stationed at project site only to cover for food expenses	Continuing
04	TA, DA and other allowance for travel	At actual	At actual	At actual

### 5.2.2 Workers' Organization/ Participation Committee, Worker Participation Fund & Worker Welfare Fund

Rule 183 (1) of the Bangladesh Labour Rules, 2015: The owner of each company, where at least fifty permanent workers work, will form a participating committee within 3 months of starting operations. On the other hand, the occupier of the factory is required to set up a "Worker Participation Fund" and "Worker Welfare Fund" in accordance to the provisions of the Bangladesh Labour Law 2006.

As the number of TSEL permanent staff is less than 50, TSEL does not required to set up any participation committee or worker welfare fund.

### 5.2.3 Non-discrimination and Equal Opportunity

TSEL should ensure non-discrimination and equal opportunity through its HR Policy as well as in practice.

It was observed that there is no female among the existing TSEL staffs at the plant. However this is mainly attributed to unavailability of competent female candidates capable of handling the designated chores in the power plant.

### 5.2.4 Grievance Redress Mechanism

Although internal grievance is recorded in a register book, a formal internal grievance redress mechanism is yet to be developed. Internal grievance box for the staff is provided at the main gate. Till 28<sup>th</sup> January 2020, all the grievance received and redressed are shown in the following table.

**Table 13.37: Grievance records of TSEL**

Sl. No.	Complain Details	Name of Complaint	Receiving Date	Closing Date	Remarks
01	Transportation- TSEL technician team asked for two bicycle to use inside the plant	Md. Shamol Ali, TSEL	03.03.2019	13.04.2019	TSEL management has provided two bicycle for the use inside the plant
02	Safety Items- TSEL staff requested for new safety items (Safety shoes, helmet, etc.) as the old ones were damaged	Md. Altaf Hossain, TSEL	09.03.2019	20.04.2019	New safety gears were purchased and distributed to the TSEL staff
03	Recreation options for Ansar- security force at TSEL	Md. Inul Haque, TSEL	10.03.2019	10.05.2019	For the entertainment purpose, TSEL management has provided one 32” LED TV for the Ansar Camp.



**Photo 19: Complain Boxes for Worker/ Staff and Other Stakeholders**

### **5.2.5 Protecting the Work Force – Child Labor & Forced Labor**

TSEL should place adequate system to ensure prohibition of child labor and forced labor. Worker below 18 years of age should not be recruited by TSEL or its contractors on any sub-contractor. During employing staffs/workers directly or through sub-contractors, child labor engagement should be strictly avoided, and National ID Card of each worker should be checked and copy of the same is to be kept in the file.

During the reporting period, no grievance has been received from any plant staff or contractor's workers regarding forced labor.

### **5.2.6 Workers' Health and Safety**

#### **5.2.6.1 Work Permits for Non-routine Activities**

TSEL maintains a general permit/checklist for the non-routine activities. There is procedure and practice in place for work permits for non-routine works.

#### **5.2.6.2 Job Hazard Analysis and Hazard Identification and Risk Assessment Control**

For all the operation activities, potential risk hazards are mentioned and communicated with the workers. Proper use of PPEs are mentioned in the work permit as well.

Concerned personnel have been made aware of the potential hazards and risks through provision of relevant trainings. Use of necessary PPEs are ensured and necessary measures are taken to control potential risks.

#### **5.2.6.3 Health Facilities for the Plant Staffs and Workers**

First aid boxes are available with adequate first aider. Contact details of the first aider is displayed with photograph. While checking a sample first aid box, updated list of medicines was found and the medicines inside the box were well maintained. A register logbook is also maintained.



**Photo 20: First Aid Box with Details of Trained First Aider**



**Photo 21: First Aid REGISTER Book and Updated Medicine List**

For any injury or medical help, the patient will be sent to Upazila Health Complex. Emergency contact details of the health complex and ambulance services are detailed in the front security office of TSEL.

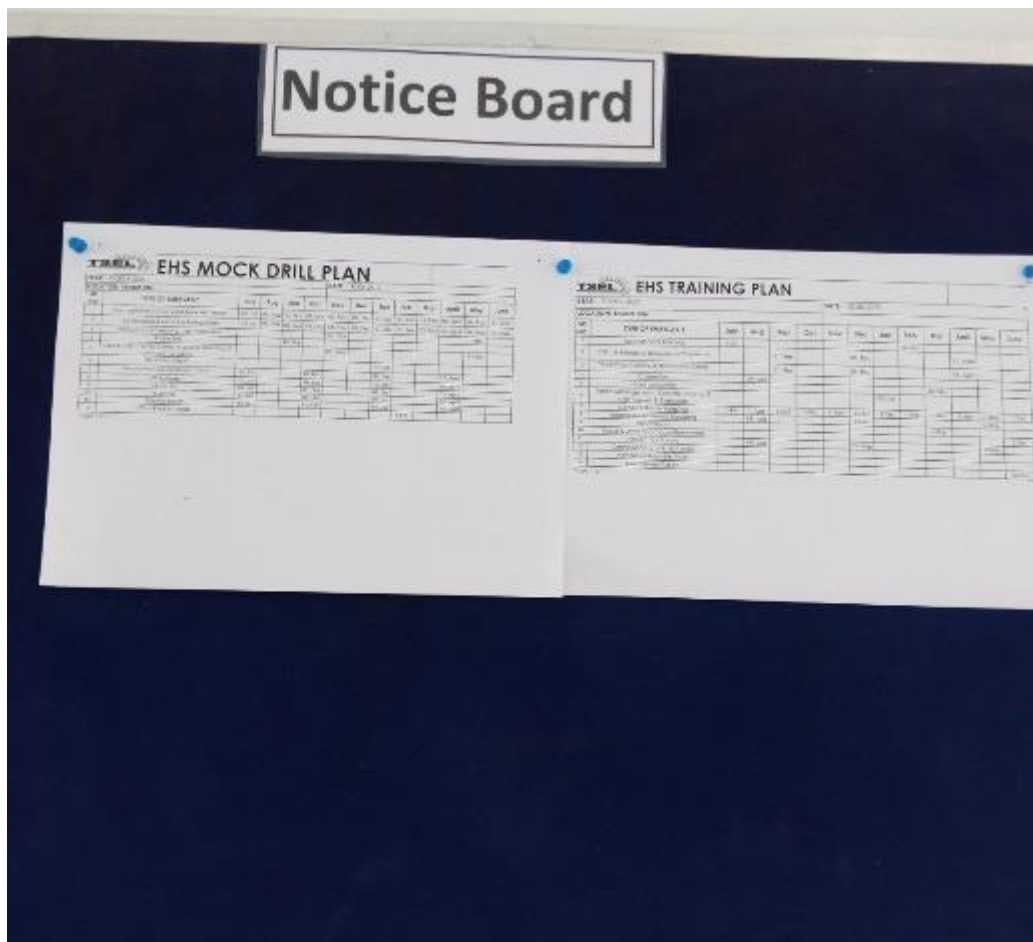


#### 5.2.6.4 Accident/Incident Investigation

Accident & Incident Register is in place. No accident took place during the reporting period.

#### 5.2.6.5 Environment, Health and Safety Trainings

Training Calendar and mock drill calendar for 2020 is in place and also displayed and communicated with the staffs and workers.



**Photo 22: Mock Drill and Training Plan displayed on the Notice board**

Training Register shall be developed in a tabular format (e.g. on MS Excel) depicting the names of all staffs in one column, names of trainings for each month on different columns in chronological manner. The register should be able to clearly depict which staff should go for which training on which month. It should also depict whether the concerned staffs participated and successfully completed the trainings. This means, the Training Register shall have to be updated on regular basis.



#### 5.2.6.6 Plant Visit Observations on Workers' Health and Safety

Overall workers' health and safety arrangement of TSEL is satisfactory. The plant staffs have been found to be using the necessary PPEs as and when needed.



**Photo 23: Mandatory PPE Usage for Worker Safety**

It is recommended that TSEL should ensure display of abstract of the key provisions of the Bangladesh Labour Rule 2015 in Bangla at the main entrance of the factory. The plant layout plan marking the dangerous or hazardous zones and routes for emergency evacuation should also be displayed.

#### 5.2.7 Contractor Management System

TSEL shall have to develop a SOP for contractor management system. Auditing of the contractors or sub-contractors did not take place before on EHS issues. Health/injury/life insurance of the contractors' or sub-contractors' workers is highly essential for those who will be engaged in risky or hazardous jobs.

### 5.3 Resource Efficiency and Pollution Prevention

#### 5.3.1 Monitoring of ESMMP Implementation

A good numbers of tasks mentioned in the Environmental and Social Management and Monitoring Plan (ESMMP) of the ESIA have not been found to be done in terms of timely manner and quantity required. All the tasks mentioned in ESMMP should be incorporated in the Environmental, Health, Safety and Social Monitoring Plan (EHSSMP). Reporting to DOE shall also be ensured on timely manner.

TSEL has renewed their environmental clearance certificate on 6th August 2019 and is valid till 16th July 2020.

### **5.3.2 Management System Certification**

TSEL has started the processes for documentation and practices to obtain Environmental Management System (EMS): ISO 14001 Accreditation and Health & Safety Management System: OHSAS18001 Accreditation within three years after operation.

### **5.3.3 Ambient Air Quality**

TSEL is a 100 % Green & Renewable Energy producing plant. During site visit, it was observe that TSEL does not operating any equipment which is producing air emission right now. Transport movement is also limited inside the plant which does not contribute to any air emission.

### **5.3.4 Noise Quality**

Power generation through solar modules do not cause any noise disturbance. After construction period was over, no other major activity was done which generated noise pollution.

### **5.3.5 Surface Water Quality**

Operation activities at TSEL do not generate any wastewater which contaminates the surface water.

### **5.3.6 Ground Water Quality**

Ground water is only used for domestic purpose and septic tanks is used for sanitary wastewater. So ground water does not get contaminated.

### **5.3.7 Electromagnetic Force**

ESMMP recommended for annual monitoring of Measurement of electromagnetic force by a certified agency for Transmission line, switch gears and transformers.

TSEL does not have EHV Overhead transmission lines in the plant. For transmission, 33000 V Underground cable is being used.

### **5.3.8 Terrestrial and Aquatic Habitats**

ESMMP recommended for boundary fencing to make terrestrial wildlife to choose alternative routes and planting of indigenous trees, where possible, around the boundary of the Project Site following the first year of operation.

Both fencing and planting of indigenous trees have already been ensured around the plant quite satisfactorily.

### 5.3.9 Traffic and Transportation

In practice, TSEL maintains records of every incoming and outgoing vehicle and keeps records of every incoming guests.

### 5.3.10 Waste Management

Different types of wastes have been found to be disposed in different locations of the site. Wastages were segregated and separate tagging were observed.



**Photo 24: Segregation of Wastages**

Third party waste contractor collects waste on regular basis. Scrap wastes such as scrap metals which are sold to the scrap vendors should be kept in a confined space avoid any incidents or accidents and to ensure workers' health and safety. Waste disposal register has to



be maintained regularly and auditing of the waste contractor shall have to be done accordingly.



**Photo 25: Scraps Wastes Waiting To Be Sold Off To Scrap Vendors**

Liquid wastes such as oils should be kept in secondary containment with proper excess volume in a designated storage area to avoid any kind of spillage and leakage.

Disposed or damaged solar panels are kept in the open. Damaged solar panels are categorized as hazardous wastage. So proper management mechanism should be adopted. Damaged or broken solar panels should be kept at a separate designated area and it is to be ensure that panels should be kept in cover so that there is no contamination in ground and water through leaching.

A small quantity, apx 20 KVA battery bank is used for internal control & protection relay power supply system. Usual life time of such lead battery is 2 years. Damaged Lead-acid batteries should be disposed by selling off to the battery recycling plants and should not be given to scrap vendors.

#### **5.3.11 Treatment of Sanitary Wastes**

There has been provision for septic tanks at the plant.

#### **5.3.12 Hazardous Material Management**

In the spare oil storage and waste oil storage, proper MSDS should be displayed both in English and local language Bangla.

#### **5.3.13 Green House Gas Emissions**

Power generation through Solar Panel does not emit greenhouse gases.

## **5.4 Community Health, Safety and Security**

### **5.4.1 Community Risk Mitigation**

Potential risks should be disclosed to neighboring community people. Necessary awareness should be made among neighboring community people in case of any emergency situation. They should also be made part of the mock drills.

### **5.4.2 Traffic Management and Logistics Plan and Its Implementation**

In practice, TSEL maintains records of every incoming and outgoing vehicle and keeps records of every incoming guests.

### **5.4.3 Life & Fire Safety**

TSEL possesses fire license from Fire Service & Civil Defense, Bangladesh. The fire license was issued on 1<sup>st</sup> July 2019 and is valid till 30th June, 2020.

Inspection of fire extinguisher is done once in every month on regular basis and records are kept by the EHS personnel. Mock drill on fire prevention and use of fire extinguisher is done once in every month.



**Photo 26: Fire Extinguisher and Updated Inspection Card**

#### 5.4.4 Grievance Redress Mechanism for Community People

External grievance redress mechanisms for the neighboring community are not established. Though a complain box is provided for the local community, a proper external redress mechanism is yet to be set.



Photo 27: Internal and External Complaint Box for Grievance

## 5.5 Biodiversity Conservation and Sustainable Management of Living Natural Resources

### 5.5.1 Develop Green belt within the Project Boundary

Greenbelt development has been done quite satisfactorily. As the plant boundary cannot have large trees due to shading problem in the panels, TSEL has planted medium and low height plants.



Photo 28: Plantation Activities by the TSEL Staff



### **5.5.2 Invasive Alien Species Management**

Invasive alien species management plan has been covered by the ESIA. The plant is well protected with boundary fencing and gates.



**Photo 29: Fencing for Boundary Protection**

## 6. Assessment of Compliance Status Regarding Environmental & Social Action Plan (ESAP) and WB PSs

### 6.1 Assessment of Compliance Status Regarding Environmental & Social Action Plan (ESAP)

The compliance status regarding Environmental & Social Action Plan (ESAP) based on the site visit and review of documents for May 2019 to October 2019 has been presented in Table 13.38. In order to define the status of various action items, color coding has been used for easy referencing, which is as follows:

	<i>Action Item Closed/ Complied</i>		<i>Satisfactory Progress</i>
	<i>Partially Complied</i>		<i>Not Complied/ Delay</i>
	<i>Not Due or To be Assessed Later</i>		

**Table 13.38: Compliance Status of TSEL Regarding Environmental & Social Action Plan (ESAP)**

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
1	Environmental and Social Management System (ESMS)	TSEL will implement an ESMS, including environmental policy, Social policy, aspect impact assessment, development of waste management, spill control and operational procedures with respect to handling hazardous substances and maintenance and aim to obtain ISO 14001 accreditation within the first	a) Environmental & Social policy b) 1st certification audit report.	TSEL management/ Third party	Within next audit	TSEL has developed an Environmental and Social Management System (ESMS) which includes all the issues regarding Environmental Care, Health and Safety, Documentation System, Management	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
		three years of operation.				Responsibility, Resource Management, Customer Related Processes, Supply and Contract Work Management and scopes for improvement. The whole system is documented and kept in both hard and soft copy in a well-organized order with a TOC. It should have the signature of the designated authority. All the required pages have to be signed by designated authority.	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
2	Health & Safety Management System	TSEL will implement a Health and Safety Management System including occupational Health & Safety policy, Hazard Identification & risk assessment, accident incident monitoring process & aim to obtain OHSAS18001 certification within the first three years of operation.	a) Occupational Health & Safety policy b) 1st certification audit report.	TSEL management/ Third party		Based on the ESMS, an Environmental, Health, Safety (EHS) Plan has been developed in tabular format with tasks, references, timeline requirements, timelines and status. This monitoring plan will be an integral part of monthly health & safety inspection and included in the health & safety inspection report accordingly and will also be discussed in the monthly HSE meetings.	
3	E&S Monitoring Program	Design environmental and social monitoring program including noise, AAQ, ground water, surface water and electromagnetic force (to be integrated with ISO 14001 process). Compare all value with the DoE guide line	Environmental and Social Monitoring report	TSEL management	Within next audit	An internal environmental and social monitoring program is not yet in place. Internal audit team should follow up the activities mentioned in the third party audits. Operation activities at	

Sl No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
						TSEL do not cause any air emission, noise disturbance and wastewater generation. Internal monitoring team should monitor any activities that can cause pollution.	
4	EHS Coordinator	TSEL will appoint a suitably qualified Environmental Health Safety (EHS) Coordinator, who will be responsible for implementation of the EMS.	Appointment letter & Training certificate of EHS coordinator	TSEL		TSEL has engaged an EHS personnel responsible for the monitoring of EHS Plan and other ESMMP implementations.	
5	Waste Management	Develop procedures for collection, storage and proper disposal of solid and hazardous waste (Integrated with ISO 14001)	Waste Management procedure	TSEL management	Within next audit	Different types of wastes have been found to be disposed in different locations of the site. Wastages were segregated and separate tagging were observed. Waste disposal register has to be maintained regularly and auditing of the waste contractor shall have to be done accordingly.	

Sl No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
						<p>Liquid wastes such as oils should be kept in secondary containment with proper excess volume in a designated storage area to avoid any kind of spillage and leakage.</p> <p>Disposed or damaged solar panels are kept in the open. Damaged or broken solar panels should be kept at a separate designated area and it is to be ensure that panels should be kept in cover so that there is no contamination in ground and water through leaching.</p> <p>Damaged Lead-acid batteries should be disposed by selling off to the battery recycling plants and should not be given to scrap</p>	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
						vendors.	
6	Green Belt	Provide evidence of compliance with the requirement of 33% green area as required in the environmental clearance condition.	Plant layout identified with green area Photo documentation	TSEL management		Green belt has been developed. As tall trees may cause shading on the solar panels, medium to low laying trees have been planted around the plant boundary.	
7	Grievance Mechanism	a) Develop an internal grievance mechanism to receive potential complaints of staff and contractors. b) Develop an external grievance mechanism to receive potential complaints of from the community & other interested parties.	a) Draft Documentation of internal grievance mechanism. b) Documentation of external grievance mechanism (if any).	TSEL	Within next audit	Although internal grievance is recorded in a register book, a formal internal grievance redress mechanism is yet to be developed. Internal grievance box for the staff is provided at the main gate.  External grievance redress mechanisms for the neighboring community are not established. Though a	



SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
						complain box is provided for the local community, a proper external redress mechanism is yet to be set.	
8	Stakeholder (Community) Engagement & communication Program	A Stakeholder Engagement Plan will be prepared by TSEL, in order to establish clear stakeholder engagement channels. People in the neighboring villages should have clear lines of communication to TSEL; and receive, investigate and address any complaints and/or concerns from all stakeholders.	Stakeholder Engagement Program	TSEL management /Third party	Within next audit	A detailed Stakeholder Engagement Plan (SEP) will be developed and Engagement records will be maintained. Commitment Register for stakeholder engagement will be developed and maintained. A complain box for grievance from local community has been set up.	
9	Environmental training	Provide EHS related training for all employees. Such as Fire training, waste management training, Risk identification, aspect impact assessment	Yearly training plan	TSEL training division	Within next audit	Training Calendar and mock drill calendar for 2020 is in place and displayed and communicated with the	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
		training.				staffs and workers.	
10	Legal register	Prepare a list of legal requirement & conduct evaluation of legal requirement as per list	Legal register	TSEL EHS team		<p>Currently, TSEL have environmental clearance certificate, factory license, trade license from Union Parishad and fire license and all are up to date. The licenses are also displayed in the front gate office.</p> <p>A legal Register is maintained for all the certificates and licenses with the issue date, expiry date and next renewal date.</p>	
11	EHS Committee	Established an EHS committee to conduct monthly Safety Meeting and present all employees for recent feedback regarding safety, environment practice and new hazard and mitigation plan.	HSE committee meeting report	TSEL management		HSE Committee has been established. Monthly meeting minutes have to be mailed to all employees and sited on notice board.	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
12	Traffic & transportation	Develop an traffic & transportation instruction for traffic safety	Vehicle safety instruction report	TSEL management		In practice, TSEL maintains records of every incoming and outgoing vehicle and keeps records of every incoming guests.	
13	Emergency response procedure	Develop an emergency response procedure for preparedness for any natural and manmade disaster like flood, earthquake, cyclone, fire, oil spillage all TSEL employee shall follow the “Emergency response procedure”.	emergency response procedure	TSEL management/ Third party		TSEL has prepared an Emergency Response Plan (ERP) as per mentioned in the ESIA report.	
14	Audit Mechanism	There are two types of audit. One is external and the other one is internal audit. External audit will be faced as per lender’s schedule. TSEL will conduct internal audit half yearly basis.	Audit report	TSEL management/ Third party	Within next audit	Third party external audit should be done as per lender’s instruction. On the other hand, No internal audit has yet been taken place since operation started.	
15	EHS communication	TSEL will develop an external & internal EHS communication process to communicate EHS issues to communicate with all stake holders.	Procedure for Environmental communication	TSEL management/ Third party	Within next audit	EHS plan has been established and EHS issues will be communicated with all the stakeholders in relevant trainings.	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
16	Accident prevention and Investigation	TSEL will develop an accident and incident investigation and preventative action process to reduce the frequency of injury (Integrated with ISO 18001).	accident and incident investigation procedure	TSEL management/ Third party		Accident and incident investigation procedure is in place. No accident till operation took place.	
17	Facility Safety Inspection	Facility Safety Inspections shall be performed by the plant management as often as needed (Integrated with ISO 18001).	Inspection process/plan/report	TSEL management	Within next audit	Facility Safety Inspections should be performed by the plant management and proper report should be documented.	
18	Fire safety	As Emergency response plan(13)	As Emergency response plan	TSEL management		Fire safety procedure has been covered under Emergency Response Plan. The factory has obtained the fire license (valid till 30th June 2020).	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
19	Invasive Alien Species Management Plan	<p>Invasive Alien Species are animals and plants that are introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment. They represent a major threat for their lives, and also for the plant and environment. Prevention, early warning and rapid response, and management are the three main of interventions on this regard. In this line, following initiatives will be taken:</p> <ol style="list-style-type: none"> <li>1. There will be more than man height wall around the Plant periphery to protect the animals trespassing into the plant.</li> <li>2. 24 hours basis security will be posted at gates and various security posts.</li> <li>3. There will be so many CCTV to monitor inside the plant.</li> <li>4. ERP response plan has been developed and it will be</li> </ol>	ESIA report/site visit/photo documentation	TSEL management	Within next audit	Invasive alien species management plan has been covered by the ESIA. The plant is well protected with boundary fencing and gates.	

SI No	Measures	Action Description	Deliverables	Responsibility	Target Completion	BCAS Observation	Status
		disclosed to the plant community.					

## 6.2 Assessment of Compliance Status Regarding World Bank PSs

The compliance status regarding World Bank PSs based on the site visit and review of documents for May 2019 to October 2019 has been presented in Table 13.39. In order to define the status of various action items, color coding has been used for easy referencing, which is as follows:

	<i>Action Item Closed/ Complied</i>		<i>Satisfactory Progress</i>
	<i>Partially Complied</i>		<i>Not Complied/ Delay</i>
	<i>Not Due or To be Assessed Later</i>		

**Table 13.39: Compliance Status of TSEL Regarding World Bank PSs**

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
<b>1</b>	<b>PS 1: Assessment and Management of Environmental and Social Risks and Impacts</b>				
1.1	Appoint a trained EHS Personnel for day to day monitoring of the EHS Plan and ESMMP implementation	High	EHS Officer for the Project		TSEL has engaged an EHS personnel responsible for the monitoring of EHS Plan and other ESMMP implementations.



SI No	Measures	Significance	Deliverables	Status	BCAS Observation
1.2	<ul style="list-style-type: none"> <li>• Develop an Environmental and Social Management System and an Environmental Health Safety (EHS) Plan on this regard.</li> <li>• Review of all the records being maintained as part of EHS Plan.</li> </ul>	High	<p>ESMS &amp; EHS Plan</p> <p>Records Review and Corrective Actions</p>		<p>TSEL has developed an Environmental and Social Management System (ESMS) which includes all the issues regarding Environmental Care, Health and Safety, Documentation System, Management Responsibility, Resource Management, Customer Related Processes, Supply and Contract Work Management and scopes for improvement. The whole system is documented and kept in both hard and soft copy in a well-organized order with a TOC.</p> <p>It should have the signature of the designated authority. All the required pages have to be signed by designated authority.</p> <p>Based on the ESMS, an Environmental, Health and Safety (EHS) Plan has been developed in tabular format with tasks, references, timeline requirements, timelines and status. This monitoring plan will be an integral part of monthly health &amp; safety inspection and be included in the health &amp; safety inspection report accordingly and shall also be discussed in the monthly HSE meetings.</p>
1.3	Display and communicate environment and health and safety and social policies of the company.	High	Disclosure of company policies		<p>The policies will be displayed and communicated. Display of these policies at the entrance gate as well as administrative building of TSEL would be more effective.</p>

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
1.4	Ensure display of abstract of the key provisions of the Bangladesh Labour Rule 2015 in Bangla at the main entrance of the factory. Contact details of the Factory Inspector as well as the registered medical practitioner engaged by TSEL should be displayed.	High	Display of Labour Rules, 2015, contact details of the Factory Inspector and medical practitioner		It is recommended that TSEL should ensure display of abstract of the key provisions of the Bangladesh Labor Rule 2015 in Bangla at the main entrance of the factory.
1.5	Develop and maintain legal register for all the Project components.	High	Legal Register for Operation Phase		Currently, TSEL have environmental clearance certificate, factory license, trade license from Union Parishad and fire license and all are up to date. The licenses are also displayed in the front gate office.  A legal Register is maintained for all the certificates and licenses with the issue date, expiry date and next renewal date.
1.6	Develop the management plans as identified in the ESIA report and update the ESMMP with defined action items, responsibilities, monitoring indicators and review/audit mechanisms.	High	Management Plans as per ESIA requirement		All the tasks mentioned in the ESMP of the ESIA report and E&S audit is incorporated in the ESMMP and EHS Plan.
1.7	Develop an organizational structure for the operation phase of the Project with defined roles and responsibilities	High	Organization Structure – Operation		Organization Structure with defined roles and responsibilities is in place.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
1.8	Mapping of training needs of TSEL Staff and development of training calendar and training register	High	Training Calendar and training register		<p>Training Calendar and mock drill calendar for 2020 is in place and displayed and communicated with the staffs and workers.</p> <p>Training Register shall be developed in a tabular format (e.g. on MS Excel) depicting the names of all staffs in one column, names of trainings for each month on different columns in chronological manner. The register should be able to clearly depict which staff should go for which training on which month. It should also depict whether the concerned staffs participated and successfully completed the trainings. This means, the Training Register shall have to be updated on regular basis.</p>
1.9	Training of TSEL Staff as well as contractor's staff/workers relevant issues of Operations ESAP, ESMS and ESMMP	High	Training Report		Currently, EHS trainings are being given to the TSEL staff as the contractors' engagement is already over.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
1.10	Develop an emergency response plan into a consolidated document with: <ul style="list-style-type: none"> <li>· Identification of, including risks associated with all project components;</li> <li>· Key community and environmental sensitivities (such as village settlements, ponds, etc.) and the potential of offsite consequences along with mitigation measures;</li> <li>· A common communication and emergency response process flow for onsite emergencies as well as their communication to authorities offsite;</li> <li>· Disclosure to communities in the vicinity of the project on the emergency readiness of the company in case of any incidents.</li> </ul>	Medium	Emergency Response Plan for Operation Phase		TSEL has prepared an Emergency Response Plan (ERP) as per mentioned in the ESIA report.
1.11	Review the emergency preparedness and response plan and include the necessary required emergencies and implement the same at the earliest.	High	ERP		TSEL should conduct risk assessment and review the ERP and updated if needed. Based on the updated ERP and procedure, the plant layout plan marking the dangerous or hazardous zones and routes for emergency evacuation should be displayed.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
1.12	Appoint a suitably qualified Emergency Coordinator for the Project	Medium	Emergency Coordinator for the Project		TSEL has formed separate team for firefighting, first aid and evacuation for any emergency situation. All the details for respective team personnel are listed in tabular format and this should be displayed for all workers.
1.13	Develop a Commitment Register as a part of stakeholder engagement process in order to document the outcomes of public consultations and respond to local community expectations, and ensure that these are communicated back to stakeholders and updates provided.	High	Commitment Register (Operation)		Commitment Register for stakeholder engagement will be developed and maintained.
1.14	Consider preparing a detailed SEP with stakeholder profiling, key concerns, expectations, impact and influence, and risk rating of various stakeholder groups. It should include details on engagement strategy, disclosure, monitoring, reporting etc. The SEP should be subsequently updated with engagement records.	High	Updated SEP for the Project		A detailed Stakeholder Engagement Plan (SEP) will be developed and Engagement records will be maintained. A complain box has been set up for grievance from local community and stakeholders.
<b>2</b>	<b>PS 2: Labor and Working Conditions</b>				

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.1	<p>TSEL while finalizing its HR policy may consider the following aspects for inclusion:</p> <ul style="list-style-type: none"> <li>• Roles and responsibilities associated with various positions need to be mentioned;</li> <li>• Non-discrimination policy should be mentioned;</li> <li>• HIV/ AIDS non- discrimination should also be spelt out;</li> <li>• Working with Suppliers and contractors and non-employee workers may also be referred to;</li> <li>• Non-tolerance of child labor and forced labor not only for employee, but for the non-employee workers if any</li> <li>• Anti- Sexual Harassment Policy may be explicitly captured;</li> </ul> <p>All contractors and sub-contractors within the consortium should be required to apply the principles of the TSEL HR Policy document and also ensure that their internal procedures follow local and international</p>	High	HR Policy and Procedures		<p>TSEL will review their HR policy. Roles and responsibilities associated with various positions should be mentioned. The policy should also include non-discrimination policy, non-tolerance of child labor and forced labor as well as anti-sexual harassment policy and also HIV/ AIDS non-discrimination policy.</p> <p>All the TSEL payroll employees are entitled to provident fund and gratuity. They have been covered under medical insurance for any sort of work related injury or health problem.</p> <p>On the other hand, the contracted staffs (if any) as well as casual staffs are not entitled to provident fund or gratuity or insurance.</p>

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
	standards.				



SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.2	Contractor's position on non-employment of child, forced or bonded labor has to be clearly stipulated more specifically to the sub-contractors and their associated workforce. There should be proper checks and verification systems in place for the workforce to ensure no cases of child labor or forced labor are not allowed within the site premises.	High	HR Policy and Procedures of Contractor		This portion will be covered in detail during the next audit after finalizing the HR policy.
2.3	<p>The Project should establish channels for management and workers to communicate and for the workers to place their concerns as well as suggestions.</p> <p>The grievance process should be made accessible for construction/operation workforce and should enable workforce to raise anonymous complaints. The grievance records should be properly documented, tracked and reviewed for redressing of the Grievances.</p>	High	Grievance redress mechanism		Although a complain box is been setup and TSEL is maintaining a record register for the grievance from the staff, a formal internal grievance redress mechanism is yet to be developed.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.4	Develop a site specific health and safety manual including SOPs and work permits required to protect the operation manpower (including subcontractors' personnel) from injuries.	High	SOPs for ESMS		Site specific health and safety manual including SOPs and work permits have been developed.
2.5	Develop a work permit system to carry out non routine jobs at the operation phase	High	SOP for work permit system and implementation		There is procedure and practice in place for work permits for non-routine works.
2.6	Prepare a Job hazard analysis for all the operation activity and same should be communicated to all the workers.	High	Job safety analysis		For all the operation activities, potential risk hazards are mentioned and communicated with the workers. Proper use of PPEs are mentioned in the work permit as well.
2.7	Prepare a pre-use inspection checklist (activity and equipment specific) and same should be performed and attach with every permit before starting of activity.	High	Activity and equipment specific checklist		For every activity, a Permit To Work checklist is maintained.
2.8	Conduct train the trainer program to increase the knowledge of the safety department.	Medium	Training Records		This portion will be covered in detail during the next audit.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.9	Ensure health Facilities for the Plant Staffs and Workers	High	Ensure necessary health facilities		<p>First aid boxes are available with adequate first aider. Contact details of the first aider is displayed with photograph. While checking a sample first aid box, updated list of medicines was found and the medicines inside the box were well maintained. A register logbook is also maintained.</p> <p>For any injury or medical help, the patient will be sent to Upazila Health Complex. Emergency contact details of the health complex and ambulance services are displayed in front of the security office of TSEL.</p>
2.10	Prepare an Accident & Investigation register to include the information related to the accident.	Medium	Accident & investigation register		Accident & Incident Register is in place. No accident took place during the reporting period.
2.11	Carryout hazard identification and risk assessment (HIRA) for all operation and associated activities and preparation of SOPs	High	HIRA Register and SOPs		Facility Risk Assessment has been carried out. It is to be noted that facility risks have been measured for the scenario before use of additional control. Control measures have been mentioned to reduce risks level within acceptable limit for the moderate/ substantial/ intolerable risks.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.12	Carry out inspection for the potential hazards at the facility and provide the risk control as per the hierarchy of control.	High	Risk control measures		All the potential hazards should be listed out with their control measures.
2.13	Provide training to workers, supervisors and employees on importance and usage of PPEs for different activities and organize PPE awareness program.	High	Training Calendar		The last training on PPE was conducted on 1st December 2019 and the next training session will be on 1st April 2020.
2.14	Prepare training modules for job specific trainings and identify workers required to undergo job specific trainings.	High	Training modules		Training modules are available. However, this will be further assessed during next audit.
2.15	Conduct the first aid training with the help of qualified first aider and make sure that first aiders are available at all times at facility.	High	First aid trainings		First aider training should be imparted every year and should be included in the training calendar. First aid boxes are available with adequate first aider. Contact details of the first aider is displayed with photograph.
2.16	Develop a standard operating procedure on incident investigation with roles and responsibilities.	High	Incident investigation SOP		SOP on incident investigation with roles and responsibilities is maintained.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
2.17	Start preparing the accident/ incident statistics for each and every area and start identifying the area of concerns and prepare an action plan to address the issues by mean of alternate work procedure, trainings, special attention to the high risk jobs, increase in number of supervisor for high risk jobs.	Medium	Statistical analysis of accident/ incident data and corrective action		No accident took place during current year.
2.18	<p>TSEL will need to put in place a formal contractor management system to audit its contractors as well as sub-contractors. The management system should include:</p> <ul style="list-style-type: none"> <li>• Compliance checklist against the Applicable Standards including applicable requirements under BLR 2015;</li> <li>• Criterion on contractor selection to minimize HSE or labor related risks and issues at the time of engagement;</li> <li>• Monitoring and audit procedures; and</li> </ul> <p>Further the contractors and the sub-contractors should be made responsible for the insurance of the</p>	High	Contractor Management System		TSEL shall have to develop a SOP for contractor management system. Auditing of the contractors or sub-contractors did not take place before in Terms of EHS issues. Health/injury/life insurance of the contractors' or sub-contractors' workers is highly essential for those who will be engaged in risky or hazardous jobs.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
	workers mobilized at the site.				
<b>3</b>	<b>PS 3: Resource Efficiency and Pollution Prevention</b>				
3.1	Update the EHS Plan including all the ESMMP implementation requirements during operation phase to be complied in line with the proposed timelines and review of implementation of ESMMP by EHS personnel of TSEL. Ensure reporting to DOE on this regard on timely manner.	High	ESMMP implementation		TSEL has set up an EHS committee to monitor the EHS plan and will be monitoring all the activities under ESMMP.

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
3.2	Environmental Management System (EMS): Ensure ISO 14001 accreditation within three years after operation.	High	ISO 14001 accreditation		Processes for documentation and practices have already been started.
3.3	Health & Safety Management System: Ensure OHSAS18001 accreditation within three years after operation.	High	OHSAS18001 accreditation		This measure will be assessed later.
3.4	Undertake regular monitoring of ambient air quality in line with the ESMMP.	High	ESMMP implementation		TSEL is a 100 % Green & Renewable Energy producing plant. During site visit, it was observe that TSEL does not operating any equipment which is producing air emission right now. Transport movement is also limited inside the plant which does not contribute to any air emission. EHS committee should monitor activities that may cause air emission and report it accordingly.
3.5	Undertake regular monitoring of noise levels in line with the ESMMP.	High	ESMMP implementation		Power generation through solar modules do not cause any noise disturbance. After construction period was over, no other major activity was done which generated noise pollution. EHS committee should monitor activities that may cause noise generation and report it accordingly.
3.6	Undertake regular monitoring of Electromagnetic Force in line with the ESMMP.	High	ESMMP implementation		TSEL does not have EHV Overhead transmission lines in the plant. For transmission, 33000 V Underground cable is being used. Electromagnetic force for transformer should be monitored.



SI No	Measures	Significance	Deliverables	Status	BCAS Observation
3.7	Undertake regular monitoring of surface water quality in line with the ESMMP.	High	ESMMP implementation		<p>Operation activities at TSEL do not generate any wastewater which contaminates the surface water.</p> <p>EHS committee should monitor activities that may cause surface water contamination and report it accordingly.</p>
3.8	Undertake regular monitoring of ground water quality in line with the ESMMP.	High	ESMMP implementation		<p>Ground water is only used for domestic purpose and septic tanks is used for sanitary wastewater. So ground water does not get contaminated.</p> <p>EHS committee should monitor activities that may cause ground water contamination and report it accordingly.</p>
3.9	Undertake necessary actions regarding terrestrial and aquatic habitats in line with the ESMMP.	High	ESMMP implementation		<p>ESMMP recommended for boundary fencing to make terrestrial wildlife to choose alternative routes and planting of indigenous trees, where possible, around the boundary of the Project Site following the first year of operation. Both fencing and planting of indigenous trees have already been ensured around the plant quite satisfactorily.</p>

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
3,10	Undertake necessary actions regarding traffic and transportation in line with the ESMMP.	Medium	ESMMP implementation		In practice, TSEL maintains records of every incoming and outgoing vehicle and keeps records of every incoming guests.
3.11	Undertake necessary actions regarding waste management in line with the ESMMP.	Medium	ESMMP implementation		<p>Different types of wastes have been found to be disposed in different locations of the site. Wastages were segregated and separate tagging were observed.</p> <p>Third party waste contractor collects waste on regular basis. Scrap wastes such as scrap metals which are sold to the scrap vendors should be kept in a confined space avoid any incidents or accidents and to ensure workers' health and safety. Waste disposal register has to be maintained regularly and auditing of the waste contractor shall have to be done accordingly.</p> <p>Liquid wastes such as oils should be kept in secondary containment with proper excess volume in a designated storage area to avoid any kind of spillage and leakage.</p> <p>Disposed or damaged solar panels are kept in the open. Damaged solar panels are categorized as hazardous wastage. So proper management mechanism should be adopted. Damaged or broken solar panels should be kept at a separate designated area and it is to be ensure that panels should be kept in cover so that there is no contamination in ground and water through leaching.</p>

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
					Damaged Lead-acid batteries should be disposed by selling off to the battery recycling plants and should not be given to scrap vendors.
3.12	Undertake necessary actions regarding human & sanitary wastes in line with the ESMMP.	High	ESMMP implementation		There has been provision for septic tanks at the plant.
3.13	Develop a Hazardous Materials Management (HMM) Plan and implement it.	High	HMM Plan – Operation phase		MSDS for Transformer oil and diesel oil have to be maintained both in English and local language Bangla.
3.14	Provide trainings on ESMMP implementation at least annually.	High	Trainings on ESMMP implementation		No training on ESMMP implementation has taken place during the current year.
3.15	Ensure no use of asbestos containing material is specified in the design of the Project.	High	No use of Asbestos Containing Material		No use of asbestos containing material has been ensured.
<b>4</b>	<b>PS 4: Community Health, Safety and Security</b>				

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
4.1	Conduct a detailed QRA for the Project based on actual design and formulate an emergency response plan.	Medium	Quantitative Risk Assessment and Emergency Response Plan		The Emergency Response Plan has been established. Risk Assessment for TSEL has been done. ERP shall have to be reviewed and updated if needed. This measure will assessed further in the next audit.
4.2	Develop a traffic management and logistics plan taking into consideration community safety	High	Traffic management plan.		In practice, TSEL maintains records of every incoming and outgoing vehicle and keeps records of every incoming guests.
4.3	Undertake specific communication on health hazards and mitigation measures on an ongoing basis against new activities and associated health and safety risks to the local community.	Medium	Communication on health hazards and mitigation measures.		Based on the ERP, potential risks should be disclosed to neighboring community people. Necessary awareness should be made among neighboring community people in case of any emergency situation. They should also be made part of the mock drills.
4.4	Obtain fire license from the government and renew it on time.	High	Fire Safety		TSEL possesses fire license from Fire Service & Civil Defense, Bangladesh. The fire license was issued on 1st July, 2019 and is valid till 30th June, 2020.
4.5	There should be an efficient grievance redress mechanism for the neighboring community.	High	GRM-External		TSEL has set up a complain box for GRM for the neighboring community and an external grievance redress mechanism will be established as well.
<b>5</b>	<b>PS 5: Land Acquisition and Involuntary Resettlement</b>				

SI No	Measures	Significance	Deliverables	Status	BCAS Observation
<b>6</b>	<b>PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources</b>				
6.1	Develop greenbelt within the project boundary.	Low	Greenbelt Development		Greenbelt development has been done quite satisfactorily. As the plant boundary cannot have large trees due to shading problem in the panels, TSEL has planted medium and low height plants.
6.2	Include an invasive alien species management plan in the ESMMP for the operational phase	Medium	Invasive alien species management plan.		Invasive alien species management plan has been covered by the ESIA. The plant is well protected with boundary fencing and gates.

## **7. Conclusions**

The corrective actions have been developed base on the status observed regarding compliance status of TSEL on ESAP implementation and World Bank PSs. Table 6.1 shows the Corrective Actions Regarding ESAP Implementation and Table 6.2 depicts the Corrective Actions Regarding World Bank PSs Achievement. Compliance with CAP attainment will be observed during the next audit. Since, this was the first environmental and social audit for TSEL, attempts were made to observe as many items as possible in an overall or gross perspective. BCAS Audit Team will endeavor to observe various environmental, social, health and safety issues in further detail during the future audits.

## Annex 18: Environmental and Social Commitment Plan (ESCP)

### Environmental and Social Commitment Plan (ESCP)

After the E&S Audit conducted by Bangladesh Centre for Advanced Studies on January 2020, TSEL was given a set of recommendation for the improvement of environmental and social aspects by on World Bank Performance Standards (WB PSs). TSEL has already implemented/ complied few of them. TSEL management is committed to implement the remaining recommendations as well. The targeted timeline is set for May-June 2020 within this time TSEL will try to implement and improve the remaining corrective actions.

The detailed commitment plan including the recommendations, third party observation responsible person and expected timeline is listed in the following table:

**Table 13.40: Environmental and Social Commitment Plan (ESCP) for TSEL**

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
<b>A PS 1: Assessment and Management of Environmental and Social Risks and Impacts</b>				
1	<ul style="list-style-type: none"> <li>Develop an Environmental and Social Management System and an Environmental Health Safety (EHS) Plan on this regard.</li> <li>Review of all the records being maintained as part of EHS Plan.</li> </ul>	TSEL Plant Management & EHS Team	TSEL has developed an Environmental and Social Management System (ESMS) which includes all the issues regarding Environmental Care, Health and Safety, Documentation System, Management Responsibility, Resource Management, Customer Related Processes, Supply and Contract Work Management and scopes for improvement. The whole system is documented and kept in both hard and soft copy in a well-organized order with	May 2020



S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
			a TOC.  It should have the signature of the designated authority. All the required pages have to be signed by designated authority.  Based on the ESMS, an Environmental, Health and Safety (EHS) Plan has been developed in tabular format with tasks, references, timeline requirements, timelines and status. This monitoring plan will be an integral part of monthly health & safety inspection and be included in the health & safety inspection report accordingly and shall also be discussed in the monthly HSE meetings.	
2	Display and communicate environment and health and safety and social policies of the company.	TSEL Plant Management	The policies will be displayed and communicated. Display of these policies at the entrance gate as well as administrative building of TSEL would be more effective.	June 2020
3	Ensure display of abstract of the key provisions of the Bangladesh Labour Rule 2015 in Bangla at the main entrance of the factory. Contact details of the Factory Inspector as well as the registered medical practitioner engaged by TSEL should be	TSEL Plant Management	It is recommended that TSEL should ensure display of abstract of the key provisions of the Bangladesh Labor Rule 2015 in Bangla at the main entrance of the factory.	June 2020

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
	displayed.			
4	Develop the management plans as identified in the ESIA report and update the ESMMP with defined action items, responsibilities, monitoring indicators and review/ audit mechanisms.	TSEL Plant Management	All the tasks mentioned in the ESMP of the ESIA report and E&S audit is incorporated in the ESMMP and EHS Plan.	June 2020
5	Mapping of training needs of TSEL Staff and development of training calendar and training register	TSEL Training Division / EHS Team	<p>Training Calendar and mock drill calendar for 2020 is in place and displayed and communicated with the staffs and workers.</p> <p>Training Register shall be developed in a tabular format (e.g. on MS Excel) depicting the names of all staffs in one column, names of trainings for each month on different columns in chronological manner. The register should be able to clearly depict which staff should go for which training on which month. It should also depict whether the concerned staffs participated and successfully completed the trainings. This means, the Training Register shall have to be updated on regular basis.</p>	May 2020
6	Training of TSEL Staff as well as contractor's staff/workers relevant issues of Operations ESAP,	TSEL Training Division / EHS	Currently, EHS trainings are being given to the TSEL staff as the contractors' engagement is already over.	June 2020

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
	ESMS and ESMMP	Team		
7	Review the emergency preparedness and response plan and include the necessary required emergencies and implement the same at the earliest.	TSEL Plant Management	TSEL should conduct risk assessment and review the ERP and updated if needed. Based on the updated ERP and procedure, the plant layout plan marking the dangerous or hazardous zones and routes for emergency evacuation should be displayed.	June 2020
8	Develop a Commitment Register as a part of stakeholder engagement process in order to document the outcomes of public consultations and respond to local community expectations, and ensure that these are communicated back to stakeholders and updates provided.	TSEL Plant Management	Commitment Register for stakeholder engagement will be developed and maintained.	June 2020
9	Consider preparing a detailed SEP with stakeholder profiling, key concerns, expectations, impact and influence, and risk rating of various stakeholder groups. It should include details on engagement strategy, disclosure, monitoring, reporting etc. The SEP should be subsequently updated with engagement records.	TSEL Plant Management	A detailed Stakeholder Engagement Plan (SEP) will be developed and Engagement records will be maintained.	June 2020
<b>B PS 2: Labor and Working Conditions</b>				

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
10	<p>TSEL while finalizing its HR policy may consider the following aspects for inclusion:</p> <ul style="list-style-type: none"> <li>• Roles and responsibilities associated with various positions need to be mentioned;</li> <li>• Non-discrimination policy should be mentioned;</li> <li>• HIV/ AIDS non- discrimination should also be spelt out;</li> <li>• Working with Suppliers and contractors and non-employee workers may also be referred to;</li> <li>• Non-tolerance of child labor and forced labor not only for employee, but for the non-employee workers if any</li> <li>• Anti- Sexual Harassment Policy may be explicitly captured;</li> </ul> <p>All contractors and sub-contractors within the consortium should be required to apply the principles of the TSEL HR Policy document and also ensure that their internal procedures follow local and international standards.</p>	TSEL Plant Management	<p>TSEL will review their HR policy. Roles and responsibilities associated with various positions should be mentioned. The policy should also include non-discrimination policy, non-tolerance of child labour and forced labour as well as anti-sexual harassment policy and also HIV/ AIDS non- discrimination policy.</p> <p>All the TSEL payroll employees are entitled to provident fund and gratuity. They have been covered under medical insurance for any sort of work related injury or health problem.</p> <p>On the other hand, the contracted staffs (if any) as well as casual staffs are not entitled to provident fund or gratuity or insurance.</p>	June 2020
11	The Project should establish channels for management and workers to communicate and for	TSEL Plant	Although a complain box is been setup and TSEL is maintaining a record register for the grievance from the	May 2020

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
	<p>the workers to place their concerns as well as suggestions.</p> <p>The grievance process should be made accessible for construction/operation workforce and should enable workforce to raise anonymous complaints. The grievance records should be properly documented, tracked and reviewed for redressing of the Grievances.</p>	Management	staff, a formal internal grievance redress mechanism is yet to be developed.	
12	Conduct train the trainer program to increase the knowledge of the safety department.	TSEL Plant Management & EHS Team	To increase the knowledge capacity of the EHS team, training sessions should be conducted.	June 2020
13	Provide training to workers, supervisors and employees on importance and usage of PPEs for different activities and organize PPE awareness program.	TSEL Plant Management & EHS Team	The last training on PPE was conducted on 1st December 2019 and the next training session will be on 1st April 2020.	1st April 2020.
14	Prepare training modules for job specific trainings and identify workers required to undergo job specific trainings.	TSEL Plant Management	Job specific training will be imparted and proper documentation will be kept.	June 2020
15	Conduct the first aid training with the help of	TSEL Plant	First aider training should be imparted every year and	June 2020

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
	qualified first aider and make sure that first aiders are available at all times at facility.	Management & EHS Team	should be included in the training calendar.  First aid boxes are available with adequate first aider. Contact details of the first aider is displayed with photograph.	
16	<p>TSEL will need to put in place a formal contractor management system to audit its contractors as well as sub-contractors. The management system should include:</p> <ul style="list-style-type: none"> <li>• Compliance checklist against the Applicable Standards including applicable requirements under BLR 2015 ;</li> <li>• Criterion on contractor selection to minimize HSE or labor related risks and issues at the time of engagement;</li> <li>• Monitoring and audit procedures; and</li> </ul> <p>Further the contractors and the sub-contractors should be made responsible for the insurance of the workers mobilized at the site.</p>	TSEL Plant Management	TSEL shall have to develop a SOP for contractor management system. Auditing of the contractors or sub-contractors did not take place before in Terms of EHS issues. Health/injury/life insurance of the contractors' or sub-contractors' workers is highly essential for those who will be engaged in risky or hazardous jobs.	June 2020

### C PS 3: Resource Efficiency and Pollution

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
<b>Prevention</b>				
17	Update the EHS Plan including all the ESMMP implementation requirements during operation phase to be complied in line with the proposed timelines and review of implementation of ESMMP by EHS personnel of TSEL. Ensure reporting to DOE on this regard on timely manner.	TSEL Plant Management	TSEL has set up an EHS committee to monitor the EHS plan and will be monitoring all the activities under ESMMP.	June 2020
18	Environmental Management System (EMS): Ensure ISO 14001 accreditation within three years after operation.	TSEL Plant Management	Processes for documentation and practices have already been started.	June 2021
19	Health & Safety Management System: Ensure OHSAS18001 accreditation within three years after operation.	TSEL Plant Management	Processes for documentation and practices have already been started.	June 2021
20	Undertake regular monitoring of Electromagnetic Force in line with the ESMMP.	TSEL Plant Management	TSEL does not have EHV Overhead transmission lines in the plant. For transmission, 33000 V Underground cable is being used.  Electromagnetic force for transformer should be monitored.	June 2020
21	Undertake necessary actions regarding waste	TSEL Plant	Different types of wastes have been found to be disposed in different locations of the site. Wastages were	June 2020



S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
	management in line with the ESMMP.	Management	<p>segregated and separate tagging were observed.</p> <p>Third party waste contractor collects waste on regular basis. Scrap wastes such as scrap metals which are sold to the scrap vendors should be kept in a confined space avoid any incidents or accidents and to ensure workers' health and safety. Waste disposal register has to be maintained regularly and auditing of the waste contractor shall have to be done accordingly.</p> <p>Liquid wastes such as oils should be kept in secondary containment with proper excess volume in a designated storage area to avoid any kind of spillage and leakage.</p> <p>Disposed or damaged solar panels are kept in the open. Damaged solar panels are categorized as hazardous wastage. So proper management mechanism should be adopted. Damaged or broken solar panels should be kept at a separate designated area and it is to be ensure that panels should be kept in cover so that there is no contamination in ground and water through leaching.</p> <p>Damaged Lead-acid batteries should be disposed by selling off to the battery recycling plants and should not</p>	

S. No	World Bank PS Requirement	Responsibility	Corrective Action/ Area of Improvement	Time Line
			be given to scrap vendors.	
22	Develop a Hazardous Materials Management (HMM) Plan and implement it.	TSEL Plant Management	MSDS for Transformer oil and diesel oil have to be maintained both in English and local language Bangla.	May 2020
23	Provide trainings on ESMMP implementation at least annually.	TSEL Plant Management & EHS Team	At least one training on ESMMP implementation should take place every year.	June 2020
<b>D PS 4: Community Health, Safety and Security</b>				
24	Undertake specific communication on health hazards and mitigation measures on an ongoing basis against new activities and associated health and safety risks to the local community.	TSEL Plant Management	Based on the ERP, potential risks should be disclosed to neighboring community people. Necessary awareness should be made among neighboring community people in case of any emergency situation. They should also be made part of the mock drills.	June 2020
25	There should be an efficient grievance redress mechanism for the neighboring community.	TSEL Plant Management	TSEL has set up a complain box for GRM for the neighboring community and an external grievance redress mechanism will be established as well.	June 2020

**Annex 19: HR Policy of TSEL**

**People Policy & Procedure (3P)**  
**Of**  
**Technaf Solartech Energy Limited (TSEL)**

## **Introduction**

People Policy of Technaf Solartech Energy Limited (TSEL) is a collection of corporate human resource policies and procedures developed to assist employees, managers and human resource professionals with daily human resource management activities.

### **Objective:**

People Policy & Procedure (3P) will help TSEL demonstrate, both internally and externally, that it meets requirements for TSEL's mission, vision, aim, values, staff hiring, compensation, benefits, training, development, performance, rewarding, grievance and firing as well as its commitments in relation to regulation and corporate governance of its employees.

### **Purpose:**

- To provide clear communication between TSEL and their employees regarding their condition of employment;
- To form a basis for treating all employees fairly and equally;
- To set of guidelines for supervisors and managers;
- To create a basis for developing the employee's handbook;
- To establish a basis for regularly reviewing possible changes affecting employees;
- To form a context for supervisor training programs and employee orientation programs;

### **Scope:**

People Policy & Procedure (3P) will applicable for all types of TSEL employee, including-

- Apprentice, probationary, permanent and time-limited employees;
- Regular employee, project based employee, contractual employee, service graded employee and day/hour basis labor;

## **Section-A: Employment Policy**

### **1. Policy Statement:**

- i. TSEL always believes that recruiting and selecting the right people is of paramount importance to the continued success. This Employment Policy sets out how to ensure, as far as possible, that the best people are recruited on merit and that the recruitment process is free from bias and discrimination.
- ii. The goal of the launching this employment policy of TSEL is to select the best possible staff at the right time and right place along with to retain them through continuous development. The organization recognizes the policy of equal employment opportunity for its employee who has the potential to enhance and utilize their skills and knowledge. TSEL fully supports the Philosophy and belief of non-discrimination in employment.
- iii. TSEL is committed to fill-up vacant positions with qualified candidates, whether from within the organization or from outside. Whenever possible, TSEL shall try to fill job openings by internal promotions and transfers before considering any other means of hiring. This procedure covers the process the HR takes in filling current or future vacancies. Candidates' selection shall be based only on qualifications and work experience. This is to be determined through careful screening, testing and interviewing prior to making the final selection.

### **2. Principles of Employment:**

- i. The organization recognizes that each employee irrespective of gender is entitled to be treated with courtesy and dignity.
- ii. Each employee is entitled to fair wages, job opportunities, in return for good job skills, co-operation, loyalty and best efforts.
- iii. The organization will demonstrate its commitment to protect the employee's organizational rights so as to improve and increase employee's motivation.
- iv. The organization is committed to develop its Human Resource to achieve the organization's mission and goals.
- v. The employees and Line Managers of TSEL shall abide by the policies, rules and regulations of the organization, which are currently in force and those that may come into force in future.

3. Non-Discrimination:

In order to provide equal employment and advancement opportunities to all individuals, employment decisions at TSEL will be based on merit, qualifications, and abilities. TSEL does not discriminate in employment opportunities or practices because of race, color, religion, sex, national origin, age or disability. This policy governs all aspects of employment, including selection, job assignment, compensation, discipline, termination, and access to benefits and training. Employees with questions or concerns about discrimination in the workplace are encouraged to bring these issues to the attention of their supervisor or HR Department. Employees can raise concerns and make reports without fear of reprisal. Anyone found to be engaging in unlawful discrimination will be subject to disciplinary action, including termination of employment.

4. Nepotism:

TSEL always discourages nepotism in hiring process. Any approach for preferential treatment will result in disqualification of the candidate. Hiring of close relatives of employees is not encouraged in TSEL. In exceptional cases, with prior approval of Managing Director, TSEL may appoint a relative of its employee only if the person is better qualified and competent than other candidates and can add extra value/ expertise to TSEL. A close relative is defined as any one of the parents, spouse, children, brother/ sister and in-laws.

5. Employment Status (Classification of Employees):

i. Regular:

A regular employee is defined as who had been employed against a permanent position in TSEL for open-ended period. All regular employees will be appointed with probationary period of 3/6 months. After which the employee may be confirmed in his/her employment. At the time employee will be 'called as "Probationary Employee" and after successfully completion of probation period if his/her job has been confirmed by the management then s/he will be called as "Confirmed Employee". Personnel from Bangladeshi citizen will be allowed to be appointed in TSEL as full time regular employee.

ii. Contractual:

A contract person is defined as who has been granted a contract to render his/her service against a specific job assignment for a specific period of time. Unless otherwise stated in the contract, the contractual payment shall be a consolidated amount per month. Expatriate may be employed as contractual basis decided by the competent authority.

iii. Casual Status:

Persons who are hired only daily basis for particular assignment and the daily wage amount is fixed based on the person's skills and abilities to perform the duties and the payment will be made as per his/her request on daily, weekly or monthly basis. The terms and conditions will be fixed which should be agreed earlier with the concerned person. The casual persons will not be eligible for any standard benefits of TSEL. The daily wages should be according to the market rate as well as government minimum wages norms.

Depending on the availability of the position a person of casual/ short term contract may be offered regular or contract employment, if his/her performance on the job was found satisfactory, after following the recruitment procedures according to TSEL's Employment policy.

6. Re-employment of Former Staff:

- i. Employees, who left TSEL voluntarily or was retrenched, may be considered for re-employment provided his/her previous performance had been satisfactory and his/her present qualifications and skills meet the current requirements for the position s/he has applied for. For such appointment will follow the policy of recruitment procedures as stated in the policy.
- ii. Employee who were dismissed or terminated or separated due to poor performance or misconduct will not be rehired or re-employed.

7. Recruitment and Hiring Process:

*i. General Policy*

TSEL is committed to selecting and employing the most suitable person(s) for the available position(s) by the way of-

- a) Effective and appropriate screening and selection;
- b) Selection standards are relevant to skills, training, experience, education and knowledge necessary for successful job performance;
- c) The hiring procedures conform to the organization's requirements and organization's policies and procedures;
- d) Under no circumstances a person employed with any other organization is appointed As full time regular or on contract in TSEL;
- e) All regular appointments in TSEL shall conform to its existing positions and salary structures;



- f) No one who is below 18 years of age can be hired as an employee for TSEL either on regular, contract, temporary or casual status;

8. Job Descriptions (Position Profile):

- i. Job Descriptions are the basis of recruitment placement, training, assignment, performance management system, performance appraisal, salaries, promotion and other HR actions for the employee of TSEL. A job description must state the functions duties, responsibilities of employees, reporting line and relationship with others in the organization. It shall be prepared based on the job's Key Result Area (KRA) or Key Performance Indicator (KPI) and include specific tasks.
- ii. Job description including Job Specification (personal profile) is a pre-condition for approval of a new position, irrespective of regular or contract. The job description should be prepared by the respective Department head or Business Unit Head in collaboration with HRD (or reviewed by HRD) and approved by Managing Director.
- iii. Job description will be provided to the employees when s/he is appointed, transferred, promoted or newly assigned. The Line Manager(s) shall ensure that their employees have the appropriate and updated job description and always modified as and when required.
- iv. The Key Element of Job Description:
  - a) the job title (which must be sex neutral)
  - b) the location of the job i.e. department/faculty /division/research group
  - c) grade of the post
  - d) the post to whom the post holder is responsible
  - e) any posts reporting to the post holder
  - f) main purpose of the job
  - g) main duties and responsibilities
  - h) any special working conditions

- v. Items that should be included in job descriptions are:
  - a) A note that indicates that, as duties and responsibilities change, the job description will be reviewed and amended in consultation with the post holder.
  - b) An indication that the post holder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager or Head of Department/Division.
  - c) A statement that the post holder will actively follow TSEL policies including other local regulatory norms & policies.
  - d) An indication that the post holder will maintain an awareness and observation of Fire and Health & Safety Regulations.
- vi. The language in job descriptions should:
  - a) Avoid jargon and unexplained acronyms and abbreviations.
  - b) Be readily understandable to potential applicants for the post.
  - c) Avoid ambiguity about responsibilities and be clear about the post holder's accountability for resources, staff, etc.
  - d) Use inclusive language - for advice on non-discriminatory language.

vii. Job Specifications (Person Profile):

The Job specification is of equal importance to the job description and informs the selection decision. The person specification details the skills, experience, abilities and expertise that are required to do the job. It should be drawn up after the job description and, with the job description, should inform the content of the advert. The person specification should be specific, related to the job, and not unnecessarily restrictive - for example only qualifications strictly needed to do the job should be specified. The job specification must form part of the further particulars of a vacancy along with the job description in order that applicants have a full picture of what the job entails. The person specification enables potential applicants to make an informed decision about whether to apply and those who do apply, to give sufficient relevant detail of their skills and experience in their application. The person specification forms the basis of the selection decision and enables the selection panel to ensure objectivity in their selection.

The Key Elements of Job Specifications:

- a) Academic Qualifications
- b) Knowledge (both technical, technological, and general related to the job)
- c) Skills and Abilities
- d) Experience
- e) Aptitudes
- f) Gender
- g) Physical & Mental conditions
- h) Appearance
- i) Working Environment etc.
- j) AGE

9. The age of all new recruits at different level in TSEL shall be governed as per following provisions:

- i. At the time of appointment of entry level management position for fresh candidates (Jr. Executive, Executive or Management Trainee) the age of the candidate shall not be less than 21 (twenty-one) and more than 28 (twenty-eight) years.
- ii. At the time of appointment of top management position (General Manager and above) the age of the candidates shall not be more than 50 (sixty) years and less than 30 (thirty) years.
- iii. For any other management position for experienced candidates, age shall not be less than 21 (twenty-one) years and more than 50 (fifty) years.
- iv. For non-management position the age shall not be less than 18 (eighteen) and not more than 40 (forty) years. But the management may relax the age limit in special cases, reasons of which shall be recorded.

Advertisement

Before proper job announcement, the following procedure must be maintained by the concern personnel through raising the prescribed hiring requisition form. Prior to requesting approval to hire a new employee, the Departmental Head will determine following:

- i. If it is necessary to fill this vacancy or if the job can be performed with existing personnel.
- ii. Prior to requisition, the Departmental Head must ensure that the manpower requirement is made according to the approved annual business plan & recent Organogram approved by the Managing Director.

Considering the above factors, the departmental heads of all companies will issue hiring requisition to the Human Resource Department for personnel required for TSEL.

10. All requests for employing personnel will be made by the Departmental Head on an Employment Requisition Form provided by the Human Resource Department, and must show the following information:
  - i. Job Description of the new position
  - ii. Education Qualifications Requirement
  - iii. Experience requirement
  - iv. Other requirement (if any)
  - v. Salary Range
  - vi. Proposed Date of Joining for the new position
11. After obtaining requisition for manpower requirement the Human Resource Department will consider the following issues:
  - i. Find out the suitable candidates from existing employee of concern business unit or any other business units under TSEL for transfer/promotion/placement if any.
  - ii. Arrange immediately in-house recruitment announcement through internal memo/notice board/e-mail in consultation with Corporate HR department or find out the prospective candidate's CV from CV data bank available in the concern business unit or Corporate Office.
  - iii. In all cases, the internal candidates must be competent enough and capable to prove competencies with external candidates.
  - iv. Announcement outside: If the vacancy cannot be filled up by the internal sources, HR department should use the following alternatives-

- a. Job Portal: The announcement must be posted for the vacancy utilizing job web portal “www bdjobs.com” within a week from the date of approval.
- b. Local Newspapers: TSEL standard Career Advertisement can be utilized to release for any vacancies in the local newspapers within a week from the date of approval of Employee Requisition Form by the Managing Director.
- c. Local Hiring Agencies: Local-hiring agencies could be explored and utilized if all the above do not fulfil the need. It is advisable to check with the agency's clients before utilizing their service.
- d. Personal references.

#### 12. Short Listing/Screening of Applications:

The concerned HR department of individual Business Unit or HR-in-charge or a committee (as deemed appropriate) along with the Line Manager of concern department who raised the requisition for hiring will short list the CVs. Applications shall be short listed upon a careful review based on the organizational need, applicant’s qualifications, experience and their suitability for the position. In the case of internal candidates, the employees' personal file, performance record and Line Manager's comment I recommendation should be taken into consideration. The screening process must be completed within a week from the last date of receiving of applications from candidates. While screening the application, the following topics must be reviewed carefully:

- i. Job application
- ii. Qualification and education
- iii. Proper experience for the vacant job (if needed)
- iv. Job history
- v. Reference check (if necessary)

#### 13. Personal Information Form:

To know in details about the applicant’s personal details an Application Blank (well known as Management Application Form/ Employee Information Form) may be provided to the short listed candidates for submission to the interview board.

14. Test and Interview Process:

- i. Short listed applicants may be called for interviews and appropriate testing procedures. Only sort listed candidates will call for interview. No candidate both from internal or external sources can be assured or guaranteed for an interview. TSEL may undertake some or all of the following tests and adopt any other appropriate devices in selection process.
  - a) Written test
  - b) Aptitude test
  - c) Viva Voce
  - d) Practical operation/technical test
  - e) On the job test
- ii. The HR Department will contact the sort listed candidates by letter or phone for appearing in the test/ interview. No TA/DA or other allowances will be provided to the candidates to attend the interview. Top Management of TSEL at their own discretion may make any exception to this rule for the cases of extended interview or subsequent series of interviews for the external candidates.
- iii. The interview panel or selection committee will be comprised usually of three or four members, which will include the Line Manager. For the selection of the senior positions the Managing Director will also be in the panel in the final interview. If deemed necessary, an external person may also be included in the panel.
- iv. During the final interview panel members will make an assessment/ rating for each candidate

15. Duration of Recruitment Process:

HR Department should complete the recruitment process within 45 days from the date of receiving approval of employee requisition by the managing Director/Director.

16. Final Selection:

Upon completion of the test and interview the selection committee will discuss about candidates among themselves and make a recommendation/approval about the selection with signature.

17. Approval for Appointment Decision:

The final selection and appointment in TSEL, employees must be endorsed/ approved by Managing Director.

18. Appointment/Contract Letter:

- i. Before issuing the appointment letter/contract, HR Department, where necessary, will check the candidate's references (preferably two) of which, at least one is official (present/last employer). Any employment will be contingent upon the reference check with personal referee (s) and the clearance of present or last employer.
- ii. The selected candidate (s) will be offered employment signed by HR responsible. The job description must be attached with the appointment letter/ contract.
- iii. When appointed, a new employee on regular status will usually be placed at the 1st step of the respective Grade of the salary chart. In exceptional cases a person having higher education, skills and experience, may be appointed at the higher step of that Grade which at the discretion of the Managing Director. The remuneration of a person on contract will be determined based on the job, and the level of his/ her education, skills, knowledge and experience.
- iv. The selected candidates, after employment, must be asked to submit their clearance certificates from his/ her employer.

19. Required Documents:

The following documents must be submitted by the applicant at the time his/her joining with TSEL:

- i. Latest resume of the candidates
- ii. Academic certificates (with original for verification)
- iii. Training certificates (if any)
- iv. Experience certificate (if any)



- v. Clearance letter (if any)
- vi. Photo (PP- 3, stamp- 1)
- vii. Nationality certificate/ photocopy of passport
- viii. Medical Certificate from any recognized registered MBBS doctor about sound health
- ix. Employee Information Form
- x. 02 Reference Letters

#### 20. Opening of New Employees File:

HR department will open personal file for new employee and related documents should be kept collecting from the employee. Personnel files are the property of TSEL and access to the information is restricted. Management personnel of TSEL who have a legitimate reason to review the file are allowed to do so.

#### 21. Salary & Benefits:

During probation period the employee will get a consolidated agreed amount of remuneration as per the terms and conditions of employment. Other admissible benefits against the position will be applicable as set out in TSEL's policy. In general, break-up of Monthly Gross Salary will be as below:

- i. Basic = 60% of Gross Salary
- ii. House Rent = 30% of Gross Salary
- iii. Medical Allowance = 6% of Gross Salary
- iv. Transport Allowance = 4% of Gross Salary

22. Provident Fund: 10% of basic salary both by the Employee & Employer shall be contributed in the provident fund. Provident fund shall be maintained as per provident fund deed and provident fund rules.

23. Gratuity Fund:

Eligibility of Gratuity:

- a. Service Condition: Continuous service for 6 months and above from the date of joining.
- b. Effective date of entitlement: From the date of joining

Calculation of Gratuity amount:

- a. Service lengths: More than 6 months but not exceeding 10 years; 1 month last basic per completed year of service and 100% thereof in excess of six months or above.
- b. More than 10 years; 1.5 months' last basic per completed year of service.
- c. On death or any other approved ground; 1.5 time of last basic per completed year of service.

Length of Service: From the date of joining.

24. Probation Period and Probation Evaluation for Confirmation Process:

- i. The objective of probation evaluation would be any one of the below three options and be notified to the concern employee before end of probation period.
  - a) Job Confirmation
  - b) Probation period extension with performance improvement plan (PIP)
  - c) Termination from the job (Non-confirmation)
- ii. Salary increment or any other financial enhancement should be considered during/under yearly pay review process. In probation period, employees can avail sick leave and casual leave.
- iii. Only special notes/recommendations during employee selection process can be considered, which has to be mention on recruitment proposal sheet.
- iv. During probation period, a new employee whose performance is being evaluated to determine whether further employment in a specific position or with TSEL is appropriate or not. When an employee completes the probationary period, the employee will be notified of his/her new status with TSEL after proper evaluation system. The probationary period is only appropriate for those employees who have been appointed to

be a regular employee after successful completion of probation period. The following timeline are determined as probationary period for the specific positions.

Position	Probation Period
Assistant General Manager to Above	3 months
Manager to Senior Manager	3 to 6 months (based on the situation)
Non-Management to Deputy Manager	6 months

However, management has the right to increase or decrease the duration of probationary period for a further period of time if the performance of the employee is not found satisfactory or any other reasons.

- v. A performance review should be carried out at the end of the probationary period using the Assessment & Employment Confirmation Form. If performance is found up to standard, then employment may be confirmed. If there were any changes with the package or title, it should be notified to the concern employee by issuing a letter of job confirmation.
- vi. TSEL has the right to terminate employment at any time during this probation period without a prior notice in case employee fails to meet job requirement. At the same time, employee may ask to quit anytime during this period without a prior notice.
- vii. Upon satisfactory completion of the probationary period, a review will be given and benefits will be entitled as appropriate. All employees, regardless of classification or length of service, are expected to meet and maintain company standards for job performance and behavior.

#### 25. Induction & Orientation Program:

- i. It is the policy of TSEL to conduct orientation and training programs to familiarize employees with TSEL and enable them to learn their assigned jobs and to develop the skills required for efficient job performance.
- ii. Orientation is a formal welcoming process that is designed to make the new employee feel comfortable at their workplace, remove their natural shyness, informed the details activities of TSEL, and prepare them as a resource for their position. New employee orientation is conducted by the Human Resources Department, and

includes an overview of TSEL history, an explanation of TSEL core values, vision, and mission; and company goals and objectives. In addition, the new employee will be given an overview of the HR policies, benefits, legal issues, and complete any necessary paperwork.

- iii. Employees should be notified about all the code of conducts and procedures needed to navigate within the workplace. The new employee's supervisor then introduces the new hire to staff throughout TSEL, reviews their job description and scope of position, explains TSEL's evaluation procedures, and helps the new employee get started on specific functions.
- iv. All employees must attend a general orientation conducted by Human Resources Department which includes on orientation to the organization as well as a benefits orientation when applicable. The necessary and brief action of Induction & Orientation Program:
  - a) Introduce to all possible employees within TSEL
  - b) Issue a Circular introducing the employee to the respective concerned
  - c) Ensure employee registration IT system for attendance purpose
  - d) Explain vacations and leaves policies and procedures
  - e) Explain work schedule and attendance policy
  - f) Explain Probation Period policy and procedure
  - g) Ensure that a copy of an updated Job description is given to employee based on his position
  - h) Show employee of his/her seating arrangement
  - i) Provide employee with necessary office supplies & stationary

## 26. Physical Fitness:

No person shall be appointed in the service of TSEL if s/he is declared physically and mentally unfit by the registered medical officer. Before joining, every employee must submit a medical fitness certificate from any registered medical PR actioner about his/her mental and physical fitness. No cost regarding medical fitness to be reimbursed from TSEL. This type of medical certificate also can be taken from our' nominated doctor of TSEL, where no consultation fees will be charged to any employee.

27. Issuing ID Cards:

- i. All the employees of TSEL and its associated company will provide an "ID" card
- ii. ID card should be issued as soon as employed by TSEL
- iii. The ID card should contain the following information on the top side-
  - a) Company name
  - b) Company logo
  - c) Name of the Person
  - d) Designation
  - e) Department
  - f) Blood Group
  - g) Authorized Signature
- iv. The back side of ID card should contain the address & telephone of TSEL, ID Number & conditions of uses. Considering the position and income, lower grade (grade - 1 & 2) employee will get blood group test expenses at actual from TSEL if the person does not have any prior blood group test result.

28. Issuing Business Cards:

It is the policy of TSEL to provide all its management employees business cards. The definition of Management Employees is determined from the position of Executive to Above Positions. The quantity of cards will depend on the uses of cards by the respective employee. ID card may be given during probation period. Every new management employee has to make a requisition prior to request for visiting cards to the HR/Admin dept. by requisition form. The requisition form has to be recommended by the departmental head.

29. Separation of Employment:

- i. During probation period, in case of termination/resignation or any kind of separation of service, 02 (two) weeks' notice from either side will be required except that this notice will not be necessary if one's service were to be terminated by the management for misconduct.

- ii. After confirmation in case of termination/resignation or any kind of separation of service, from either side, 03 (three) months' notice or three month's salary (basic salary) in lieu of notice from either side will be required except that this notice will not be necessary if one's services were to be terminated by the management for misconduct.

## **Section-B: Employment Policy Only for Expatriate**

### **1. Policy Statement:**

Considering the global business diversity and select the best talents, the company sometimes recruit the Expatriate Employees in the special field where local resources are not available. The objective of this recruitment is to develop the local counterparts in association with the foreign Expatriate and transfer the knowledge, skill, technology and job related know how for the overall development of the business and the economy of the country as a whole.

### **Employment Status:**

The Foreign Expatriate recruitment is totally contractual basis for a specific period. Generally, an expatriate employee is recruited for a period of 02 (two) years which may be extended for a further period of time subject to mutual agreement of both parties. To recruit expatriate, the company follow local regulatory norms.

### **Selection Process:**

The recruitment and selection process for expatriate employment is merely similar to local process except few areas. The brief selection processes are as under:

- i. Raised hiring requisition by the Business Unit Head/Director/CEO and must be taken approval from MD.
- ii. Should find out the sources of recruitment such as advertisement in home or abroad, reference, through overseas office etc.
- iii. Placed the advertisement according to the Job Description and Job Specification.
- iv. Collect resume along with passports size photograph and photocopy of passport of potential candidates.

- v. Interview in home or abroad where the presence of Managing Director, Concern Business Unit Head and Head of HR is must as a common selection committee.
- vi. Managing Director has the sole discretion for selecting any expatriate without following all the process considering the necessity and other factors.
- vii. Proposal, Deed of Contract Agreement and Appointment Letter to be placed for MD's approval with details terms & conditions.
- viii. Handed over the appointment letter and deed agreement to the employee.

2. Other formalities for joining:

- i. A visa request letter to be issued to the Bangladesh Embassy/High Commission of the respective country of selected employee for E-Visa for Bangladesh. For other country, necessary formalities must be done according to the respective country's laws.
- ii. Air Ticket to be issued in favor of selected candidate and his family members (if required).
- iii. Medical certificates for the selected candidate and his family members to be produced to the company mentioning the candidate mental and physical fitness. As a matter of policy, the company may not consider any employment if the candidate or his dependents (who will accompany with candidate) have any HIV/HBS symptoms.
- iv. Management may arrange an alternative medical checkup both for the candidate or his family members in Bangladesh if desired so.
- v. Arrange a residence and vehicle (if required) for the employee within the range of his/her ceiling
- vi. HR department will also ensure other logistic support in connection with the employee office and residence.

3. Formalities after Joining:

- i. For Bangladesh-
  - a) Submit necessary document such as appointment letter, E-visa, photocopy of passport to get work permit from Board of Investment (BOI) for Bangladesh.



- b) Apply for Multiple Employment Visa from Department Immigration & Passport, Bangladesh.
  - c) Get a Clearance from the employees native Embassy/High Commission in Bangladesh.
  - d) Get Police clearance form Intelligent Department and Special Branch in Bangladesh.
  - e) Received E-Visa for a specific period from Department Immigration & Passport of Bangladesh.
- ii. For Other Country-

Necessary formalities must be followed according to the respective countries laws and regulation.

#### 4. Job Descriptions (Position Profile):

A standard job description will be provided to the newly appointed employee at the very beginning of his/her joining.

#### 5. Personal Information Form:

To know in details about the employee's personal information, an Application Blank (well known as Management Application Form/ Employee Information Form) to be provided to the employee for submission to the HR department.

#### 6. Opening of New Employees File:

A personal file for every new employee must be open ensuring that all related documents are kept in the file.

#### 7. Induction & Orientation Program:

HR department will conduct orientation and training programs to familiarize employees with the company and enable them to learn their assigned jobs and to develop the skills required for efficient job performance.

8. Issuing ID Cards:

All the employees of the company and its associated company will provide an "10" card according to the standard format. ID card should be issued as soon as possible.

9. Issuing Business Cards:

The entire management employee must get business cards according to the approved format of the company.

10. Duties:

During the employment, the employee shall devote all of his/her time and energy to perform such duties and exercises, such functions as may from time to time be assigned to or vested in him/her by the Managing Director or his/her immediate supervisor of the Company and shall not either directly or indirectly work or take on job for any other company and person. The employee is obliged to observe the company's established general rules, guidelines, regulations and policies and any subsequent amendments or modifications thereto issued by the Company

11. Salary & Benefits:

Salary and other admissible benefits against the position will be applicable as per the terms conditions of appointment and existing company's policy. The general terms and conditions are as given below:

- i. The employee shall be paid a fixed net monthly salary in USD or BDT to be paid by the 5th of next month from the date of joining.
- ii. The Salary is agreed inclusive of local, maid and all other allowances and is free of taxes, which will be paid by the Company.
- iii. The Company will provide 02(Two) bonus equivalent to One Month's Basic salary, Two in a year within the accounting year. Generally, this bonus is paid at the time of Eid Ul Fitre and Eid Ul Adha.

## 12. Accommodation:

The Company will provide a suitable accommodation however the cost of rent and utilities does not exceed the ceiling (will fixed by the management) per month (Utility include electricity, water, gas, and maintenance). Any additional amounts, if required, will be paid by the employee from his/her personal account. Company supposed to provide a minimum furnished house (not in lavished) where most essential house hold items should be included. No luxurious or optional items to be provided. The house will be minimum furnished and the following house hold equipment/furniture will be available-

- i. Washing Machine – 01
- ii. Refrigerator- 01
- iii. Iron
- iv. TV with Stand (satellite connection charge and monthly bill will be paid by the employee, if required)
- v. Air Condition
- vi. Sealing Fan - as per room requirement
- vii. Sofa for Guest Room (5 seaters)- 01 set
- viii. Dining Table (6 seaters)- 01 set
- ix. Bed Set - max 3 set
- x. Wardrobe - 02 set
- xi. Reading Table- 01 set
- xii. Dressing Table- 01 set
- xiii. Window/Door Screen
- xiv. Kitchen Gas Burners
- xv. Water Filter- 01 set
- xvi. Microwave Oven- 01 pc

13. Car:

A company maintained car would be provided according to the car policy. The car would be self-driven by the employee and the employee will be provided fuel or gas according to the company policy. Management may provide personal driver's allowance or company provided driver for senior position based on the situation and other measurable issues upon its own discretion power which must be mentioned in the agreement.

14. Mobile Phone:

The company will provide a mobile phone. The company will bear: the monthly mobile bill ceiling according to the policy. All overseas personal calls, which will be on account of the employee. However, all overseas official calls will be borne by the company.

15. Schooling for the Children:

i. For Bangladesh-

The company will bear the cost of schooling of the employee's children subject to a maximum of 02 (two) children up to Grade XII and subject to the maximum of the following amounts per month:

- a) Up to Grade V : US\$ 50.00
- b) Grade VI to VIII : US\$ 75.00
- c) Grade IX to XII : US\$ 100.00

ii. For Other Country-

The company will bear the cost of schooling of the employee's children subject to a maximum of 2 (two) children commensurate with the country's standard of educational cost. In this regard, the company will pay registration cost once only during the service tenure in the same country. Tuitions fees will be paid by the company at actual. No other cost related to education will be borne by the company. In this regard a proposal must be submitted for management approval at least 02 weeks before the admission of children(s).

16. Medical:

The Company will bear at actual medical coverage for the Employee and his family member's health and medical expenses for normal sickness and accident. The medical coverage will

include all the cost related to doctor consultation fees, test and drugs. Dental and Eyes are not included in the medical coverage except only for the doctor consultation fees.

#### 17. Leave Entitlement:

The employee is entitled to the following leave facilities for a period of 01 (one) completed year of service in the company from the effective date of employment contract:

- i. Casual Leave- 28 days
- ii. Sick Leave - 07 days

This entitlement is not cumulative and, if not exercised during one year, cannot be carried over to the next year end-cashed. Annual Leave will be provided for any kind of personal overseas trip. If the employee desires not to leave country to enjoy holiday, s/he can enjoy his/her Annual Leave in his/her posting country within its surroundings. In that case s/he will be only entitled travel related expenses during his/her leave within the country if any.

#### 18. Travel Expenses:

- i. On joining, Company will pay the actual cost of travel by air from home country to workstation for the employee and his family members.
- ii. The Company shall provide roundtrip air tickets to the employee and his/her family once in a year for traveling from work station to home country and back during the period of his/her employment. This entitlement is not cumulative and, if not exercised during one year, cannot be carried over to the next year or en-cashed. If any expatriate wants to visit abroad several times due to personal reason, s/he will bear the cost by his/her own and the duration of his/her leave period will be counted as Leave without Pay (LWP) if s/he do not have any balance Annual Leave.
- iii. On return to home country permanently, the company will pay USD 750.00 (USD Seven hundred fifty) only as transfer cost to the employee and his family from workstation to home country as cost of travel by air.

19. Termination of Employment:

It is envisaged that the period of employment of the concern employee will be only for contract

Period as mentioned in the appointment letter. Either party may terminate this contract by giving 90 days' notice in writing or payment in lieu of notice, provided the Company may terminate this contract at any time without giving any notice or payment in lieu thereof, if you are found to be guilty against misconduct, disobedience, insubordination, misbehaviour, gross carelessness or other conduct, detrimental to the interest of the Company.

20. Other Terms and Conditions:

i. Secrecy of the business:

During his employment and during a period of two years thereafter, the employee undertakes to observe complete secrecy concerning the business, including but not limited to the affairs, finance, customers or trade connection of the Company. S/he should also not divulge to outsiders - or otherwise irrelevant persons - matters that come to his/her knowledge in his position as an employee in the Company.

iii. Required documents:

In order to complete the enrolment/ the employee should provide us the following:

- a) A set of complete resume
- b) 2 copies of passport size photograph
- c) Copy of passport
- d) Copy of all educational certificates
- e) Release letter from the previous employer
- f) Spouse details and passport photocopy
- g) Children details and passport photocopy
- h) Blood Group
- i) Driving license (Local & International)
- j) Medical certificates (for employee and his family members)

iv. Visa / Work -Permit:

Visa or work-permit will be processed by the company at its own cost. At the end of this contract or prior determination of the contract<sup>1</sup> the visa I work permit will be cancelled by the company and the employee will be required to return it to the embassy/high commission of Bangladesh or respective country's diplomatic mission at his/her own country of residence.

v. Arbitration:

The agreement shall be governed by the law in force in Bangladesh. Disputes arising from this agreement shall in the final instance be settled by arbitration/ according to the rules of Bangladesh Arbitration Act. The arbitration will take place in English language.

vi. Signature:

The deed agreement should be signed by the employer and accepted by the employee knowing and agreeing all the terms and conditions as mentioned. This agreement should be endorsed by at least two witnesses.

21. Management Discretion:

The Management reserves all the right to change, modify, amend, cancel or waive any or all of the provisions of this policy at its absolute discretion and without any prior notice and any reason whatsoever.

## **Section C-Leave Policy**

1. Policy Statement:

This policy encourages TSEL's employees to take a break from work as this provides for healthy, stress free and more productive staff. The leave policy sets out the various types of leaves that an employee is eligible for and outlines the procedure for taking leave. And Leave policy will be maintained as per financial year (i.e. July-June / January-December).



2. Types of Leave:

i. Casual Leave (10 days):

- a) A confirmed employee is entitled to have Casual Leave at the rate of 10 (Ten) days with pay in a calendar year, which cannot be carried forward to next year. Casual leave can be taken within one-day notice under the discretion of the authority.
- b) In case of emergency, Casual Leave may be granted on the same day if it is required.
- c) Maximum 03 days Casual Leave may be allowed in a single occasion.
- d) In case of suffix and prefix situation, casual leave cannot be attached to the public holidays. Under the special circumstances, one can take maximum 03 (three) days casual leave including either suffix or prefix.
- e) Casual leave cannot be extended beyond 3 days. If same happened, it should be automatically counted as Annual Leave. If the balances Annual (Earned) Leave of that specific employee are not available, the additional absent days will be counted as Leave without Pay (LWP).
- f) In any case casual leave cannot be attached with Annual (Earned) Leave consecutively.

ii. Annual / Earn Leave (20 days):

- a) A confirmed employee is entitled to obtain 20 (twenty)-days Annual (Earned) Leave in a Calendar Year and can enjoy on the basis of accumulation.
- b) This leave will be commenced and calculated from the date of joining (Probation period included).
- c) During the probation period no leave will be allowed for probationary employee. But in case of special event/emergency purpose management can allow Leave without Pay (LWP) or advance leave to be adjusted from accumulated Annual (Earned) Leave after confirmation. During probation period maximum 06 (six) days Annual (Earned) Leave may be allowed for emergency purpose. If it is more than 06 days, the leave will be automatically counted as Leave without Pay (LWP) and salary deduction will be made according monthly remuneration.

- d) It has been observed from experience that due to exigencies of service almost all the employees cannot enjoy their full annual leave. Management has decided that all the confirmed employees must enjoy at least 05 (five) days mandatory Annual (Earned) Leave in a year at their convenient. The objectives of this mandatory leave is to grow close attachment. Towards family by giving a longer period at least once in a year, to improve productivity & reduce cost and to enhance corporate image as part of better management practice.
- e) The balance Annual (Earned) Leave (i.e. maximum 15 days or at actual balance after availing from this 15 days) will be forwarded for encashment at the time of closing of each calendar year (before 2nd week of July) and payment must be ensured within July.
- f) Annual (Earned) Leave can be carried forward up-to 60 days. In that case the concern employee must have to notify the management about his/her intention to carry forward.
- g) In general case, the application for Annual (Earned) Leave must be submitted at least 3 (three) days before the leave availing date and the leave will be granted at the sole discretion of the authority.
- h) For the purpose of mandatory 05 (five) days earn leave at a time, Head of Operation/ Department will prepare a leave calendar for their employee and submit it to Unit Head for information & approval. Once the approval was made by the Unit Head it should be forward to respective HR representative for their record. For emergency purpose, individual employee can apply for re-arrange/change it, once in a calendar year. But management has its sole discretion to rearrange/ reschedule/ change the leave plan in case of emergency or based on business priority or requirement.
- i) The calculation of encashment for earn leave will be based on monthly gross salary (i.e. 30 days - in a month) for a maximum period of 15 days or below (at actual after availing annual leave).
- j) In case of suffix and prefix situation, annual leave cannot be attached to the public holidays. However, under the special circumstances, one can take maximum 03 (three) days annual leave including either suffix or prefix.
- k) In any circumstances, if the mandatory Annual (Earned) Leave is not availed by the employee, shall not be carried forward in next year or shall not be end-cashed for the same.

iii. Sick Leave (14 days):

Confirmed employee is entitled to avail 14 (fourteen) days sick leave in a calendar year with full pay on the ground of physical unwell or sickness. In case of extension of sick leave longer than the specified period (14 days), remaining casual leave or annual (earned) leave, which is favorable, will be considered as sick leave.

In case of serious accident or serious illness, the Higher Management (Unit Head & MD) may sanction I extend special leave at their own discretion. However, special leave on the ground of sick should not be more than 30 days and- the leave will be without pay (LWP).

All sick leave applications must be supported by a registered physician's certificate, if it is more than 2 days.

- a) Respective authority may seek if needed a second opinion by another competent medical practitioner on the merit of the Sick Leave application.
- b) If an employee is feeling sick on weekend or on a public holiday and the sick days continue up-to a certain period of day(s), the initial holiday will not be counted as sick day and the rest availing number of sick day(s) will be counted as Sick Leave.
- c) Sick leave cannot be carried forward to the succeeding year and cannot be encashed.

iv. Maternity Leave (16 Weeks /112 days):

- a) A female employee who have rendered her services for 06 months will be entitled to enjoy Maternity Leave for 16 (sixteen) weeks, which shall include the Public Holidays, and Weekends days (non-working days).
- b) A female employee will be allowed maternity leave up-to twice in her service life for 1<sup>st</sup> and 2<sup>nd</sup> issues.
- c) The entitlement to maternity leave is to be availed as follows (8 weeks by 8 weeks' ratio):
  - 8 weeks immediately preceding and including the day of delivery (Pre-natal)
  - 8 weeks immediately following the day of delivery (Post-natal)
- d) The concern employee should submit registered doctor's certificate mentioning the EDD for obtaining the leave.

- e) If the employee is fully capable and desires to continue her office work immediately preceding 4 weeks before the expected date of delivery (EDD), management may consider her leave as 4 weeks (pre-natal) + 12 weeks (post-natal) ratio, in this case, employee needs to submit a doctor certificate mentioning her capability to work up-to the pre-natal days.
  - f) The days availed as Maternity Leave should not be added to calculate Annual Leave (Earned Leave) and annual leave will be calculated accordingly.
  - g) Management may consider additional leave on Maternity ground from her authorized Sick Leave/Casual Leave /Annual (earned) Leave /LWP as per management discretion.
- v. Other Leave:
- a) Days or periods of absence from work without an acceptable reason and without prior permission of management will be counted as LWP.
  - b) Late attendance for each 3 (three) working days in a month will be considered as 01 (One) day LWP. Management may consider to adjust this late attendance with 01 (one) day annual (earned) leave on special ground.
  - c) If an employee already enjoyed all types of leave facilities in a year and desires for more leave with valid and justified reason, in that case s/he will not be entitled any advance leave but management may allow him/her expected leave as "leave without Pay". If this sequence continues up-to 30 days, his/her job may be terminated from TSEL.
  - d) If any employee availed advanced annual (earned) leave during probation period with the consent of competence authority for emergency purpose, those leave will be adjusted from his/her annual (earned) leave after confirmation.
  - e) Compensatory leave may be granted to the management employee if s/he worked for at least six hours on Public Holidays or on Weekends day. If overtime or other benefits are provided for the working holiday, the compensatory holiday will not be provided. The compensatory holiday must be enjoyed within the next month.
  - f) On special ground Management may allow maximum 45 days Hajj Leave with pay for the Muslim employees once in their service life. Additionally, for Umrah, 15 days Leave with pay is allowed once in service life. The pre-

condition of getting this leave, one should continue their job for a minimum period of 05 years. If someone desires to avail this leave earlier and leave TSEL before 5 years, she/he will be required to debit the entire salary amount (for leave period) to TSEL.

- g) Any kind of leave such as Study Leave/Marriage Leave/Paternity Leave etc. may be considered as Leave without Pay (LWP) upon discretion of management.
- h) To avail any type of leave, prescribe Leave Application Form must be filled-up by the respective applicant.
- i) A contractual employee will get 10 days Casual Leave and 14 days Sick Leave in a Calendar year or proportionately. No Annual (Earned) Leave will be allowed if it is not mentioned in the terms & conditions of employment. All the leave allocation will be proportionate in a Calendar year.
- j) In the event of staff leaving or separation from TSEL, the concern employee will get benefit for encashment of his/her balance Annual (Earned) Leave on pro-rata basis which will not be exceeding 15 days.
- k) Management discourages to take short leave in office hour. In case of emergency half (1/2) day leave may be approved from his/her annual (earned) leave. To take half (1/2) day leave, the person must be ensured that his/her pending job will not affect his day to day business operation. An employee can take maximum 12 days short leave in a calendar year or financial year.
- l) The leave approval must be done according to the hierarchy of the organizational structure. In this case, concern supervisor will recommend the leave and head of business unit will approve the same. For head of business unit or similar position, the leave recommendation and approval will be done by Managing Director. During leave period, the duties must be carried by a responsible person to be selected by the applicant and his supervisor.
- m) All types of approved leave must be kept in record by HR Department for their future reference. A monthly leave status report must be submitted to Corporate HR department for their record.

## **Section D- Car and Transport Policy**

### **A. Objective:**

1. To ensure faster movement at office work and provide personal support/requirement to staff as and when required;
2. To ensure smooth function of transportation management;
3. To help the allottees to grow their career with TSEL and thereby motivating them to have more productivity towards company;
4. To look into outsourcing alternative to provide transportation to the staffs;

### **B. Eligibility for Availing Full Time Car Facilities:**

1. This policy will be applicable to all management level employees starting from Manager (Band I) to above positions considering the job nature and urgency of service.
2. Higher Management (MD, Chairman, Director, DMD, CEO, COO and all CXOs above General Manager position) will get company provided car along with fuel, maintenance & driver at actual.
3. An eligible Higher Management personnel may apply for the car facility to the Human Resources Department in writing. The car will be procured as per the prescribed form (capital expenditure form of procurement policy) or rented as per this policy.
4. The entitlement of car allowance will be enjoyed by the employees only after submission of valid documents (both whether purchased or hired) and approval of the same.

### **C. Entitlement for Higher Management:**

1. The following limit/capacity shall be allowed by TSEL to following higher Management positions for using official cars:

Designation	Vehicle Capacity (Maximum CC)	Maximum Ceiling to Purchase/ Rent the Vehicle	Fuel, maintenance & other expenses	Driver Category
MD/ Director/ CEO	As per management decision	As per Board decision	At actual subject to the provision of this policy	Company provided driver
Higher Management other than MD/Director/CEO	1500 cc	For purchase: ceiling will be up to BDT 35,00,000 only. For rent: vehicle condition will be equivalent/ similar to purchasing ceiling conditioned vehicle.	Fuel ceiling will be up to 250 liters per month. However, maintenance and other expenses will be at actual subject to the provision of this policy.	Company provided driver

**D. Entitlement of Other Management Positions:**

1. Other positions starting from Manager (Band I) up to General Manager are eligible to get only car allowance not eligible for company provided car. and avail the benefits according to bellow Structure:
2. Management encourages employees to buy and use good Conditioned vehicle which will represent company images and staff's safety. However, car purchasing/rental document/agreement are not mandatory to avail the car.

**MONTHLY CAR ALLOWANCES (ALL INCLUSIVE)**

Designation	Monthly Transport Allowance & other expenses
General Manager	Tk. 70,000 per Month
Assistant General Manager to Deputy General Manager	Tk. 65,000 per Month
Manager (Band-I) to Senior Manager	Tk. 60,000 per Month
Note: If fuel/CNG price go up/down, management may adjust and commensurate the above ceiling accordingly.	



## 3. Car Drop &amp; Pickup Facility Cost (incurred from Employee Salary):

Designation	Transport Availing Charge/ Month (BDT)
Non-Management to Executive	1,000
Senior Executive	1,500
Assistant Manager	2,000
Deputy Manager	2,500
Manager (Band-III)	5,000
Manager (Band-H)	6,000
Note: Management may adjust the above rates at their own discretion.	

**Note:**

\* The car model shall not be more than 10 years old at the time of entitlement of the benefit.

\* The existing employees who are enjoying the benefit under current policy but the car model year is more than 10 years at effective date shall have to buy car complying with the new policy in order to avail the benefit. However, they will be provided with the existing benefits under old policy for the said six months and thereafter will not be provided any benefits on their existing cars.

\* The existing employees who are using outsourcing cars will have to purchase own car by the effective date of this policy to avail benefit under the new policy.\* The employees working in Sales Department can avail Taka 4,500 additional along with the entitled car ceiling.

4. To avail this opportunity, the approval of entitlement along with ownership documents of the car must be submitted to corporate HR & Admin Department. Corporate Audit, HR & Finance will evaluate and fix the car and recommend accordingly.

5. If fuel/CNG price go up/down, management will increase/decrease and commensurate the above ceiling accordingly.
6. The car must be used as full time for official as well as personal usages as and when required. Any interruption or negligence for using the car for official purpose, management may decide to stop paying the monthly ceiling amount subject to have proof of the allegation(s).
7. This benefit will continue until the entitled employees' continuation of service /legal association with TSEL. However, management may discontinue this benefit without showing any reason

**E. Conditions of Outsourcing of Cars for Higher Management:**

Management may decide to provide car to the entitled higher management personnel through outsourcing agents. In that case, company will provide full time car, driver, fuel & maintenance and other related costs through outsourcing agent on monthly basis.

The following terms & conditions will be applied to use the outsourcing cars:

1. Outsourcing company will provide brand new/reconditioned car in showroom conditions with all the modern car amenities (AC, POWER STEERING, POWER WINDOW, CD, CASSETTE, NEW ALLOY, NEW TYRE, AND STANDARD TOOLS & ACCESSORIES). The car should be converted by CNG. The car manufacturing year should not be more than 5 years old. Company will be pay monthly rent of vehicle to the supplier as per the contract for higher management.
2. The driver will get compensation and other benefits as per company policy.
3. Others terms & conditions with suppliers will be maintained according to the written agreement and as per contract set forth by parties.

**F. Terms & Conditions of Using Car for Higher Management:**

1. Higher management will get company provided car according to their ceiling as per Clause-C.
2. Company will procure car from any sources and the car will be asset of TSEL or its financier until full settlement of liabilities. To procure a car, company may not seek or honor any alternative choice from the employee concerned about its

model, color, specifications and any other issues. Management has the sole discretion to take any decision in this regard.

3. The vehicle to be run by Octane. No CNG conversion is accepted.
4. The car will be insured with 1<sup>st</sup> party insurance facility having full coverage. The insurance premium will be paid by TSEL.
5. Minor denting and painting work will not be done frequently until major denting & painting is required. For major denting & painting work proper insurance claim to be lodged to insurance company for the respective car, if possible. Admin department will evaluate the necessity of denting & painting issue.
6. For any accidental damage, proper insurance to be claimed from insurance company. In this regard, necessary formalities such as valid driving license, general dairy, up to date document must be updated and ensured by HR & Admin and allottee's concerns.
7. TSEL will bear the cost related to periodic maintenance, general maintenance, changes of tires, wheels, battery, denting painting and other cost related to vehicle maintenance. The standard schedule of the mentioned work will be maintained by HR & Admin department. Flexibility is only acceptable upon inspecting the physical condition of the car and the significance of problem. Engine overhauling and other major maintenance work will be done considering the physical conditions of car, mileage, duration and other standard considerable points and also according to the standard practice of TSEL.
8. Periodic maintenance (including servicing) should be done after every 3,000 kilometers running of the vehicle. However, formal requisition should be raised in this regard through HR & Admin department. Regular washing and cleaning are the sole responsibility of the allottee's driver.
9. For decorating the car and other necessary items, the following shall be provided from TSEL:
  - I. Carpeting – change after every 3 years
  - II. Seat cover – change after every 2.5 years
  - III. Tub & mug – once in a year
  - IV. Plastic carpet/inside carpet – once only
  - V. Umbrella – once in a year
  - VI. Log book and pen – as per actual requirement

10. If any spares or parts are lost, damaged or theft due to the willful negligence of the driver or allottee, immediate replacement will be done by the allottee. Company will not bear any cost in this regard.
11. Official drivers will be recruited as per Company recruitment policy.
12. Allottee is also be requiring to have their valid driving license for driving TSEL car. Without driving license no one is allowed to play the vehicle on the road. If any accident occurred due to unskilled driving and without driving license, then the concerned personnel will be responsible to bear the cost and thus company will not be any more responsible for the same.
13. The allottee shall be fully responsible for keeping the car in neat and clean conditions at all times and do proper attention for its safety and security.
14. Management has all the right to audit, check and inspect vehicle at any time and placed necessary advice, suggestion, and recommendation for the betterment of TSEL.
15. Fuel shall not be transferred to one car to another car whatever the case it is. Practicing this kind of illegal thing will be treated as gross violation of company's code of conduct.
16. The allottee must always use the car for business as well as his personal purpose and shall not be used for any commercial purpose.
17. The allottee shall not be paid any conveyance allowance or traveling expense for his/her day to day official duty. But company may provide pool car as temporary support at the time of non-availability of car due to technical problems or maintenance work.
18. The car must not be used for any unlawful activities.
19. Car safety and security shall be ensured by the allottee himself/herself or by appointing.
20. It is the management discretion to withdraw or cancel the car facilities provided to the higher management of TSEL. In that case, the allottee must return the car to TSEL with immediate effect.
21. Fuel consumption will be considered as average of 03 months ceiling.
22. TSEL will bear all the expenses related to tax token, fitness, route permit etc. of the car.

23. It is the allottees' option to make TSEL's car in his name. However, TSEL shall transfer ownership in favor of allottee on the following manner:

Year	Cost	Depreciation	Markup value on depreciated value	Transfer value
1	100	20	0%	80
2	80	20	5%	63
3	60	20	7%	42.8
4	40	20	10%	22
5	20	20	15% of cost	15

24. The above payment schedule will be distributed to the allottee's at the time of handover the car. The depreciation is calculated in straight line method. The allottee can take over the car ownership at the time of his separation from TSEL by paying the value as specified above. After completion of 5 years the allottee must pay 15% of the purchase amount to transfer the ownership in favor of them. TSEL will initiate the process to transfer the ownership to the allottee.
25. After five years, company will provide a new car to the allottee according to the policy.
26. All the relevant cost regarding transferring the ownership in favor of employee to be borne by TSEL.
27. Allotment of vehicles towards contractual employee is the sole discretion of management and a separate terms & conditions will be applicable for those cases.

G. Guidelines for Using Staff Bus for Pick & Drop Service:

1. Executive to above who are not entitled for car shall be nominated for pick and drop service subject to availability of space. Female employees will get priority to avail this facility if they are willing to use it. All the allotment is on temporary basis subject to availability of space.
2. Prescribed Form must be filled up to avail staff bus/ transport facility. This form should be properly filled up and recommendation to be taken from respective supervisor for management approval.

3. Monthly transport availing charge 1000/month will be deducted from salary.
4. Route will be planned by HR & Admin department. User will avail this facility at the nearest point of his/her locality. User will stay at their nearest preset point at least 5 minutes before his/her schedule time. Vehicle will not provide home service or door to door service for carrying staffs. The route will also be planned considering the office timing, so that the vehicle reach office at least 5 minutes before the attendance timing.
5. If anybody fails to avail pick/drop facility by any reason, he/she will not be able to claim compensatory conveyance for the same purpose.
6. User should notify to the driver or other users of HR & Admin department earlier, if he/she is not being able to avail staff bus for any specific day(s) for avoiding extra time consumption of the users.
7. The staff carrying facility may be temporarily stopped for any emergency and important assignment for the broader perspective of business or maintenance purpose of the vehicle. HR & Admin department will notify to all the users earlier for their convenient and try to solve the problem as early as possible. No compensatory convenience allowances to be provided in this regard.
8. User's coordination is very much essential to ply the staff bus on the route for its smooth and convenient operation.
9. If any employee wants to take company vehicle against requisition for personal use after office hour or in holiday, he/she to pay the following charges to TSEL:
  - A. Tk. 10 X Per Kilometer
  - B. Tk. 25 X Per hour waiting time
  - C. Tk. 250 as service charge
10. Users shall take maximum care during his/her use time of vehicles. Smoking, illegal goods carrying and other unlawful activities are strictly prohibitive.

## **Section E- Insurance Policy (Life, Health & Out Patience)**

### **1. Employee Medical Benefit Policy:**

Sound mental and physical health always ensures highest level of productivity at work. To ensure maximum productivity by minimum human resources, the employee concern as well as the organization directly or indirectly can play vital role for ensuring sound mental and physical health of each and every individual. TSEL always believes the modern human resources practice within the organization. As part of continuous development of HR policies and procedures, TSEL have started to review its existing policies aligning with the best HR practice in different organizations over the country. Employee Medical Benefit Policy is applicable for all the permanent nature of employment (except contractual, casual, daily basis) employees of different business units under TSEL, Bangladesh.

### **2. Objectives:**

- i. To ensure sound mental and physical health of the employee and authorized member of the family
- ii. To ensure highest level of productivity at work
- iii. To attract, recruit and retain the talents
- iv. To enhance the image of TSEL
- v. To follow a standard practice within the organization

### **3. Company Doctor:**

TSEL already engaged a part time General Medical Practitioner to check employee's health in a weekly basis. The schedule of Doctor's consultation time already been circulated to all concerns in different business units under TSEL.

### **4. Hospitalization Plan:**

Almost everyone can afford outpatient treatment, but when hospitalization is required the heavy expenditure incurred for hospital treatment adds to the worry and anxiety. In order to be free be free from the worry and anxiety of hospitalization treatment expenses, TSEL decide on a health insurance scheme with life insurance. To provide the best service towards



employees TSEL paid the insurance premium by its own in favor of the employee (self, spouse and up to 02 children) to ensure maximum relief from the hospitalization treatment expenses.

#### 5. How The Employee Will Get the Benefit:

The following benefits will be provided to the employee by the Insurance Company:

- i. The plan is only for hospitalization (minimum hospital stay is 24 hours)
- ii. No restriction to choose hospital/clinic to be treated in. no registration of consultation by whom to be treated. There are some enlisted hospitals of Insurance Company where special care or direct of the bill be ensured.
- iii. Virtually all members of a given group may be insured, regardless of their prior health history.
- iv. As the plan of non-contributory by the employee, the employer pays the coverage that employees would otherwise have to pay for with personal money.
- v. Each member of the plan will get a personal health insurance card with photograph, if required so.
- vi. Easy to admission in the designated hospital by showing Health Insurance Card.
- vii. Direct settlement of hospital bills in case of admission in the designated hospitals.
- viii. Maternity coverage for married women without any extra premium. Maternity benefit shall be effective after 6 (six) months of membership under the plan for the spouse of a male employee. However, for female employees, maternity coverage shall be from the date of commencement.
- ix. Overseas treatment in India/ Thailand/Singapore is also allowed as per mutual agreement.

#### 6. What will Cover:

- i. Hospital accommodation in private room
- ii. Consultation with physicians and /or surgeons during hospitalization
- iii. Medical investigation and test during hospitalization
- iv. Major and intermediate surgical operations

- v. Use of operation theatre, anesthesia and other services
- vi. Medicines during Hospitalization
- vii. Ancillary services like, Labor room, Post-operative care and Intensive care facility, Blood transfusion, Oxygen therapy etc.

#### 7. Hospitalization and Claim Procedure:

Prior to admission in the hospital/clinic the patient (employee) will simply complete a Claim Notification Form (available in HR Dept.) and submit it to HR department along with consulting Doctor's Advice Note. The HR department will send it to the Insurance company Life Office to obtain a letter of authorization for admission and advise the patient accordingly. The patient shall submit the claim through the HR dept. in the prescribed form along with the supporting original documents for reimbursement of expenses. In case of emergency, prior authorization is not necessary but Insurance Company should be notified through the Employer within 48 Hrs. of submission.

#### 8. Exclusion of the Plan:

- i. Any congenital infirmity
- ii. Any pre-existing condition
- iii. Any food or food supplements, antiseptics, cosmetic cream etc.
- iv. Any pre-hospitalization expenses
- v. Mental, emotional or physical disorders, alcoholism or any narcotic addiction
- vi. Any procedure which is experimental or not generally accepted by the medical profession i.e., acupuncture.
- vii. Any cosmetic or plastic treatment/surgery unless required as re-construction surgery as a consequence of injury due to accidents/burns.
- viii. Rest, convalescence or rejuvenation cures, thermal baths or confinement for the purposes of slimming or beautification
- ix. Treatment for family planning purposes including termination of pregnancy, dilatation curettage or sterility.
- x. Abortion, miscarriage, ectopic pregnancy, fetal death or any complication and or sequel there from.

- xi. Attempted suicide, violation or attempted violation of the law, injuries willfully or intentionally self-inflicted or due to instantly or under the influence of a drug.
- xii. The examination, fitting or replacement of spectacles including contact lenses or hearing aids.
- xiii. Health checkups, radiography, chemotherapy, in form of investigation/treatment when not incidental or necessary to the treatment of the injury/illness which caused hospitalization.
- xiv. Circumcision
- xv. Aids and HIV related diseases
- xvi. Any dental treatment like route cannel, scaling, filling, and other auxiliary dental issues.
- xvii. First Tk. 500/= of each claim.

#### 9. Entitlement of Group Health Insurance Plan

Benefits/Year Including Dental & Optical	(NE: 1-3)	(E: 10-13)	(E: 6-9)	(E: 4-5)	(E-3)	(E: 1-2)
Max. Coverage Per Member Per Disability	60,000	90,000	120,000	125,000	175,000	185,000
Total Hospital Room Rent limit (at actual or Max.)	24,000	36,000	48,000	50,000	70,000	74,000
Daily Hospital Room Rent limit (at actual or Max.)	4,000	5,000	8,000	10,000	15,000	30,000
ICU/CCU Limit per confinement	14 days	14 days	14 days	14 days	14 days	14 days
All other In-Patient treatment expenses inclusive of surgical charges, consultation fees, medicines, Ambulance and relevant medical investigations related to the ailment and other ancillary	36,000	54,000	72,000	75,000	105,000	111,000

services (excluding Room & ICU/CCU charges) maximum per person per Disability						
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- i. Every regular employee whose job is permanent in nature will covered by this health insurance scheme along with their family members (self, spouse, and maximum 02 child).
- ii. All contractual employees (only self-other than their family members) will be entitled for this scheme for their contract period only.

#### 10. Group Life Insurance(GLI)

SN	Grade	Group Life Coverage	Term (GT)	ADB Coverage	PTD Coverage	PPD Coverage	CI-18 Coverage
1	(NE: 2-3)	200,000		400,000	200,000	As per Schedule	600,000
2	(NE: 1)	250,000		500,000	250,000	As per Schedule	700,000
3	(E: 12-13)	350,000		700,000	350,000	As per Schedule	700,000
4	(E: 10-11)	600,000		1,200,000	600,000	As per Schedule	800,000
5	(E: 6-9)	650,000		1,300,000	650,000	As per Schedule	800,000
6	(E: 3-5)	900,000		1,800,000	900,000	As per Schedule	800,000
7	(E: 2)	1,500,000		3,000,000	1,500,000	As per Schedule	800,000
8	(E: 1)	2,000,000		4,000,000	2,000,000	As per Schedule	1,000,000

#### 11. Medical Benefits for Out-patient Treatment:

In addition of the above Group Hospitalization Insurance Plan, the employee will get yearly fixed amount of Outpatient Treatment Allowance according to the following entitlement:

General OPD Including Dental & Optical Max. 70% per person	(NE: 1-3)	(E: 12-13)	(E: 10-11)	(E: 6-9)	(E: 3-5)	(E-2)	(E-1)
Maximum Limit per family per year	15,000	20,000	30,000	50,000	120,000	400,000	500,000
Max. Consultation Limit per family per year	4,050	5,400	8,100	13,500	32,400	108,000	135,000
Specialist visit / General Practitioner Visit	At Actual, up to maximum consultation limit						
Investigation Limit per family per year	4,800	6,400	9,600	16,000	38,400	128,000	160,000
Medicine Limit per family per year	4,050	5,400	8,100	13,500	32,400	108,000	135,000
For dental Root Canal Treatment, Amalgam, Resin Plastic, Temporary Fillings, Medication, X-rays & optical Lenses, spectacles per family per year.	2,100	2,800	4,200	7,000	16,800	56,000	70,000

## 12. Other Terms and Conditions:

- i. Starting from non-management employee to Sr. Manager yearly allowance will be paid as per above limits. No bills are required for the allowances.
- ii. Starting from AGM to GM reimbursement will be allowed at actual or maximum ceiling of Tk. 36000 per annum whichever is low, against submission of Medical Bills
- iii. At actual ceiling will be applicable for the employee (self), spouse, and maximum 02 children (up to their age of 22 years)
- iv. Expatriate employee COO/CEO/Director/Executive Director/Managing Director's reimbursement will be allowed at actual against submission of Medical Bills.

- v. Additional expenses after receiving the claim from Insurance Company, if any, will also be paid by TSEL.
- vi. At actual reimbursement will be entertained only if the following documents (as applicable) are enclosed with the claim:
  - a) Original cash memo of medicines purchased;
  - b) Receipt of Doctors fee;
  - c) Doctor's advice for tests need to be produced for claim;
  - d) Original receipts in connection with reports like pathological tests/X-Ray/ECG/Scanning etc.
  - e) Cash Memo for spectacles purchased under Medical Prescription;
  - f) Doctors recommendation for Nurses/Attendant;
  - g) Nurse/attendant's receipt.

13. Out Patient Allowances:

- i. Outpatient allowances to be disbursed amongst the regular/permanent employees at the end of the financial year as per the mentioned structure.
- ii. At actual bill will be provided at the end of the month for the entitled positions (if any). All the consultation against the treatment must be carried out by Registered Medical Practitioner. TSEL reserves the right to approve and verify the Medical Practitioner's advice. Purchase of medicine and conduct diagnosis must be done as referred by the Medical Consultant.
- iii. Dental treatment included as preventive measures, TSEL will reimburse for upper & Lower dental cleaning twice in a year.
- iv. Reimbursement of the cost will be restricted to the treatment of the employee, spouse and maximum 02 dependent (unmarried, unemployed) children (age up to 22 Yrs.)
- v. Relevant details including name and date of birth of spouse and the eligible children must be sent to HR dept. for record/documentation.
- vi. Children attaining 22 years of age or getting married, whichever is earlier will not be entitled to reimbursement of the cost of medical-treatment.

- vii. Claims for reimbursement not supported by prescriptions and receipted bills/vouchers will not be entertained. All claims for reimbursement should be submitted within 01(one) month of the treatment, failing which, such claims will not be entertained.
- viii. Concern personnel are requested to complete the Medical Reimbursement Form (along with the above mentioned documents) and submit to the Audit Dept. through HR dept. to complete the procedure of Medical Payment Reimbursement.
- ix. The following expenses cannot be claimed and TSEL will not reimburse the same:
  - a) The supply of dentures and the false caps
  - b) Any cosmetic dental work.
  - c) Any cosmetic treatment/surgery for beautification
  - d) The supply of spectacle frames
  - e) Special diets except in hospital under medical advice
- x. Any kind of falsifying or miss-management in regards of submission bills may be treated as misconduct and management may take disciplinary action against it.
- xi. Maternity Benefits:

Applicable as below only for permanent employee-

Plan	(NE: 2-3)	(E: 12-13, NE: 1)	(E: 6-11)	(E: 3-5)	(E: 1-2)
Caesarean Delivery	40,000	50,000	75,000	100,000	150,000
Normal Delivery	20,000	25,000	37,500	50,000	75,000
Legal Abortion /Miscarriage	10,000	12,500	18,750	25,000	37,500

#### 14. Disclaimer:

This policy can change time to time on the contract agreement with 3<sup>rd</sup> party Insurance Company. Management of TSEL reserves all the right to cancel, amend, alter, change, and modify the policy at any time or to increase and decrease the facility to all or any individual employee with valid and justified reason without showing any formal written documents.



## **Section F- Different Types of Allowances**

### 1. Holiday Allowance:

- i. Minimum working hour should be not less than three (03) hours in a day to provide this benefit-

Position	Entertainment Allowance in BDT (Applicable for minimum 06 hours duty/stay in office)	Entertainment Allowance in BDT (Applicable for minimum 03 hours duty/stay in office)
Manager, Sr. Manager , AGM, DGM, GM, and above	At actual	At actual
Assistant Manager to Deputy Manager	600/=	400/=
Executive to Senior Executive	500/=	300/=
Junior Executive	250/=	150/=
	(no overtime is entitled )	( no overtime is entitled )
Other non-management staff	01 day of Gross Salary payable with Monthly Salary	½ day of Gross salary payable with Monthly Salary

- ii. Minimum working should not be less than three (03) hours for half day holiday work and six (06) hours for full day holiday subject to prior permission taken from respective supervisor mentioning the justification.
- iii. Employees will be either entertained holiday allowance or compensatory Holiday (depends on requirement).
- iv. For Major Religious Festival Holidays (Eid-UI-Fitre, Eid-UI-Azha, Durga Puja, Boudhdho Purnima, Christmas Day), the employees of the specified religious belief may be required to work on festival holiday, but two day's

compensatory holidays with wages and a substitute holiday shall be provided for the employee.

- v. No official transport or transport allowance will be entertained under this scheme.
- vi. No overtime will be entertained under this scheme.
- vii. Lunch bill will be given as per “section-i” subject to completion of equivalent full office hours. If anyone works below the full office hours, will be entertained only holiday allowance.

## 2. Lunch, Refreshment & Dinner Allowance:

- i. Considering the job nature sales, marketing and other staffs (who supposed to work outdoor frequently) are not allowed to claim Lunch or Dinner allowances.
- ii. Official staffs will be allowed to claim Lunch Bill subject prior approval to respective supervisor with justification of claim the bill.
- iii. No transport allowances/conveyance are allowed from Residence-Office-Residence.
- iv. Management staffs will get Taxi/auto-rickshaw fare at actual for official visit outside. If required, company Vehicle will be provided (if requisition is raised earlier).
- v. Non-Management staffs will get only bus fare for official visit. For emergency, company vehicle will be provided.
- vi. Rate of Allowances as below mentioned-

Positions	Lunch ( if anyone work outside office from 12.00 PM to 3.00 PM for official special duty)- in BDT	Refreshment allowances (if work up to 8.00 PM)- in BDT	Fixed overtime- in BDT	Dinner (if anyone continue work after 9 pm or above)- in BDT
Management staff	300	35	Nil	300
Non-Management staff	200	Nil	At actual	200

**3. Night Allowance:**

- i. Night Allowance will be given as per schedule-3 in addition of the refreshment and dinner allowance.
- ii. Non-management staff (excluding jr. executive) will get OT at actual beyond their schedule working hours.
- iii. No Transport allowance/conveyance is allowed from residence-office-residence.
- iv. Rate of Allowances as below mentioned-

Position	Night Allowance (if anyone really need to work till 11.00 pm at night)- in BDT	Night Allowance (if anyone really need to work till 06.00 am)- in BDT
Assistant Manager to Dy. Manager	200 (as per Receipt)	300 (As per Receipt)
Junior Executive to Senior Executive	125 (as per Receipt)	200 (As per Receipt)

4. **Overtime Allowance:** Where a worker/employee works for more hours than the hours fixed, over time Allowance shall be paid at the rate of twice of ordinary rate of basic wages. Overtime Allowance shall be paid with the monthly salary of the employee.

**5. Station Allowance:**

Employees stationed at TSEL plant/project site (outside of Dhaka city) can avail the Station Allowance to cover their food expenses. Procedures are:

- i. All types of employees (i.e. Permanent, Contractual, Management level & Non-Management, etc.) can avail the station allowance;
- ii. Station Allowance will be BDT 6,000/= per month irrespective of employ's salary, grade and designation;

#### 6. Accommodation Facilities:

The objective of this policy is to motivate TSEL employees to work and stay at remote place/plant/project/site. Procedures are:

- i. Employees stationed at TSEL plant/project site (outside of Dhaka city) can avail the accommodation facilities provided by TSEL;
- ii. Only non-local employees can avail the facilities to stay at remote place/plant/project/site;
- iii. Single accommodation will be provided for employee only (family members not allowed);
- iv. All types of employee (i.e. Permanent, Contractual, Expatriate, etc.) can avail the facilities subject to availability of seat/bed/room/accommodation;

#### 7. Subsidized Lunch Benefit:

- i. The subsidized lunch benefit towards all the staffs of TSEL will add value for harmonious HR practices amongst all the employee. This lunch facility will be provided for all the employees located in different places.
- ii. Subsidized Lunch Benefit as Given Below:

##### a) Proportion of Contribution-

Position	Company Contribution	Employee Contribution
Manager to Managing Director	50%	50%
Executive to Deputy Manager	60%	40%
Below Executive Level	70%	30%

- a) All branch/offices under TSEL will be provided the same subsidized lunch benefits.
- b) Considering the job nature, the sales personnel will be provided cash benefit of BDT 100/= for working day (excluding Friday, Saturday and govt. holidays).

- c) However, the employees who already availing Lunch/Dinner allowances will remain unchanged.

## **Section G- Bonus Policy**

### **1. Policy Statement:**

This objective for providing this bonus is to assist all employees to celebrate their festivals with their family members for meeting extra expenses of their individual festival occasions and meet the extra financial obligations if any. The following articles should be followed in order to ensure smooth and proper distribution of Bonus (Festival/Incentive) amongst the employee.

### **2. Festival Bonus:**

- i. All the confirmed and permanent employee under different units of TSEL, whose job is under permanent nature will be entitled to get 02 (two) festival bonuses in a year. The amount of festival bonus will be sanctioned and announced by the management by its sole discretion at the time of festival occasions. The bonus will be distributed a justified and rational time before the festival occasion.
- ii. Probationary employees, whose job not confirmed will get the festival bonus according to the recommended schedule (section vi & vii). The employee whose job is eligible to confirm but due to process/system gap the job was not confirmed on time she will be entitled full bonus. The employee whose probation period is extended for a further period of any specific time/duration due to unacceptable performance, she will be entitled bonus according to the recommended schedule.
- iii. The employee who are in the employment of TSEL as daily or casual basis would not be entitled festival bonuses. But if any employee continued his/her job as daily or casual basis for a period of more than 01 (one) year, the concerned employee will be entitled 02 festival bonuses where each festival bonus will be equal to 50% of their gross salary.
- iv. Contractual employees (except foreign expatriates) will be entitled festival bonuses according to the terms & conditions of their contractual employment. If nothing is mentioned in the employment, then they will be entitled two festival bonuses equivalent to their basic Salary.

- v. For all cases the basic salary will be fixed according to the pay structure (i.e. Basic Salary = (Gross Salary – House Rent, Fixed DA, Fixed Medical, Fixed Conveyance and House Rent).

- vi. Recommended schedule for Festival Bonus Payment-

Service Length	Distribution
Less than 3 months (on probation)	50% of declared Bonus
More than 3 months (on probation)	75 of declared Bonus
Confirmed or Eligible to confirm on due time	100% of declared Bonus

- vii. Schedule of Festival Occasions

Religion	1 <sup>st</sup> Bonus Occasion	2 <sup>nd</sup> Bonus Occasion
Muslims		Eid-ul-Azha
Hindu	Eid-UI-Fitr	Durga Puja
Buddhist		Buddha Purnima
Christian		Christmas Day

### 3. Incentive Bonus:

- i. TSEL may provide incentive bonus amongst its employees depends on TSEL's profitability. The eligibility of the incentive benefits will be determined by the management based on the performance of individual business unit. Based on the profitability and overall situation including financial stability and management will sanction the same by its sole discretion.
- ii. The incentive bonus will be declared for a specific financial year. As incentive is concern so to motivate all level of employee, the incentive bonus should be distributed to all permanent nature of employee, on prorata basis who were in TSEL's employment for the specific financial year either fully or partially. The payment will be made according to the recommended schedule (Article-14).
- iii. The incentive will be distributed amongst employee at the convenient time after closing the balance sheet of previous financial year and completion all

other formalities. Concern Accounts & Finance Department will submit their proposal to Managing Director for his early decision and disposal.

- iv. The amount of incentive bonus will be sanctioned and declared by the management by its sole discretion considering the profitability company's overall financial strength and other admissible issues before distributing the incentive. The sanctioned incentive bonus figure may be varied from year to year.
- v. The employee who have already completed their full 01 year service with TSEL for the specific financial year will be entitled to get full incentive bonus. Probationary employee will also be entitled to get incentive bonus according to the recommended schedule on pro rata basis contractual daily and casual nature employee will not be entitled to get incentive bonus if it is not mentioned with their service or appointment terms & conditions.
- vi. Due to job nature and full involvement with the business process of different business units, Group/corporate employees are supposed to get incentive bonus from each and every profitable company. In that case management any sanction special incentive bonus package for group/corporate for recognizing their contribution toward all the business units the Group.
- vii. Recommended Schedule for Incentive Bonus Payment-

Service Length	Distribution
01 year & above	100% of declared incentive
Below 01 year	Pro-rata basis of declared incentive
- viii. The Management reserves the right to cancel amend, change, modify the policy at any time and will have also right to increase and decrease the bonus /incentive facility to all or any individual employee with valid and justified reason without showing any formal written document.



## **Section H- Mobile Allowance Policy**

### **Policy Statement:**

TSEL ensures best assistance towards its employees along for business purpose. Most of the management employees have been provided Mobile SIM along with the Ceiling for smooth business communication and availed the best as per Mobile Phone Policy. Considering the best use of communication assistance Management has fixed position wise Monthly Ceiling which is including VAT & TAX. Management has decided to consider the Mobile Ceiling facility considering only usage bill excluding VAT & TAX. The Management of TSEL has comprehended that to build a faster communication network between different units, persons, and offices through mobile phone to carry out professional duties more efficiently and effectively the use mobile are increasing day by day. In view of this, management has intended to provide mobile facility through a policy. Based on the position & nature of job responsibilities the following articles are recommended to implement a structured Mobile policy.

#### **1. Procedure:**

- i. Considering the job nature and exigency of services, management may allow entitlement of Mobile facility to any deserving employee of TSEL and its associated companies. The recommendation must be raised through a prescribed form by the respective head of department and head of operation with rational and justified reason.
- ii. Management may provide any mobile line from existing mobile operators in Bangladesh including the brand of mobile set at its own discretion and convenient. Range for procure a set for GM and above is Tk. 8000- 10000, Manager to DGM is Tk. 6000 - 8000 and Assistant Manager to below is Tk. 4000 - 5000 (if any).
- iii. For Managers and above positions, company will arrange to provide mobile line and set. If the person desires, s/he can use his/her personal mobile number for official use and can get monthly ceiling facilities. For this purpose, the mobile line must be a postpaid one from any mobile operators.
- iv. For Jr. Executive to Deputy Manager, only the ceiling will be provided as per recommended schedule. The mobile line and set will be arranged by the concern employee at their own. If require and anybody desires, company will provide loan to the concern employee to procure a personal mobile for official use which will be deducted from monthly salary within 6 months from the date of receiving the loan.

- v. Maximum monthly ceiling of mobile allowance including line rent will be as per recommended schedule. The individual ceiling will be notified through official letter signed by Head of HR or Head of Operations.
- vi. Monthly mobile bills will be paid by the company at actual basis within the sanctioned limit for the respective positions as approved by the management. Any access bill, if any, will be borne by the employee and the amount will be deducted from his/her monthly salary. For personal mobile, all are requested to submit their monthly mobile bill for necessary payment adjustment.
- vii. Those who are entitled overseas call for official purpose, item wise bill must be collected and payment will be made on actual basis. No personal overseas call is allowed to any employee and office will not bear any cost related to personal overseas call if any.
- viii. If an employee is terminated or left from the company or vice-versa, and using official mobile phone facilities, s/he must surrender mobile set and line to the respective HR representative before the last day of his/her association with the company. The last mobile bill payment will be adjusted at the time of his/her final settlement.
- ix. The user will maintain the mobile set and the charger in a very good condition during the period under control by the user. The safety of the set should be ensured and the user will be fully responsible if the set/charger is lost or stolen. S/he is liable for damage, malfunction of the- set & charger caused due to mishandling. In such case, the user shall purchase a new set of existing brand & model or repair the damage at his/her own cost immediately after such occasion. The expenses related to periodical maintenance/ battery change/ minor repairs if required will be borne by TSEL.
- x. No residence telephone bill will be provided to any official for business purposes. Everybody must be reachable over mobile for 24 hours a day. The set is not transferable or should not be handed over to anybody. If the person is transferred within the group, s/he will surrender his/her mobile to concern unit HR representative. Management may approve to transfer the set and line to the person's new assigned unit. In that case necessary inter-unit assets transferring formalities will be done by the concern accounts department of both units.

xi. Recommended mobile ceiling including line rent (recommended schedule)

Position	Operations / Sales / Marketing / Import / Customer Service	HR & Admin / Accounts & Finance Logistics	Audit / IT / Others
Director	5000	5000	4500
GM	4000	4000	3500
DGM	3500	3500	3000
Manager	2500	2500	2000
Dy. Manager / Asst. Manager	2000	2000	1800
Sr. Executive	1500	1500	1500
Executive	1200	1200	1200
Jr. Executive	600	600	600
Others	600	600	600

- xii. For Expatriate employees the ceiling will be according to their contract and other terms and conditions will be according to the policy.
- xiii. Management may allow highest or lowest ceiling to any employee considering their job nature and necessity of mobile use for the greater interest of the company.

2. Disclaimer:

The management also reserves all the right to cancel, amend, alter, change, modify the policy at any time and will have also right to withdraw the mobile from any employee without showing any reason.

## **Section I- Attendance Policy**

### **1. Objective:**

The purpose of this policy is to set forth company policy and procedures for handling employee absences and delay to promote the efficient operation of TSEL and minimize unscheduled absenteeism. This practice may ensure work life balance, improved employee motivations as it will increase the employee engagement.

### **2. Procedure:**

Punctual and regular attendance is an essential responsibility of each employee of TSEL. Employees are expected to report at work as scheduled, on time and prepared to start working. Employees also are expected to remain at work for their entire work schedule. Late arrival, early departure or other absences from scheduled hours are disruptive and must be avoided.

### **3. Working Days & Weekly Holidays:**

- i. Generally, working days for TSEL will be from Sunday to Thursday.
- ii. However, Management of TSEL may choose different days or off days according to business nature.

### **4. Office Timing:**

- i. In general, in working day check-in time will be on/before 10:00 AM and check-out time will be on/after 6:30 PM.
- ii. Lunch time for all cases will be thirty (30) minutes maximum and standard time is from 1:30 PM to 2:00 PM.
- iii. Minimum Eight and half (8.5) hours in a row should be completed per working day (including lunch time).
- iv. Minimum four (04) hours should be completed for half-day office, and staff can avail either 1st half or 2nd half (before/after 1:00 PM from starting and ending time). To avail half day leave, employee must have prior acknowledgement from superior and/or team.

- v. Working days and time can be re-fixed by the authority based on necessity.
- vi. Office timing can be customized only for special reasons by the concerned SBU/department and be informed to HR with approval copy. And the concerned authority can change and modify their office time. However, shared services like transportation service will strictly follow general office hours (10:00 AM – 06:00 PM).
- vii. Employee can avail customized working hour upon prior approval, as flexi hour is not solution for alternative office hour.
- viii. In case of adversity the authority may keep the office open on weekends or holidays.

5. Flexible Working Hour:

- i. Check-in time will be from 10:00 AM to 06:30 PM.
- ii. Check-out time will be from 6:30 PM.
- iii. Staffs should contribute minimum eight and half (8) hours per day to ensure his/her full day attendance.
- iv. Female staff may not be obliged to visit during the menstruation and entitled desk work in the office for at least two (02) days in a month. In case of special needs of female staff like maternity period, pregnancy, post-delivery and breastfeeding period, rules and regulations, travel and work hour shall be considered. Breastfed mothers shall be entitled to thirty (30) minutes additional break during lunch time.
- v. Without prior approval, flexible working hour cannot be availed more than five (05) days in a month.

6. Attendance Record:

- i. All staff must come to office within fixed office time.
- ii. The staff shall record their attendance by attendance register/biometric attendance system /swiping ID-card.
- iii. If staff needs to stay away from work station, s/he must write it clearly in the attendance register/apply through HRIS system. Staff shall record his/her visit entry in the prescribed attendance register/HRIS system.

- iv. Staff who does not attend the office within fifteen (15) minutes of start time, shall be treated as late.
- v. If earn leave is not available, then it shall be treated as leave without pay.
- vi. All staff must write the type and the duration of leave in the leave register/HRIS system.

#### 7. Absence:

“Absence” is defined as the failure of an employee to report for work when he or she is scheduled to work.

- i. The employee provides to his or her supervisor sufficient notice at least two (02) working days in advance of the absence.
- ii. The absence request is approved in advance by the employee's supervisor.
- iii. The employee has sufficient accrued paid time off to cover the absence.
- iv. Employees with three or more consecutive days of excused absences because of illness or injury must give TSEL proof of physician's care and a fitness for duty release prior to returning to work.

#### 8. Delay and Early Departures:

Employees are expected to report to work and return from scheduled breaks on time. If employees cannot report to work as scheduled, they must notify their line manager (1<sup>st</sup> supervisor) before than their regular starting time.

- i. This notification does not excuse the tardiness but simply notifies the supervisor that a schedule change may be necessary.
- ii. Employees who must leave work before the end of their scheduled shift must notify the supervisor immediately.
- iii. Tardiness and early departures are each one-half an occurrence for the purpose of discipline under this policy.

## 9. Disciplinary Action:

Excessive absenteeism/unauthorized leave may take under disciplinary action. Employee self and line manager should notice to address the issue.

## **Section J- Travel Policy (Local & Overseas)**

### 1. Policy Statement:

Travel policy applies to all TSEL employees and ‘travel’ meaning purposeful business trip. This policy doesn’t refer to traveling to and from the office on a daily basis for work.

### 2. Local Travel Policy:

The TA/DA/Accommodation expense policy for local tour for the management/non-management staffs of TSEL as below:

#### i. Daily Allowance (DA), Transport Allowance (TA) & Hotel Accommodation Expenses:

Designation	TA	DA (EX-HQ) (Taka) Below 60 K.M	DA (Out Station) (Taka)	Hotel Accommodation
CEO / COO / Director or Equivalent	Company transport / Car (under Car Policy) / Air/ AC Bus / AC Train / Highest Class of Steamer	1000	2000	Standard with AC (Single)
General Manager or Equivalent	Company transport / Car (under Car Policy) / Air/ AC Bus / AC Train / Highest Class of Steamer	800	1600	Standard with AC (Single)



DGM / AGM / Equivalent	Company transport / Car (under Car Policy) / Air/ AC  Bus / AC Train / Highest Class of Steamer	600	1200	Standard with AC (Single)
Deputy Manager / Assistant Manager or equivalent	Company Transport/ AC Bus / Train (1st class with AC) /1 <sup>st</sup> Class Steamer	500	1000	AC (Single)
Sr. Executive / Executive / Equivalent	AC Bus / 1st Class Train/ 1st Class Steamer/	400	800	Non AC
Jr. Executive / Officer / Sr. Office assistant / Sr. Assistant / Equivalent	Bus (Non AC) / Train (Non AC)	300	600	Non AC
Security Guard / Messenger / Peon / Office Boy / Driver / Office assistant / Equivalent	Bus (Non AC) / Train (Non AC)	100	200	Non AC (Economy)

ii. The following conditions shall be observed to claim the allowances:

- a) Ex-HQ means traveling outside base station and being able to return on the same day and the minimum distance from base station should not be less than approximately 60 km (one way).
- b) If work is involved for the whole day (at least 6 hours) in the visited EX-HQ place and traveling starts after work and reaches base station after 10 PM, he/she will be entitled to get EX-HQ DA for the day.
- c) Out Station means traveling outside base station where at least one-night halt is essential.
- d) The basis of calculation of DA (Per Diem) shall be as follows (including reporting time at Airport/Station):

I.	Form Day of Departure	Before 12:00 Noon	Full DA
		After 12:00 Noon	Half DA
II.	Arrival	Before 12:00 Noon	Full DA
		After 12:00 Noon	Half DA

- e) The Daily Allowance is given to a person considering his/her expenses for food & entertainment, pocket money, disturbance, incidents, incentive and other related costs during one's stay at outside of his workplace.
- f) For Tours on weekly or public holidays the EX-HQ & Out Station Allowances will be 1.5 times of the normal approval rate and if required the staff will work on the same day for official work.
- g) If an employee uses Company Car for official traveling with prior approval from management, he/she will be entitled to reimburse actual fuel/CNG cost for such travel. If the personal driver is accompanying with the concern personnel, the concern personal driver (not in company payroll) will also get the TA/DA as same as official driver.
- h) An employee may be avail a faster moving transport or a higher class treatment beyond his/her entitlement, if so required for EMERGENCY- SITUATION subject to the approval of management. Management encourages Air Travel only for emergency situation.
- i) If any employee is placed in another workstation for a temporary period of maximum 15 days, s/he will get the normal DA applicable to him/her. If s/he is required to stay up to 30 days, s/he will get 75% of his/her D.A for the rest 15 days. If s/he is required to stay more than 30 days, a transfer letter will be issued in favor of him/her and no question of DA will be raised for onward period. If this stay requires above 03 (three) months in continuous basis, in this case management may consider one extra basic salary as Out Station Allowance based on the situation, profitability and other related issues.
- j) Necessary supporting documents such as ticket, bills and other payables etc. must be enclosed at the time of submission of tour bill.
- k) If company provides Guest House I Accommodation facility to the employee, the employee must be availed that and no question of Hotel Accommodation allowance will be raised for this reason.

- l) If any employee desires to stay with his/her relation during official visit, management may allow additional 50% of their daily allowance as accommodation allowance.
- m) For normal working day if anyone who works outside office for any assignment will get actual travel fare. Prior approval of his/her respective supervisor through outside visit/movement form is must to claim this bill.
- n) Management staffs who are supposed to work to complete emergency assignment in the office on holiday/weekly off day will be entitled to get allowances as under. To claim this, benefit the employee should work at least 04 (four) hours for the same day. Allowances includes Lunch/Dinner/Refreshment and supplementary expenses. Prior approval must be taken from his/her supervisor in this regard.

Designation	For Claiming Allowance the minimum working hour should be less than 04 hours	
	TA	Entertainment Allowance
General Manager	Not Applicable	500
Deputy General Manager	Not Applicable	450
Assistant General Manager	Official Car / TK. 100	400
Manager	Official Car / TK. 100	350
Deputy Manager	Official Car / TK. 100	300
Asst. Manager	Official Car / TK. 100	250
Sr. Executive	Official Car / TK. 75	200
Executive	Official Car / TK. 75	150

- o) Non-Management staffs (Jr. Executive to below) who are supposed to work to complete emergency assignment in the office on holiday/weekly off day will be entitled to get overtime allowances as per company policy. No TA or other allowances to be provided in this regard.
- p) Local travel expenses and other miscellaneous expenses which are required for official purpose at the time of staying Ex- HQ or Out Station will be billed at actual and this cost will be borne by TSEL.

- q) If any employee desires to get compensate holiday in replacement of a specific holiday, s/he will not get any TA/OT/Allowances or any other benefits for the same and his/her office.

3. Overseas Travel Policy:

i. Terms & Conditions:

- a) For travel outside Bangladesh, Director and above position are entitled to Business Class Air Fare;
- b) All other officers are entitled for Economy Class Air Fare and other related travel expenses such as visa fees, Travel tax, Terminal Tax, embarkation fees, which would be reimbursed at actual on the basis of supporting documents/vouchers etc.
- c) Management may allow higher class Air Fare beyond the entitlement if so required for emergency situation.
- d) Hotel Fare will be billed at actual including breakfast and the payment will be made by TSEL.
- e) If the visited country has any offices of TSEL, they may be requested to arrange the hotel and pay the bill at actual upon submission a request from Bangladesh Office.
- f) Accounts Department will adjust the bill at their convenient.
- g) Expenses related to transport and other Tariff for official purpose in abroad will be billed at actual.
- h) If possible, and wherever applicable actual vouchers should be enclosed with the tour bill.
- i) At least 01 (one) week before leaving the country, the respective person will prepare a budget for his/her entire tour and submit it to HR Responsible to get approval.
- j) Accounts department will disburse the payment in advance/accordingly.
- k) The tour/visit approval will be recommended by the concern designated channel and must be approved by the Managing Director of TSEL by any media (i.e. Hard Copy, soft copy, e-mail, etc.).

ii. Entitlement of Hotel and Daily Allowances:

<b>Level of officers</b>	<b>Normal Limit ( in US\$) per day</b>	<b>Hotel Standard</b>
Managing Director	US\$ 150 For SAARC & US\$ 175 for other countries	5 Star
Director/COO/CHRO/CFO	US\$ 100 For SAARC & US\$ 125 for other countries	5/4 star
General Manager	US\$ 75 For SAARC & US\$ 100 for other countries	5/4 star
Deputy General Manager, Assistant General Manager, Manager	US\$ 75.00 Per Day for all countries	3 star
Deputy Manager, Assistant Manager, Sr. Executive, Executive	US\$ 50.00 Per Day for all countries	3 star

iii. The DA entitlement will be effected under the following rules and regulations:

- a) The daily allowances are given to a person considering his/her expenses for food and entertainment, pocket money, disturbance, incidents, incentive, and other related costs during one's stay at outside country.
- b) Main visit place(s) will be the basis for claiming DA. Transit point will not be counted for DA entitlement (if not exceed 12 hours in transit point).
- c) The basis of calculation of DA (per Diem) shall be as follows (including reporting time at Airport/ Station):

I. From day of Departure	Before 12:00 Noon	Full D.A
	After 12.00 Noon	Half D.A
II. Arrival	Before 12:00 Noon	No D.A
	After 12.00 Noon	Half D.A

iv. Others Procedures:

- a) In principal, unit HR responsible will assist to concern employee to make their visit smooth and ensure all the process done accordingly. Hotel booking and Air Ticket will be arranged by the office in consultation of the concern employee.
- b) All the employee will take an advance submitting the approval of his/her tour plan to concern Accounts Department. After return from tour/visit, the employee must submit the actual bill and Voucher to Accounts Department for adjustment of advance (Excluding DA) within 07 days of his/her arrival. The employee must submit a report on his/her visit/tour and give a clear outcome for the same.
- c) For training purpose, a standard bond must be signed by the employee concern mentioning that he will return back from the training, join TSEL, use his learning outcome for the betterment of TSEL and will stay with this company for at least the time frame as mentioned in the bond.
- d) While representing TSEL in abroad, it is expected that everybody will maintain a high reputation and value of TSEL and uphold the zeal and enthusiasm at their best.

4. Disclaimer:

TSEL management reserves all the right to cancel, amend, alter, change, modify, the policy at any time and will have also right to increase and decrease the facility to all or any individual employee with valid and justified reason without showing any formal written document.

## **Section K- Recruitment Policy**

1. Policy Statement:

Recruitment policy, manuals, processes, forms are established to ensure that the best available candidates are considered for new or vacant positions. These will seek to ensure openness in developing criteria and in the process of identifying qualified candidates and selecting new staffs, and to minimise problems related to cronyism or nepotism.

2. Staff Forecasting:

The team recruitment is responsible to start annual staff forecasting between June of every year/or fiscal year in consultation with the respective department head of each business unit.

In line with the budget, team recruitment will prepare their annual sourcing plan including active and proactive recruitment plan of visiting universities, job fairs and associations.

### 3. Requisition:

The formal recruitment will begin upon receiving the complete form of requisition, for national or international hiring approved by the respective authority with 60 days' lead time. The replacement to be raised immediately upon resignation of staffs and it will be checked and verified in line with the respective department/unit organogram, job description along with other indicator by the Human Resources be approved by the respective Head of the Business/Chief Executive Officer/ Director of the group for cases of replacement and Managing Director for New Positions.

### 4. Lead Time:

The normal lead time for sourcing, selection and on boarding is 60 days from date of receiving the approved requisition; 10 days for advertisement and sourcing, following 5 days for primary shortlisting, 10 days for selections, 5 days for approval and making the offer including operational tasks and lastly 30 days for candidate notice period. This lead time may shorten depending on the business unit demand on reality ground and HR ability to supply as well as candidate notice period from their current employer.

### 5. Sourcing:

The channel of sourcing depends upon the respective positions; however, team recruitment will be highly aligned with the recruitment cost under control and publish advertisement online offline and internally. The in house recruitment using our own resources is highly encouraged but may opt for Executive Search Company in need for some critical positions. HR dept. will regularly post the vacancies circular internally to invite internal applicants to apply and with requesting them to share the vacancies to their own networks. The internal applicants will follow the same applications process with prior consent from the SBU Head channelled through line Manager.

### 6. Referral Candidates:

Management may entertain referral candidates in condition that it is declared the connections and relations with the candidates at the prior stage to HR dept. The concern person who will refer someone must not be involved in the selection panel or interview board.

7. Selection:

i. Non-Management Positions:

- a) Entry level non-management approved position can be recruited by the business unit if. The concern Unit HR Lead will be the HR Representative and will take part in all sort of dealings till final interview.
- b) The final interview hiring decision will be made by the concern Business Unit Head or delegated person.
- c) The interview board will be consisting of three persons, 1 from HR (mandatory), 1 from concern business unit (mandatory) and 1 from relevant office or department (Mandatory). Each one will fill up the interview rating sheet for each candidate.
- d) Unit HR Lead process the recruitment final hiring process, and get approval from the Head of the Business on the recruitment proposals and issue the appointment letter, prepare personal file and preserve locally.
- e) For those independent business unit don't have unit HR Lead on board, may drop the requisition by the Unit Head to Corporate Talent Acquisition team for further processing of hiring and to carry all the relevant processes. However, in case, corporate HR's involvement is required, may follow the aforesaid process as appropriate in the clauses 4.01, a to d.
- f) For hiring the daily labour, for immediate/casual demand, the requirement should be analysed properly and be approved it by the Unit Head of Business. Concern functions will propose, concern HR and Finance Accounts will check before channelled to approval.

4.02 Management Positions:

The positions those falls under management categories will directly be processed by the Corporate Human Resource Office following same procedures outlined here upon receiving requisition, from Units. Each one will fill up the interview rating sheet for each candidate. Upon discretion of Management and Corporate Human Resources, Executive/Sr. Executive positions recruitment can be delegated to Unit HR, considering their readiness and ability to maintain compliance.



#### 4.02.01 Written Test:

In order to find the specific functional readiness of the position specific, business unit or concern hiring manager may request for written test. The written test questions may contain cases or questions on language ability, management and leadership track judgment, behavioural judgement, logical writing, aptitude indicator and on functional/technical competencies. For the functional/technical aspect the concern hiring units will be responsible to prepare the questions and share to HR in advance. HR team will prepare and design the final written questions. Written test may go mandatory for Executive and Sr. Executive level; however, others positions can go directly to follow 4.02.02.

In absence of written test request from concern business unit/hiring manager, HR may seek for written test as part of their shortlisting process case to case basis.

#### 4.02.02 Preliminary Interview:

Preliminary Interview can be substitute of clause 4.02.01 for Executive or Sr. Executive level. However, for other positions its mandatory to conduct preliminary interview before placing the shortlisted candidates to the hiring manager or management for final interview, concern team in Human Resource should assume that the shortlisting was accurate and there is high probability of hiring the final candidate upon completion of final interview by the board.

#### 4.02.03 Final Interview:

Upon completion of clause 4.02.01 and 4.02.02, final interview will be called upon. In order to align with the recruitment compliance, HR is supposed to ideally provide minimum 2 candidates for a single position to select the final & right potential incumbent.

#### 5.0 Interview Board:

The board consist of minimum 3 people. One from Human Resources Representative (mandatory), one from concern business/functions (mandatory) and one from relevant functions (mandatory). Interview board note, will be prepared with recruitment history of the relevant recruitment by the team recruitment for attaching with recruitment proposals.

#### 5.01 Interview Board Member:

The manager and above and below Head of Business positions preliminary interview will be conducted by the Head of Human Resources and the final preliminary interview will be conducted by the Head of the concern department along with Head of Human Resources.

For the other positions, below managerial level, the Talent Acquisition Lead may conduct the preliminary round along with written test if necessary.

In case of Head level positions, final interview will be conducted by the Head of Business unit/HoHR/CEO/Managing Director or as delegated by them.

In terms of hierarchy the interviewer will be at least one level higher than the position of the interview to be conducted.

#### 6.0 Hiring Decisions:

The board is the sole authority to recommend the finalist and panel list. HR Recruitment Team will prepare a matrix. All the written score and interview score will be added and based on the score and overall recommendation from the board, ideal candidate will be selected.

Based on the board member recommendations and matrix results, the team recruitment will prepare a recruitment proposal. Which will be acknowledged by concern business unit and HR Head and be approved by Chief Executive Officer for replacement hiring and Managing Director for new hiring with the exception of clause 4.01.

#### 7.0 Joining Formalities & Personal file:

All the new joiners personal file will be prepared by the Talent Acquisition Team and hand over to HR Operations for records keeping. The list of document which needs in respective personal file e.g. personal/employee information forms, academic certificates, recruitment process papers, rating sheets, interview board notes, experience certificates according to the candidates' declaration in his/her resumes, pictures, nominations details, Minor Beneficiary Details Form, reference check forms, if conducted for critical positions according to the relevant policy.

#### 8.0 Reference Check:

The final selection depends upon reference check, positive feedback received by the referees, at least 2 reference. Business unit may request those positions needs reference checks. However, HR will assume to check reference for some critical positions on needs but ideally not for every positions unless management has different decisions. For some critical positions

team recruitment must go for background check by the external professional firms if necessary or does internally.

#### 9.0 Signatories:

Except clause 4.01 a to d, all appointment letter will be signed by the Managing Director/CEO/Head of Human Resources depending on the position. Head of the Business Unit appointment letters will be signed preferably by the Managing Director or CEO for some cases. All other positions appointment letter may be signed by the Human Resources Head of the Group.

The appointment letter template to issue upon contextualisation according to the business unit benefits scheme and individual negotiations for Management Staffs, Non-Management contractual staffs, Non-Management permanent staffs, Management Contractual staffs and International staffs.

Except clause 4.01, all new/replacement recruitment proposals will be initiated by the Corporate Human Resources Office, acknowledged by the concern hiring manager/department and reviewed by CEO, finally be approved by the Managing Director.

#### 10.0 Probation Evaluations:

All new joiners will be undergoing a certain period of probation in line with the final selection process according to the law of Bangladesh and be reviewed their probation performance accordingly, pass them, extend them or terminate them according to the internal employee discipline policy and Bangladesh labour law.

Ideally the duration of probation will be 3 months for Manager and above and 6 months for other positions. However, may vary from case to case basis with options to extend to further 3 months or shorten based on performance.

All the evaluations process must be completed in advance and written message of evaluation results must reach to the staffs before expiry of the probation period.

The message of probation performance evaluations will be processed to the candidate in written either extensions, offering permanent status with all regular company benefits or terminations for poor performance.

11.0 Compliance:

All recruitment process, hiring decisions must be in line with the policies and processes of TSEL. The biased and non-compliant recruitment may lead to seek for disciplinary hearing of the parities/staffs involved.

12.0 Documentations:

The recruitment process papers for unsuccessful candidates and associated all documents must be in safe custody for at least 3 months preferably 6 months for audit purposes.

13.0 Communication to Unsuccessful Applicants:

Team Talent Acquisition will send regret message to the unsuccessful final list candidates upon successful candidates joining of the position concern.

## **Section L- Employee Entry & Exit Policy**

**Policy Statement:**

Purpose of the entry policy is to ensure the warm welcome of an employee and give him/her detailed idea about TSEL's Vision, Mission, Strategy, values and etc. It will help him/her to make them feel belongingness to TSEL that will ultimately create maximum satisfaction for an employee and also help them to be loyal towards TSEL. And also try to give a memorable farewell and positive image about TSEL during separation.

**Recruitment Procedure:**

All new hiring activity, sourcing, interview and final selection, communication with candidates and joining activities along with other relevant recruitment tasks will be guided and followed by relevant policy.

**1. On-Boarding:**

All new joiners will go through a certain period of on boarding programme to make the employee feels welcomed and comfortable in the new environment, to swiftly align the new employee's productivity with the new workgroup to support the employee retention. It will also establish a standardized tool for Line Manager and HR in welcoming, handling, and

developing new team members in the group. All the transactions, activities of welcoming or on boarding any new joiners will be guided by the on boarding programme manuals, forms, process and procedures written for Buddy, HR, Line Manager and New Joiners for survey to streamline effectiveness.

## **2. Orientation:**

HR will ensure that an employee must get his orientation within 30 days of his/her joining according to the class room session. The content can be changed time to time according to the needs or business information. 1<sup>st</sup> day and 15<sup>th</sup> day of every month will be the tentative joining date for all employees to align with orientation programme. However, depending on the request or business requirement date of joining can be changed accordingly.

### **i. Welcome Kit:**

Employee should be welcomed with the kit during orientation or after the orientation when new employee is handed over to line manager. The line manager is requested to prepare and handover the welcome kit to the new joiners with an introductory speech to impress the new joiners. Kits items are a token of appreciation arranged by line manager in consultation with HR. It can be even a single diary, view card or anything in a formal way.

### **ii. Welcome lunch:**

Line manager may arrange a welcome lunch with the new staffs in the office cafeteria or in budgeted and cost effective place to easy professional relationship between them.

### **iii. New Employee Welcome Packets:**

HR Team is responsible to prepare a new employee kits which might contain, new employee on boarding role, job description, employee hand book, organization vision, mission, value proposition hand-outs/booklets, pen/diary in a formal way to the new joiners.

### **iv. Handover to Concern Department:**

After finishing the orientation program, the Team HR will introduce him/her in the relevant colleagues/fellows in the same place in person one to one visits in the same areas and finally will hand over him/her to the concerned departments.

## **Joining Intimation:**

Before joining of an employee to his/her concern department, HR needs to make sure about his/her potential arrival date and all logistics e.g. sitting arrangement, Laptop/Desktop, notebook and other work relevant stationaries are ready. In line with that, Talent Acquisition

Team will circulate a Joining Intimation, letter/ e-mail to respective department to nominate one Buddy, coordinate with concern department for logistics arrangement. e.g. for visiting card and sitting arrangement need to contact with admin, new email to request to IT and to take potential preparations to welcome new joiners on board, according to the on boarding guidelines.

**Exit Processes:**

- v. Employees are advised to discuss his potential plan of separation to his/her concern supervisor or directly fill the prescribed form of resignation to submit official resignation with the terms of his/her appointment letter as stated clearly to Human Resource/Concern Department/ Line Manager.
- vi. Responsible personnel according this policy must conduct exit interview in the prescribed Exit Interview Form.
- vii. Upon approval of resignation letter, employee will get the Resignation Acceptance Letter from Human Resource Department.
- viii. The concern employee is advised to visit Concern Human Resource Office to submit the proper handover and taking over prescribe standard format which is signed by all the parties to ensure proper exit process.
- ix. HR Operations/ Unit HR will verify the handing and taking over processed completed properly including but not limited to sales portfolio, clients lists, accounts list and other important issues depending on the positions. The outgoing sales staffs are advised by this policy to introduce his/her all the clients, preferably by client visits, he is used to deal to the replaced staffs for his/her quick on boarding. The handing and taking over documents to be preserved in concern staffs personal file and be supplied a to concern employee as a token of proper exit from TSEL.
- x. HR Operations/Unit HR will begin the final settlement process as stated along with provident fund and gratuity fund in association with Accounts and Finance.
- xi. This final payment should be released in account payee cheque or direct bank transfer according to the financial policy of TSEL in preferably 40 days from the day from the resignation approved.
- xii. After all the exit clearance procedure done, employee will get their experience certificate according to the prescribed format.

### **Employee Farewell:**

To pass the good memory of TSEL and future potential company branding by outgoing employees, the concern department may organize a farewell gathering in a modest way using our own resources, or as agreed by the concern department/units, conveying gratitude speech for his/her contributions during farewell session at the last day of works.

## **Section M- Employee Transfer Policy**

### **1. Objective:**

Transfer policy, manuals, processes, forms are established to ensure that the internal staff movement is being carried out with best possible easy way to put positive impact on the business and ensure transfer is for the business purpose and no misuse of it.

### **2. Scope:**

Since TSEL's activity is spread throughout the country as well as overseas, all types of staff can be transferred to any working area in the interest of the organization. Staff, irrespective of gender, posted in supervisory capacity can be transferred anywhere inside or outside of the country. The staff under order of transfer shall be obliged to join at the new work place.

### **3. Types of Transfer:**

- i. Transfer Within Department
- ii. Transfer/employment transactions Across TSEL

**4. Table of Authority for Transfer** (applicable for all types and levels of employee):

Type of Transfer	Proposed by Existing BU	Recommended by New BU	Acknowledged by Dept. Head – EG (if needed)	Acknowledged by Finance dept. (if needed to check the budget)	Acknowledged by HR dept.	Approved by
Transfer Within Dept.	Head of BU	Head of BU	Head of Department-EG	Head of Finance- EG	HR Business Lead	Head of Dept.
Transfer / Employment Transactions Across TSEL	Head of BU	Head of BU	Head of Department-EG	Head of Finance- EG	Head of HR	CEO / Managing Director

**5. Transfer Order Issue:**

- i. Transfer Order of section 3(i) will be issued by HR Business Lead
- ii. Transfer Order of section: 3(ii) will be issued by Head of HR

**6. Rules of Transfer:**

- i. Transfer order will be valid for thirty (30) days and be effective from the day of joining.
- ii. Transfers must be conducted prescribed Transfer Order. Line manager should fill-up the Transfer Proposal and process through HR department.
- iii. Once Transfer Proposal approved, HR will issue Transfer Order. And note that, no transfer be valid till it's written and duly completed the transfer process.



- iv. Staff shall not be transferred more than twice in a year in general. However, there can be exceptions for the interest of the organization.
- v. Employee, especially female and mother of baby, can be transferred to any suitable place according to discussion with them. Female staff shall not be transferred from one place to another during the period of conception to six (06) months after delivery of the child. Exceptions shall be accepted by the MD's special approval or written prayer of concerned staff.
- vi. Transfer is not a long-term solution to low performance or behavioral problem of staff. Therefore, in such a case staff development initiative shall be initiated or administrative action shall be pursued.

#### **7. Responsibility Hand Over and Take Over:**

- i. Staff having transfer order must hand over all responsibilities including all papers, documents, equipment and stocks to his/her replacement within one month.
- ii. After joining at the new place, staff shall fill up the Joining After Transfer properly and be ensured to send it to HR department and other concerned dept./unit with supervisor's approval.
- iii. Transfer shall be effective after responsibilities are handed over to the replacement.

#### **8. Transfer Leave:**

- i. Transfer within the country-

Employee will have entitled for two (02) days leave with pay (except clause 9.i.a).

- ii. Transfer outside the country-

Employee will have entitled for five (05) days leave.

- iii. This leave shall applicable in addition to earned leave and treated as transfer leave and have to enjoy within thirty (30) days of transfer effective date.

**9. Transfer Allowance and Bill:**

- i. For transportation of household goods to the new place (with/without family), transferred staff shall be entitled as follows:
  - a) Transfer allowance and transfer leave will be applicable for more than 10 KM distance from previous job station to new job station.
  - b) Employee married/unmarried (with/without family) shall be entitled to reimbursement of reasonable actual cost of transportation for goods (furniture/household items).
  - c) Transferred employee shall be entitled to actual transportation fare for his/her family members (maximum five members including employee) and applicable as per TA/DA policy.
- ii. Transferred staff shall receive traveling and other bills (related to transfer) from the new working place.
- iii. HR and Accounts department will complete all relevant task and bill-voucher for smooth salary posting at new place.
- iv. The transferred staff shall draw his/her salary from the new office irrespective of the transfer date.

