

Initial Environmental Examination Report

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Bangladesh: Paramount Solar Power Project

PART 3: Main Report

Prepared by Dynamic Sun Energy Private Limited for the Asian Development Bank (ADB).

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4.16 Socio-Economic Conditions

A social baseline study was carried out in areas surrounding the project site. This has been done based on several surveys around the locality as well as Pabna Sadar Upazila Profile. Bangladesh Bureau of Statistics (BBS), Bangladesh National Portal, concerned books and periodicals were also consulted.

4.16.1 Administrative Information

Proposed Power Plant- is in Hemayetpur union, Pabna Sadar upazila, Pabna district which further comes under Rajshahi Division. Pabna is a district in North-western Bangladesh. It is situated at the fringe of mighty Padma River.

Pabna Sadar upazila is in Pabna district. Pabna District (Rajshahi Division) area 2,371.5 sq. km. Pabna is bounded on the north by Natore and Sirajganj zilas, on the east by Manikganj zila and the river Jamuna, on the south by Rajbari and Kushtia zilas and the river Padma and on the west by Natore zila. The district lies between 23°48' and 24°21' north latitudes and between 89°00' and 89°44' East longitudes. Demographic Characteristics of Pabna District is presented on **Table 4.29**.

Table 4.29: Demographic Characteristics of Pabna District

District	Pabna
Upazila	9
Union	74
Mouza	1321
Village	1549
Paurashovas	9
Ward	87
Mahalla	234

(District Statistics 2011, Pabna)

The project area is in Pabna Sadar Upazila. Pabna Sadar is the largest upazila of Pabna; occupies an area of 439.30 sq. km. It is located between 23°53' and 24°05' north latitudes and between 89°09' and 89°25' east longitudes. The upazila is bounded on the north by Atgharia upazila, on the east by Santhia upazila and Sujanager upazila, on the south by Pangsha upazila of Rajbari zila and Khoksha upazila and Kumarkhali upazila of Kushtia zila and on the west by Ishwardi upazila.

4.16.2 Population and Social Structure

The project location is at Pabna Sadar Upazila, Pabna. The Demographic characteristic of the Pabna Sadar Upazila is presented in **Table 4.30**.

Table 4.30: Demographic Characteristics of the Pabna Sadar Upazila

Upazila	Pabna Sadar
Total Area (Sq. km)	439.30
Total Household	1,38,839

Upazila	Pabna Sadar
Total population	5,90,914
Male	2,96,870
Female	2,94,044
Average Household	4.21
Literacy rate (%)	51.4
Sex ratio (M/F)	101
Population Density (Per Sq. km)	1345
Municipality	1
Union	10
Mouza	243
Village	291
Ward	15
Mahalla	46

(District Statistics 2011, Pabna)

4.16.3 Religion

Table 4.31: Religion of the households Pabna Sadar Upazila

Upazila	Total population	Muslim	Hindu	Buddhists	Christian	Others
Pabna Sadar	590914	578365	12294	221	27	7
%	100	97.87	2.08	0.037	0.004	0.001

(District Statistics 2011, Pabna)

From the above table it could be understood that Pabna Sadar is predominantly a Muslim populated area with 97.87 percent of Muslim population, while Hindus are the second most populated religion, with a presence of 2.08 percent. Buddhists and Christians are the two other religions having a slight presence of 0.037 and 0.004 percent while others are 7 in number representing a trivial population of 0.001 percent.

4.16.5 Health and Medical facilities

There are 4 Govt. Hospitals and 10 Health Center/Clinic at the upazila. The one and only Mental Hospital of the country is also situated near the project site.

4.16.4 Source of Drinking Water

In Pabna Sadar upazila 93.9% of general households have got the facility of drinking tube well water, 3.7% tap water and the remaining 2.3% household gets water from other sources.

(Population and Housing Census 2011; Community Report: Pabna)

4.16.5 Sanitation

In the upazila, 71.4% of general households use sanitary latrine, 25.9% non-sanitary latrine and 2.7% have no toilet facility. (Population and Housing Census 2011; Community Report: Pabna).

4.16.6 Literacy

In Pabna Sadar upazila it is found that 51.4% population aged 7 years and over is literate. (Population and Housing Census 2011; Community Report: Pabna).

4.16.7 Access to Electricity

The entire Pabna Sadar upazila have brought under the Rural Electrification Program. However, a total of 73.4% of the general households reported to have electricity connection. (Population and Housing Census 2011; Community Report: Pabna).

4.16.8 Agriculture

The economy of Pabna is predominately agriculture. The main crops of this district are boro and aman paddy, jute, chili, sugarcane, potato etc. Fruits like Mango, jackfruit, papaya, banana, litchi, betel nut and palm are also produced. Most of the people depend on agriculture in this char.

4.16.9 Archeological, Cultural Heritage and Religious Site

The famous archaeological heritage and relics are Sree Sree Thakur Anukul Chandra Ashram, Hardinge Bridge, Ishwardi Railway Junction, Chatmohor Shahi Jame Masjid and Khetupara Zamindar Bari etc.

4.16.10 Indigenous people and others

There is no presence of indigenous people in and around the project area.

4.17 Primary Social/Household Survey

For this project, land of the main power plant area has been purchased following willing buyer and willing seller process and there were no informal land users who would have been involuntarily displaced, nor any structures been displaced. In addition to that, there was no informal land user, land sellers / users who will be worse off as a result of the land sale / loss. Involuntary resettlement is triggered for land acquisition along TL for transmission tower footing area. There is no informal land user or any structure along the TL route. Transmission Line runs mostly through agricultural land. So, there is no village along that route. A detailed survey of all the affected HH due to this Power Plant and TL has been conducted to establish the socio-economic conditions of the households within the power plant and TL, to identify project impacts and their mitigating/management measures. Findings of the primary socio-economic survey of the affected HH is provided the sections 4.17.1 & 4.17.2.

4.17.1 Socio-economic Conditions of Power Plant Area

Socio-economic details of the power plant area households were collected during the social baseline survey. The socio-economic profile of the surveyed HHs is consequently presented following

demographic profile of the HHs. A total of 1054 HHs comprises of 3693 people has been surveyed with average HH size 3.50.

Table 4.32: General Profile of Surveyed Population

Category	Total
Number of total surveyed Households /Units	1054
Number of total Population	3693
Average HHs Size	3.50

Source: Field survey of AECL Team

4.17.1.1 Demographic Profile of Project Area Households

Demographic profile of the affected community has been analyzed as a part of socio- economic profile of the project area. This comprises of gender profile and age-sex distribution of the project affected communities. Precisely, it can be stated that the area lacks gender parity as 97.55% male headed and 2.45 female headed HHs are found during census period. The general scenario in Bangladesh is same as most of the HHs head are male. Age-sex ratio indicates that majority of the population are within the age limit of 15-59.

4.17.1.2 Distribution of Household Population

Distribution of HH population is presented in the table below. It indicates that majority of the HHs have 3-4 members. It is interesting that 214 HHs have only 1-2 members. HH size of within 7 to 8 members was minimal in the area. Distribution of HH population is presented by area-wise in the illustration:

Table 4.33: Distribution of HH population

SL No.	Number of household members	Total	
		HH	%
1	1 to 2	214	20.30
2	3 to 4	786	74.57
3	5 to 6	37	3.52
4	7 to 8	17	1.61
5	9 to 10	0	0
6	10+	0	0
	Total	1054	100

Source: Field Survey of AECL Team

4.17.1.3 Age and Sex Distribution of project area Population

Age-sex distribution of the surveyed 1054 HHs was measured during the census and IOL survey. It was found that population density increases respectively from the age group of 1-60. According to the age band, the most prominent group is 30-60. The number of surveyed persons steadily decreases with increasing age limit above 60. It is the almost similar to the national scenario. Details see in **Table 4.34**.

Table 4.34: Age Sex Distribution of Surveyed Population

SL	Age Group (Years)	Male		Female		Total	Overall %
			%		%		
1	01 to 05	109	5.09	115	7.30	224	6.07
2	06 to 15	252	11.89	226	14.35	478	12.94
3	16-30	573	27.10	394	25.01	967	26.18
4	31-60	1094	51.66	751	47.68	1845	49.96
5	61-65	46	2.15	36	2.29	82	2.22
6	Above 65	44	2.11	53	3.37	97	2.63
Total		2118	100	1575	100	3693	100

Source: Field Survey of AECL Team

4.17.1.4 Sex Profile of Project Area Households

The percentage of male populations are greater than female in the project area. At project area total of 3693 populations will be surveyed where 2118 are male and 1575 are female, which represents that percentage of female population in the project area is less compared to the male population.

4.17.1.5 Marital Status

Among the 3693 surveyed population around the project area, 2806 people are above 18 years. Any person below 18 years are not allowed to marry in Bangladesh. No people below the age of 18 are found married. It is found that 65.12% people are married against 34.88% unmarried or widow.

Table 4.35: Marital Status of Male & Female population (18 years above)

SL	Marital Status	Male	%	Female	%	Total	%
1	Married	1329	62.75	1076	68.31	2405	65.12
2	Unmarried	774	36.54	470	29.85	1288	33.69
3	Abandoned	0	0	0	0	0	0
4	Widow	15	0.71	29	1.84	44	1.19
Total		2118	100	1575	100	3693	100

Source: Field Survey of AECL Team

4.17.1.6 Household by Religion

It is found that Islam is the predominant religion in the study area (96.77%). Rest of the people are the followers of Hinduism (3.23%). No other religions were found in the surveyed area.

4.17.1.7 Education Level of Surveyed Population (6 Years and above)

Education level of the surveyed population is presented in the table below. Among the surveyed 3693 populations, 3469 populations are at the age of above 6 years and 6 people are below the age of 6 years who has not started the school yet. The table demonstrates that primary and secondary level education entrance is high in the area and considered the people above the age of 6 (3469 population). But dropout rate is very high as the number of people sharply decreases from secondary certificate achievers. It also indicates that education rate is higher among male population than female. Also, illiteracy is higher among female population than male population.

Table 4.36: Level of Education of Surveyed Population (6 Years and above)

SL	Education Level	Male	%	Female	%	Total	%
1	Up to class five/ Ebtedaye Madrasa	513	24.23	477	30.28	990	26.81
2	Class six to ten	206	9.71	186	11.81	392	10.61
3	SSC or equivalent	427	20.17	394	25.02	821	22.23
4	HSC or equivalent	180	8.50	76	4.82	256	6.93
5	BA or equivalent	57	2.69	9	0.57	66	1.79
6	MA or equivalent	3	0.14	0	0	3	0.08
7	Illiterate	328	15.49	398	25.27	726	19.66
8	Can sign only	404	19.07	35	2.22	439	11.89
Total		2118	100	1575	100	3693	100

Source: Field Survey of AECL Team

4.17.1.8 Occupation of the Population

There are varieties number of occupations have been identified during survey of the project. The population distribution according to gender engaged in various Primary Occupations is presented in tabular form below. A variety of occupational choices have been found in the project location, and majority are farmer. Female population are mostly unemployed. In addition to agriculture, the other significant occupations are involvement with business, service, day labor, service, doctor and mason etc. Apart from these, a minimal number of populations have been identified as unemployed in the form of retired person and aged persons.

Table 4.37: Distribution of Surveyed People by occupation (15 years and above)

SL No.	Occupation	Male	Female	Total	%
1	Agriculture/Husbandry	778	527	1305	42.23
2	Service holder	143	15	158	5.11
3	Housewife/Househusband	2	354	356	11.52
4	Business	256	13	269	8.71
5	Day Laborer	305	156	461	14.92
6	Driver	9	0	9	0.29
7	Mason	0	0	0	0
8	Carpenter	2	0	2	0.06

SL No.	Occupation	Male	Female	Total	%
9	Unemployed	0	0	0	0
10	Doctor	0	0	0	0
11	Ayurveda physician	0	0	0	0
12	Student	309	197	506	16.38
13	Aged Person	3	21	24	0.78
14	Retired Person	0	0	0	0
Total		1807	1283	3090	100

Source: Field Survey of AECL Team

4.17.1.9 Per capita income of surveyed HHs

The total surveyed based on per capita income. Table demonstrates per capita income distribution of the project area. It is clear that out of the 1054 HHs surveyed, 273 incomes fall below the poverty line.

Table 4.38: Per capita income of surveyed HHS

SL	Yearly Level of Income (BDT)	Total	
		No.	%
1	Up to 100000	273	25.90
2	100000 to 120000	148	14.04
3	120001 to 180000	309	29.32
4	180001 to 240000	222	21.06
5	240001 to 360000	63	5.98
6	360001 to 480000	16	1.52
7	480001 to 600000	14	1.33
8	Above 600000	9	0.85
Total		1054	100

Source: Field Survey of AECL Team

4.17.1.10 Drinking Water Facility

In transmission line area, 74.19% of general households have got the facility of drinking tube well water, 1.43% tap water and the remaining 24.38% household gets water from other sources.

Table 4.39: Drinking Water Facility of surveyed HHS

SL	Drinking Water source	Total	
		No.	%
1	Tube well	782	74.19
2	Tap water	15	1.43
3	Other sources	257	24.38

SL	Drinking Water source	Total	
		No.	%
	Total	1054	100

Source: Field survey of AECL team

4.17.1.11 Sanitation

In the transmission line area, 67.27% of general household use sanitary facility, 31.50% non-sanitary latrine and 1.23% have no toilet facility.

Table 4.40: Sanitation Facility of surveyed HHS

SL	Sanitation Facility	Total	
		No.	%
1	Proper sanitary latrine	709	67.27
2	Non- sanitary latrine	332	31.50
3	No toilet facility	13	1.23
	Total	1054	100

Source: Field survey of AECL team

4.17.1.12 Access to Electricity

The entire Pabna Sadar upazila have brought under the Rural Electrification Program. However, a total of 73.5% of the survey households in transmission line area reported to have electricity connection.

(Source: Field survey of AECL team)

4.17.2 Socio-economic Conditions of Transmission Line Area

Socio-economic details of the Transmission line area households were collected during the social baseline survey. The socio-economic profile of the surveyed HHs is consequently presented following demographic profile of the HHs. A total of 79 HHs comprises of 257 people has been surveyed with average HH size 3.25.

Table 4.41: General Profile of Surveyed Population

Category	Total
Number of total surveyed Households /Units	79
Number of total Population	257
Average HHs Size	3.25

Source: Field survey of AECL Team

4.17.2.1 Demographic Profile of Project Area Households

Demographic profile of the affected community has been analyzed as a part of socio- economic profile of the project area. This comprises of gender profile and age-sex distribution of the project affected communities. Precisely, it can be stated that the area lacks gender parity as 97.47% male headed and 2.53 female headed HHs are found during census period. The general scenario in Bangladesh is same as most of the HHs head are male. Age-sex ratio indicates that majority of the population are within the age limit of 15-59.

4.17.2.2 Distribution of Household Population

Distribution of HH population is presented in the table below. It indicates that majority of the HHs have 3-4 members. It is interesting that 14 HHs have only 1-2 members. HH size of within 7 to 8 members was minimal in the area. Distribution of HH population is presented by area-wise in the illustration:

Table 4.42: Distribution of HH population

SL No.	Number of household members	Total	
		HH	%
1	1 to 2	14	17.72
2	3 to 4	61	77.22
3	5 to 6	3	3.80
4	7 to 8	1	1.27
5	9 to 10	0	0
6	10+	0	0
	Total	79	100

Source: Field Survey of AECL Team

4.17.2.3 Age and Sex Distribution of project area Population

Age-sex distribution of the surveyed 79 HHs was measured during the census and IOL survey. It was found that population density increases respectively from the age group of 1-60. According to the age band, the most prominent group is 30-60. The number of surveyed persons steadily decreases with increasing age limit above 60. It is the almost similar to the national scenario. Details see in **Table 4.43**.

Table 4.43: Age Sex Distribution of Surveyed Population

SL	Age Group (Years)	Male		Female		Total	Overall %
			%		%		
1	01 to 05	0	0	2	1.74	2	0.78
2	06 to 15	26	18.31	14	12.17	40	15.56
3	16-30	35	24.65	38	33.04	73	28.40
4	31-60	76	53.52	57	49.57	133	51.75
5	61-65	2	1.41	2	1.74	4	1.56
6	Above 65	3	2.11	2	1.74	5	1.95
Total		142	100	115	100	257	100

Source: Field Survey of AECL Team

4.17.2.4 Sex Profile of Project Area Households

The percentage of male populations are greater than female in the project area. At project area total of 256 populations will be surveyed where 142 are male and 114 are female, which represents that percentage of female population in the project area is less compared to the male population.

4.17.2.5 Marital Status

Among the 257 surveyed population around the project area, 170 people are above 18 years. Any person below 18 years are not allowed to marry in Bangladesh. No people below the age of 18 are found married. It is found that 66.15% people are married against 33.85% unmarried. This means that child marriage is not that common in the project area and widows/widowers are not found in project survey areas.

Table 4.44: Marital Status of Male & Female population (18 years above)

SL	Marital Status	Male	%	Female	%	Total	%
1	Married	89	62.68	81	70.43	170	66.15
2	Unmarried	53	37.32	34	29.57	87	33.85
3	Abandoned	0	0	0	0	0	0
4	Widow	0	0	0	0	0	0
Total		142	100	115	100	257	100

Source: Field Survey of AECL Team

4.17.2.6 Household by Religion

It is found that Islam is the predominant religion in the study area (100%). Among the surveyed people there is no other religion.

4.17.2.7 Education Level of Surveyed Population (6 Years and above)

Education level of the surveyed population is presented in the table below. Among the surveyed 257 populations, 251 populations are at the age of above 6 years and 6 people are below the age of 6 years who has not started the school yet. The table demonstrates that primary and secondary level education entrance is high in the area and considered the people above the age of 6 (251 population). But dropout rate is very high as the number of people sharply decreases from secondary certificate achievers. It also indicates that education rate is higher among male population than female. Also, illiteracy is higher among female population than male population.

Table 4.45: Level of Education of Surveyed Population (6 Years and above)

SL	Education Level	Male	%	Female	%	Total	%
1	Up to class five/ Ebtedaye Madrasa	31	21.83	22	19.13	53	20.62
2	Class six to ten	23	16.19	30	26.09	53	20.62
3	SSC or equivalent	27	19.01	12	10.43	39	15.18
4	HSC or equivalent	18	12.68	18	15.65	36	14.01
5	BA or equivalent	6	4.23	4	3.48	10	3.89
6	MA or equivalent	0	0	0	0	0	0
7	Illiterate	18	12.68	10	8.70	28	10.89
8	Can sign only	19	13.38	19	16.52	38	14.79
Total		142	100	115	100	257	100

Source: Field Survey of AECL Team

4.17.2.8 Occupation of the Population

There are varieties number of occupations have been identified during survey of the project. The population distribution according to gender engaged in various Primary Occupations is presented in tabular form below. A variety of occupational choices have been found in the project location, and majority are farmer. Female population are mostly unemployed. In addition to agriculture, the other significant occupations are involvement with business, service, day labour, service, doctor, and mason etc. Apart from these, a minimal number of populations have been identified as unemployed in the form of retired person and aged persons.

Table 4.46: Distribution of Surveyed People by occupation (15 years and above)

SL No.	Occupation	Male	Female	Total	%
1	Agriculture	31	1	32	13.62
2	Service holder	6	2	8	3.40

SL No.	Occupation	Male	Female	Total	%
3	Housewife/Househusband	2	78	80	34.04
4	Business	1	0	1	0.43
5	Day Laborer	31	1	32	13.62
6	Driver	3	0	3	1.28
7	Mason	0	0	0	0
8	Carpenter	0	0	0	0
9	Unemployed	0	0	0	0
10	Doctor	0	0	0	0
11	Ayurveda physician	1	0	1	0.43
12	Student	46	29	75	31.91
13	Aged Person	1	1	2	0.85
14	Retired Person	1	0	1	0.43
Total		123	112	235	100

Source: Field Survey of AECL Team

4.17.2.9 Per capita income of surveyed HHs

The total surveyed based on per capita income. Table demonstrates per capita income distribution of the project area. Out of the 79 HHs surveyed, 15 incomes fall below the poverty line.

Table 4.47: Per capita income of surveyed HHS

SL	Yearly Level of Income (BDT)	Total	
		No.	%
1	Up to 100000	16	20.25
2	100000 to 120000	2	2.53
3	120001 to 180000	22	27.85
4	180001 to 240000	11	13.92
5	240001 to 360000	21	26.58
6	360001 to 480000	3	3.80
7	480001 to 600000	3	3.80
8	Above 600000	1	1.27
Total		79	100

Source: Field Survey of AECL Team

4.17.2.10 Drinking Water Facility

In transmission line area, 92.04% of general households have got the facility of drinking tube well water, 4.1% tap water and the remaining 3.86% household gets water from other sources.

Table 4.48: Drinking Water Facility of surveyed HHS

SL	Drinking Water source	Total	
		No.	%
1	Tube well	72	92.04
2	Tap water	3	4.1
3	Other sources	4	3.86
	Total	79	100

Source: Field survey of AECL team

4.17.2.11 Sanitation

In the transmission line area, 67% of general household use sanitary facility, 27.6% non-sanitary latrine and 4.3% have no toilet facility.

Table 4.49: Sanitation Facility of surveyed HHS

SL	Sanitation Facility	Total	
		No.	%
1	Proper sanitary latrine	53	67
2	Non- sanitary latrine	21	26.4
3	No toilet facility	5	6.6
	Total	79	100

Source: Field survey of AECL team

4.17.2.12 Access to Electricity

The entire Pabna Sadar upazila have brought under the Rural Electrification Program. However, a total of 68.7% of the survey households in transmission line area reported to have electricity connection. (**Source:** Field survey of AECL team)

4.18 Ecology (Flora and Fauna)

Bangladesh has realm number of biological diversities for its geographical location and favorable climatic condition for life. Biodiversity is facing unprecedented levels of threat due to unwise industrialization. For the reasons, it has become imperative to assay diversity prior to any big set up. Understanding biological diversity in terms of the processes by which ecosystems and their component function, be it at community, species, population, or genetic levels, is critical to informing its sustainable use and safeguarding it for the benefit of future generations.

4.18.1 Primary Study Methodology

A comprehensive survey was conducted at the vicinity of the proposed project area. The baseline ecological survey has been conducted on and from 7th – 9th February 2023 and 14th – 17th August, 2023 to get an idea about the status of the diversity of Flora and Fauna in that area. The basic methodological approaches which were followed for the present baseline work are:

- Field survey,
- Visual observations,
- Review of literature,
- Secondary available data,
- By interviewing local people,
- Data analysis and interpretation.

4.18.2 Ecological Field Survey

According to the AECL field survey, habitat type around the project area including the Transmission Line area is described below

- **Agricultural land around the T/L:** This land is usually used for one or two types of paddy cultivation such as (rice, wheat, banana etc.). Transmission lines are passing through agricultural land. Least diversity of floral community is present there. Some modified habitat of fauna such as Bengal mongoose, common toads, local birds, yellow speckled wolf snake and small mammals etc. are present there.
- **Near Settlements:** Habitats around the settlements area are mostly comprises of tall fruit plants (mango, litchi, coconut, banana) with underground natural shrub and climber species diversity. Some modified habitat of fauna such as pigeon, domestic chicken, duck, cat, dog, domestic cow, goat and crow etc. are present there.
- **Roadside Habitats:** Roadside vegetation near the main power plant site is generally planted and the vegetation developed an ecosystem which is dominated by hard wood and economic tree species. Major species are found along the roadside of study area are Mango (*Mangifera indica*), litchi (*Litchi chinensis Sonn.*), banana (*Musa acuminata*), Akashmoni (*Acacia auriculiformis*), Bot (*Ficus benghalensis L.*), Eucalyptus (*Eucalyptus camaldulensis*) etc. In most cases, this plantation program is considered under public-private partnership afforestation. Some terrestrial fauna such as local birds (Common Myna, King Crows, Magpie Robin etc.), domestic cows, Bengal mongoose etc.



Transmission Line Area Ecosystem



Settlements Ecosystem

Roadside Ecosystem



Around Project Area Ecosystem

Figure 4.36: Ecological diversity of the project area surroundings

4.18.3 Flora

4.18.3.1 Terrestrial Flora

Detail lists of Terrestrial Flora found during our field visit in main power plant and transmission line area are presented in **Table 4.50** and **Table 4.51**.

Table 4.50: Terrestrial Flora around the Main Power Plant Area

Sl. No.	Local name	Scientific name	Family name	Habit	Plant group
1.	Papaya	<i>Carica papaya</i>	Caricaceae	Herb	Dicot
2.	Aam	<i>Mangifera indica</i>	Anacardiaceae	Tree	Dicot
3.	Kachu	<i>Colocasia esculenta</i>	Araceae	Herb	Mocot
4.	Bel	<i>Aegle marmelos (L.) Corr.</i>	Rutaceae	Tree	Dicot
5.	Jam	<i>Syzygium cumini (L.) Skeels</i>	Myrtaceae	Tree	Dicot
6.	Kathal	<i>Artocarpus heterophyllus Lamk.</i>	Moraceae	Tree	Dicot
7.	Kamranga	<i>Averrhoa carambola L.</i>	Oxalidaceae	Tree	Dicot
8.	Neem	<i>Azadirachta indica A. Juss.</i>	Meliaceae	Tree	Dicot
9.	Narical	<i>Cocos nucifera L.</i>	Arecaceae	Tree	Mocot
10.	Ata, Nona Ata	<i>Annona reticulate L.</i>	Annonaceae	Tree	Dicot
11.	Shorifa	<i>Annona squamosa L.</i>	Annonaceae	Shrub	Dicot
12.	Akond	<i>Calotropis gigantea (L.) R. Br.</i>	Asclepiadaceae	Shrub	Dicot
13.	Ghash	<i>Chloris barbata Sw.</i>	Poaceae	Herb	Monocot
14.	Lotagach	<i>Cissampelos pareira</i>	Menispermaceae	Climber	Dicot
15.	Jambura	<i>Citrus grandis (L.) Osbeck.</i>	Rutaceae	Tree	Dicot
16.	Misti alu	<i>Ipomoea batatas (L.) Poir.</i>	Convolvulaceae	Creeper	Dicot
17.	Jui	<i>Jasminum sambac (L.) Ait.</i>	Oleaceae	Shrub	Dicot
18.	Muthaghas	<i>Kyllinga microcephala Steud.</i>	Cyperaceae	Herb	Monocot
19.	Shim	<i>Lablab purpureus (L.) Sweet</i>	Fabaceae	Climber	Dicot
20.	Mistikumra	<i>Cucurbita maxima Duch. ex Lamk.</i>	Cucurbitaceae	Climber	Dicot
21.	Durba	<i>Cynodon dactylon (L.) Pers.</i>	Poaceae	Herb	Mocot
22.	Chalta	<i>Dillenia indica L.</i>	Dilleniaceae	Tree	Dicot
23.	Deshigab	<i>Diospyros peregrina Guerke</i>	Ebenaceae	Tree	Dicot
24.	Eucalyptus	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Tree	Dicot

Sl. No.	Local name	Scientific name	Family name	Habit	Plant group
25.	Bot	<i>Ficus benghalensis L.</i>	Moraceae	Tree	Dicot
26.	Jhinga	<i>Luffa cylindrica (L.) M. Roem.</i>	Cucurbitaceae	Climber	Dicot
27.	Gora Neem	<i>Melia azedarach L.</i>	Meliaceae	Tree	Dicot
28.	Shayndhamaloti	<i>Mirabilis jalapa L.</i>	Nyctaginaceae	Herb	Dicot
29.	Shojna	<i>Moringa oleifera Lamk.</i>	Moringaceae	Tree	Dicot
30.	Tetul	<i>Tamarindus indica L.</i>	Caesalpiniaceae	Tree	Dicot
31.	Lau	<i>Lagenaria siceraria (Molina) Standl.</i>	Cucurbitaceae	Climber	Dicot
32.	Mehedi	<i>Lawsonia inermis L.</i>	Lythraceae	Tree	Dicot
33.	Litchu	<i>Litchi chinensis Sonn.</i>	Sapindaceae	Tree	Dicot
34.	Tomato	<i>Solanum lycopersicum Dunal</i>	Solanaceae	Herb	Dicot
35.	Begun	<i>Solanum melongena L.</i>	Solanaceae	Herb	Dicot
36.	Kata begun	<i>Solanum sisymbriifolium Lam.</i>	Solanaceae	Shrub	Dicot
37.	Korolla	<i>Momordica charantia L.</i>	Cucurbitaceae	Climber	Dicot
38.	Kul, Boro	<i>Ziziphus mauritiana Lamk.</i>	Rhamnaceae	Tree	Dicot
39.	Peyara	<i>Psidium guajava L.</i>	Myrtaceae	Tree	Dicot
40.	Bon Tulshi	<i>Croton banplandianum</i>	Euphorbiaceae	shrub	Dicot
41.	Hatisur	<i>Heliotropium indicum</i>	Asteraceae	Herb	Dicot
42.	Mundi	<i>Sphaeranthus indicus</i>	Asteraceae	Herb	Dicot

Source: Field survey of AECL team

Table 4.51: Terrestrial Flora around the Transmission Line Area

Sl. No.	Local name	Scientific name	Family name	Habit	Plant group
1.	Aam	<i>Mangifera indica</i>	Anacardiaceae	Tree	Dicot
2.	Bon Tulshi	<i>Croton banplandianum</i>	Euphorbiaceae	shrub	Dicot
3.	Hatisur	<i>Heliotropium indicum</i>	Asteraceae	Herb	Dicot
4.	Kathal	<i>Artocarpus heterophyllus Lamk.</i>	Moraceae	Tree	Dicot
5.	Papaya	<i>Carica papaya</i>	Caricaceae	Herb	Dicot
6.	Mundi	<i>Sphaeranthus indicus</i>	Asteraceae	Herb	Dicot
7.	Neem	<i>Azadirachta indica A. Juss.</i>	Meliaceae	Tree	Dicot
8.	Narical	<i>Cocos nucifera L.</i>	Arecaceae	Tree	Mocot
9.	Banana	<i>Musa acuminata</i>	Musaceae	Herbaceous	Monocot
10.	Litchu	<i>Litchi chinensis Sonn.</i>	Sapindaceae	Tree	Dicot
11.	Akond	<i>Calotropis gigantea (L.) R. Br.</i>	Asclepiadaceae	Shrub	Dicot
12.	Ghash	<i>Chloris barbata Sw.</i>	Poaceae	Herb	Monocot
13.	Lotagach	<i>Cissampelos pareira</i>	Menispermaceae	Climber	Dicot
14.	Jambura	<i>Citrus grandis (L.) Osbeck.</i>	Rutaceae	Tree	Dicot
15.	Misti alu	<i>Ipomoea batatas (L.) Poir.</i>	Convolvulaceae	Creeper	Dicot
16.	Jui	<i>Jasminum sambac (L.) Ait.</i>	Oleaceae	Shrub	Dicot
17.	Muthaghas	<i>Kyllinga microcephala Steud.</i>	Cyperaceae	Herb	Monocot
18.	Eucalyptus	<i>Eucalyptus camaldulensis</i>	Myrtaceae	Tree	Dicot
19.	Bot	<i>Ficus benghalensis L.</i>	Moraceae	Tree	Dicot
20.	Tetul	<i>Tamarindus indica L.</i>	Caesalpiniaceae	Tree	Dicot
21.	Rice	<i>Oryza sativa</i>	Poaceae	Herb	Monocot
22.	Tomato	<i>Solanum lycopersicum Dunal</i>	Solanaceae	Herb	Dicot

Sl. No.	Local name	Scientific name	Family name	Habit	Plant group
23.	Begun	<i>Solanum melongena L.</i>	Solanaceae	Herb	Dicot
24.	Korolla	<i>Momordica charantia L.</i>	Cucurbitaceae	Climber	Dicot
25.	Wheat	<i>Triticum aestivum L.</i>	Poaceae	Herb	Monocot
26.	Kata begun	<i>Solanum sisymbriifolium Lam.</i>	Solanaceae	Shrub	Dicot
27.	Kathali kola	<i>Musa paradisiaca</i>	Musaceae	Herbaceous	Monocot
28.	Thankuni	<i>Centella asiatica (L.) Urban</i>	Apiaceae	Creeper	Dicot
29.	Botua shak	<i>Chenopodium album L.</i>	Chenopodiaceae	Herb	Dicot
30.	Jhonjhoni	<i>Crotalaria pallida Ait.</i>	Fabaceae	Herb	Dicot
31.	Banmarich	<i>Croton bonplandianus Baill.</i>	Euphorbiaceae	Herb	Dicot
32.	Gimashak	<i>Glinus oppositifolius (L.) A. DC.</i>	Molluginaceae	Herb	Dicot

Source: Field survey of AECL team



Carica papaya



Cocos nucifera



Musa Sapientum



Mangifera indica



Phoenix sylvestris



Colocasia esculenta



Swietenia macrophylla



Psidium guajava



Areca catechu



Ficus racemosa



Zizyphus mauritiana



Borassus flabellifer



Bambusa bambus



Casuarina equisetifolia



Oryza sativa



Albizia chinensis



Sonneratia apetala



Excoecaria agallocha

Figure 4.37: Terrestrial Flora around the project area

4.18.3.1 Aquatic Flora

Aquatic flora is divided into three major types - tree, shrub, and herb. Aquatic floral species grow in rivers, canals, ditches, seasonal wetland, and low-lying agricultural lands in submerged, free floating, or rooted floating states. Common aquatic floral species in the study areas include Kalmi Shak (*Ipomoea aquatica*), Shapla (*Nymphaea nouchali*), Helencha (*Enhydra fluctuans*), Kuchuripana (*Eichhornia crassipes*) are also seen. No water bodies are crossed by the transmission line.



Ipomoea aquatica



Eichhornia crassipes



Nymphaea nouchali



Enhydra fluctuans

Figure 4.38: Aquatic Flora around the project area

4.18.4 Fauna

4.18.4.1 Terrestrial Fauna

The study was based on field survey methods where an appropriate questionnaire was prepared and used for collecting data from different sampling locations. During collection of data, both primary and secondary sources were considered to interpret the results. Primary data were collected from fishermen through questionnaire interviews and from the local fish markets. The secondary information was collected from books, journals, and thesis and also discussion with the local people. After collecting the data through questionnaire interviews, it was cross-checked through interviews of school teachers, local leaders in the study area. Finally, data were analyzed. List of Fauna Identified in

and around the main power plant and transmission line area are mentioned below **Table 4.52** and **Table 4.53** respectively.

Table 4.52: List of Terrestrial Fauna Identified in and around the Main Power Plant Area

Sl. no	English name	Scientific name	Local Name	Conservational status	
				IUCN Bangladesh status	IUCN Global status
Amphibians					
1.	Skipper Frog	<i>Rana cyanophlyctis</i>	Kotkoti Bang	LC	LC
2.	Bull Frog	<i>Rana tigrina</i>	Sona Bang, Kola Bang	LC	LC
3.	Common Toad	<i>Bufo melanostictus</i>	Kuno Bang	LC	LC
Reptiles					
1.	House Lizard	<i>Hemidactylus brookii</i>	Goda Tiktiki	LC	NE
2.	Common House Gecko	<i>Hemidactylus frenatus</i>	Mosrin Tiktiki	LC	LC
Birds					
1.	Marsh harrier	<i>Circus aeruginosus</i>	Poshchima Pankapashi	LC	LC
2.	Black Kite	<i>Milvus migrans</i>	Bhubon Chil	LC	LC
3.	Cattle Egret	<i>Bubulcus ibis</i>	Go-Boga	LC	LC
4.	Black Hooded Oriole	<i>Oriolus xanthornus</i>	Halde pakhi	LC	LC
5.	Common Myna	<i>Acridotheres tristis</i>	Shalik	LC	LC
6.	Red-vented bulbul	<i>Pycnonotus cafer</i>	Bangla Bulbul	LC	LC
7.	Tailor Bird	<i>Orthotomus sutorious</i>	Tuntuni	LC	LC
8.	White-rumped Shama	<i>Copsychus malabaricus</i>	Shama	LC	LC
9.	House Sparrow	<i>Passer domesticus</i>	Pati Chorui	LC	LC
10.	Baya Weaver	<i>Ploceus phillippinus</i>	Babui	LC	LC
11.	Eagles	<i>Accipiter badius</i>	Pati Shikre	LC	LC
12.	Cuckoos	<i>Cuculus micropterus</i>	Kokil	LC	LC
13.	King Crows	<i>Dicrurus adsimilis</i>	Kak	LC	LC
14.	House Crows	<i>Corvus splendens</i>	Pati Kak	LC	LC
15.	Magpie Robin	<i>Copsychus saularis</i>	Doel	LC	LC
Mammalian					
1.	Pallas's Squirrel	<i>Callosciurus erythraeus</i>	Lalche-buk Kathbirali	LC	LC
2.	Bengal mongoose	<i>Herpestes edwardsii</i>	Boro Beji	LC	LC
3.	House Mouse	<i>Mus musculus</i>	Indur	LC	LC

Sl. no	English name	Scientific name	Local Name	Conservational status	
				IUCN Bangladesh status	IUCN Global status
4.	Indian Flying Fox	<i>Pteropus giganteus</i>	Baro Badur	LC	LC
5.	Domestic Goat	<i>Capra aegagrus hircus</i>	Chhagol	LC	-
6.	Domestic Cow	<i>Bos Taurus</i>	Goru	LC	-
*Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Not Added (N/A)					

Source: Field survey of AECL team

Table 4.53: List of Terrestrial Fauna Identified in and around the Transmission Line Area

Sl. no	English name	Scientific name	Local Name	Conservational status	
				IUCN Bangladesh status	IUCN Global status
Amphibians					
1.	Skipper Frog	<i>Rana cyanophlyctis</i>	Kotkoti Bang	LC	LC
2.	Bull Frog	<i>Rana tigrina</i>	Sona Bang, Kola Bang	LC	LC
3.	Common Toad	<i>Bufo melanostictus</i>	Kuno Bang	LC	LC
Reptiles					
1.	Common House Gecko	<i>Hemidactylus frenatus</i>	Mosrin Tiktiki	LC	LC
2.	Yellow speckled wolf snake	<i>Lycodon jara</i>	Ghorginni Shap	LC	LC
Birds					
1.	Marsh harrier	<i>Circus aeruginosus</i>	Poshchima Pankapashi	LC	LC
2.	Black Kite	<i>Milvus migrans</i>	Bhubon Chil	LC	LC
3.	Cattle Egret	<i>Bubulcus ibis</i>	Go-Boga	LC	LC
4.	Black Hooded Oriole	<i>Oriolus xanthornus</i>	Halde pakhi	LC	LC
5.	Common Myna	<i>Acridotheres tristis</i>	Shalik	LC	LC
6.	Red-vented bulbul	<i>Pycnonotus cafer</i>	Bangla Bulbul	LC	LC
7.	Tailor Bird	<i>Orthotomus sutorious</i>	Tuntuni	LC	LC
8.	King Crows	<i>Dicrurus adsimilis</i>	Kak	LC	LC
9.	House Crows	<i>Corvus splendens</i>	Pati Kak	LC	LC
10.	White-rumped Shama	<i>Copsychus malabaricus</i>	Shama	LC	LC
11.	House Sparrow	<i>Passer domesticus</i>	Pati Chorui	LC	LC
12.	Baya Weaver	<i>Ploceus phillippinus</i>	Babui	LC	LC

Sl. no	English name	Scientific name	Local Name	Conservational status	
				IUCN Bangladesh status	IUCN Global status
13.	Owl	<i>Strigiformes</i>	Pecha	LC	LC
14.	Cuckoos	<i>Cuculus micropterus</i>	Kokil	LC	LC
15.	Magpie Robin	<i>Copsychus saularis</i>	Doel	LC	LC
Mammalian					
1.	Bengal mongoose	<i>Herpestes edwardsii</i>	Boro Beji	LC	LC
2.	House Mouse	<i>Mus musculus</i>	Indur	LC	LC
3.	Indian Flying Fox	<i>Pteropus giganteus</i>	Baro Badur	LC	LC
4.	Fox	<i>Canis aureus</i>	Shial	LC	LC
5.	Jungle cat	<i>Felis chaus</i>	Bon biral	LC	LC
6.	squirrle	<i>Funambulus pennanti</i>	Dura katbrali	LC	LC
*Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Not Added (N/A)					

Source: Field survey of AECL team

4.18.4.2 Aquatic Fauna

There are different types of fishes present the waterbody of surrounding main power plant area. No significant water body was found around the transmission line area except some small local pond during ecological field survey. So, some of the commonly available fishes and other aquatic fauna both in the main power plant and transmission line area are mentioned below in **Table 4.54**.

Table 4.54: List of Aquatic fauna around the project area

Sl No.	Common English Name	Scientific Name	Local Name	Red List Category	
				IUCN Bangladesh status	IUCN Global status
Fish Fauna					
1.	Rohu	<i>Labeo Rohita</i>	Rui	LC	LC
2.	Catla	<i>Catla catla</i>	Katla	LC	NE
3.	Stinging Catfish	<i>Saccobranchus fossilis</i>	Shing	LC	LC
4.	Striped Gourami	<i>Colisa fasciatus</i>	Kholsha	LC	LC
5.	Bleeker's Mystus	<i>Mystus bleekeri</i>	Tengra	LC	LC
6.	Walking Catfish	<i>Clarias batrachus</i>	Magur	LC	LC
7.	Snakehead Murrel	<i>Channa striatus</i>	Shol	LC	LC

SI No.	Common English Name	Scientific Name	Local Name	Red List Category	
				IUCN Bangladesh status	IUCN Global status
8.	River Shad, Hilsha Shad	<i>Tenualosa ilisha</i>	Ilish, Ilsha	LC	LC
9.	Snakehead	<i>Channa gachaua</i>	Cheng	LC	LC
10.	Tank Goby	<i>Glossogobius giuris</i>	Baila	LC	LC
11.	Black Rohu	<i>Labeo calbasu</i>	Kalbaosh, Baus	LC	LC
12.	Elongate Glassy Perchlet	<i>Chanda nama</i>	Chanda	LC	LC
13.	Climbing Perch Fish	<i>Anabas testudineus</i>	Koi	LC	LC
14.	Pama Croaker, Pama	<i>Otolithoides pama</i>	Poa	LC	NE
15.	Mozambique tilapia	<i>Oreochromis mossambicus</i>	Tilapia	N/A	-
16.	Silver Carp	<i>Hypophthalmichthys molitrix</i>	Silver Carp	N/A	-
17.	Grass Carp	<i>Ctenopharyngodon idella</i>	Grass Carp	N/A	-
Other Fauna (Birds)					
1.	Bar headed goose	<i>Anser indicus</i>	Raj Hans	LC	LC
2.	Greenleg goose	<i>Anser anser</i>	Metey Rajhash	LC	LC
3.	Indian Pond Heron	<i>Ardeola grayii</i>	Kani Bok	LC	LC
4.	Little cormorant	<i>Phalacrocorax niger</i>	Pankawri	LC	LC
5.	Waterhen	<i>Amaurornis phoenicurus</i>	Dahuk	LC	LC
6.	Pintail	<i>Anas acuta</i>	Lenja Hans	LC	LC
7.	Watercock	<i>Gallicrex cinerea</i>	Kora	LC	LC

Source: Field survey of AECL team

4.18.5 Findings from Ecological Survey

According to the field survey, there is no critical and natural habitat present in and around the project area. Few alien invasive flora i.e., Eucalyptus and water hyacinth, some alien invasive fauna i.e., grass carp and silver carp are present in and around the project area. List of existing flora and fauna are mentioned in **Table 4.50 – Table 4.54** and they all fall under least concern category according to IUCN.

Any endangered, vulnerable or threatened faunal species were not found during the field visit around the main power plant area as well as transmission line area. There are some nocturnal animals around the project site, but their movement will not be hampered as the construction work will not be undertaken at night time.

According to the study *Pteropus giganteus* (Indian Flying Fox) was found in the study area. But the population of them was not significant, it was rarely common and there is no large roost of them. We considered 0.5 km on both sides of the transmission line as the area of influence and baseline study was undertaken along that strip. The TL runs through mostly agricultural land but there are few residential areas around the TL route. Normally there are fruit trees around the residential area of Bangladesh. The *Pteropus giganteus* (Indian Flying Fox) feeds mainly on ripe fruits, such as mangoes and bananas etc. So, they are seen occasionally during those fruit seasons.

According to a study (Hasan, M. K., Feerez, M. M., Datta, A. K., Saha, A., & Ahmed, T. (2014). Indian flying fox (*Pteropus giganteus*) roosts in north Bengal of Bangladesh.) *Pteropus giganteus* (Indian Flying Fox) roosters are not present in the Pabna District. The map of Location of the bat roosts in northern part of Bangladesh is shown in Figure 4.39

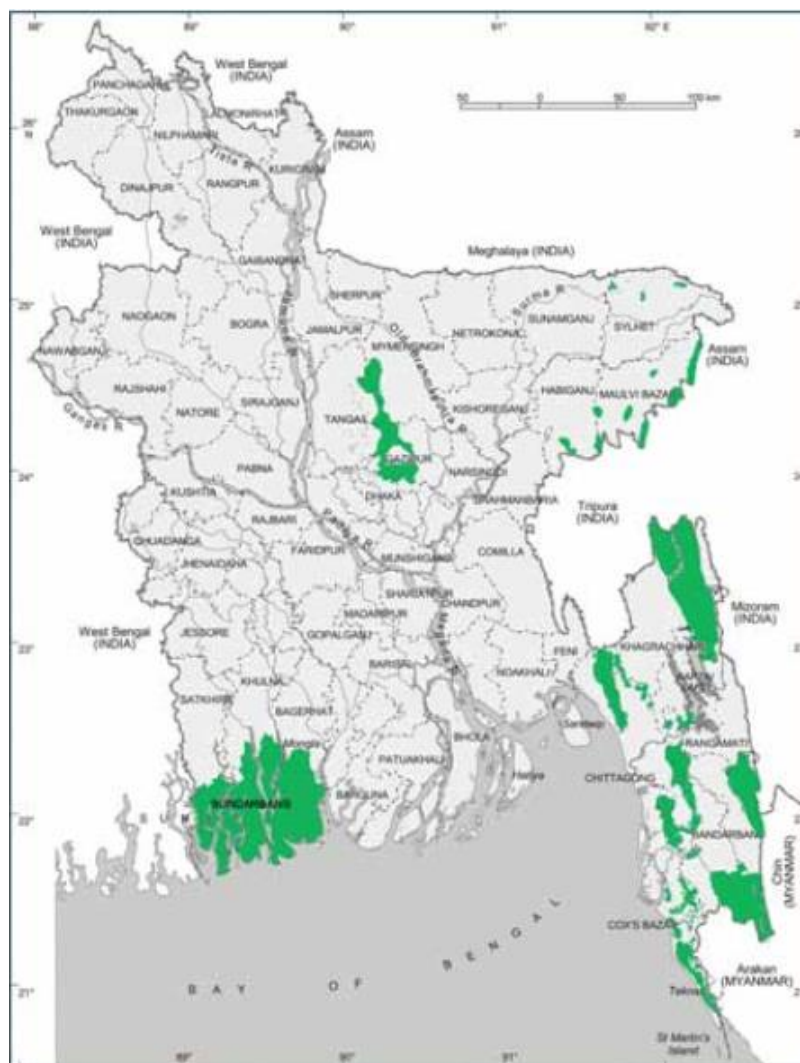


Figure 4.39: Location of the bat roosts in northern part of Bangladesh.

Amphibian



Rana cyanophlyctis

Reptile



Hemidactylus brooki

Aves



Corvus splendens



Passer domesticus



Acridotheres tristis



Ploceus philippinus



Accipiter badius



Dicaeum erythrorhynchos



Copsychus saularis



Milvus migrans

Mammals



Mus musculus



Capra aegagrus hircus



Bos Taurus

Figure 4.40: Terrestrial Fauna around the project area

Fish Fauna



Catla catla



Tenualosa ilisha



Channa striatus



Anabas testudineus



Clarias batrachus



Mystus bleekeri

Other Fauna



Anser indicus



Anser anser



Ardeola grayii



Anas acuta



Phalacrocorax niger



Amaurornis phoenicurus

Figure 4.41: Aquatic Fauna around the project area

5 IDENTIFICATION OF POTENTIAL IMPACT

5.1 General Consideration

In case for most projects, potential negative impacts sometime could be far more numerous than beneficial impacts. The regional and national economic benefits associated with the implementation of any development project are considered to fall outside the scope of an IEE, and therefore not considered here. However, it is generally expected that these long-term benefits will ultimately trickle down to the local population and will make a contribution to an improvement in the quality of life. Likewise, the indirect benefits of strengthening of technical capabilities of local persons through association with foreign experts and other training elements that may form part of a project have been considered to fall outside the scope of IEE.

5.2 Scoping of Impacts

Identification of potential impacts due to the Pre-construction, construction and operation of the Project has been done using checklist/impact interaction matrix (**Table 5.1**). In this matrix major, proposed activities related to the project which may create significant impacts have been presented. Identification and prediction methodology for impacts has been described in **Annexure 9**.

Table 5.1: Impact Evaluation and Identification table

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben	
Pre-construction Phase																	
Land Acquisition and Resettlement																	400 acres of land will be purchased by willing buyer and willing seller process for the power plant site where there are no informal land users. For the TL 0.7642 acres for 79 tower footings where there is no informal land user, infrastructure or share cropper. Construction of the TL will cause temporary crop damage and restriction in RoW land use which will be compensated for with cash. According to the socio-economic survey, no HHs will be affected by the main site land acquisition and the TL.
Disruption of Earth Surface and Impact due to land filling																	Cutting and filling method will be applied to maintain ground level elevation of 12.3m PWD. In addition to that, some outsourced sand used for land development work. As the sand was procured from nearby river of Kushtia District according to

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments	
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben		
																		the government guideline for sand collection so there won't be any impact due to land filling
Change in Landscape																		Comparative to adjacent rural and agricultural setup
Impact on ecological habitats																		Due to land development work, there will be temporary impact on ecological habitat
Indigenous people																		No existence of indigenous people within 5km radial zone of the project site; No impact anticipated
Cultural Heritage site																		No cultural heritage site within 5km radial zone of the project area; No impact anticipated
Construction Phase																		
Air Quality																		Dust emission may occur during excavation and construction activity and traffic movement will also cause additional air emission
Noise Hazard																		Equipment installations and constructional work may create noise and vibration
Land Use																		Agricultural land may be permanently lost due to the

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben	
																	tower footing and power plant construction.
Impact on Soil quality																	Accidental spillage of different chemicals and hazardous substances may occur occasionally
Impact on Surface Water																	Improper management of soil, sand and other fine materials and surface runoff from the site
Impact on Ground Water																	Improper management of liquid waste and accidental spillage or seepage of different chemicals and over extraction of ground water
Impact due to Solid Waste																	Generation of different kinds of solid and liquid waste, office waste from constructional work and labour camp
Hazardous Materials Managements																	Accidental spillage of liquid fuel, lubricants, other chemical and generation of e-waste may occur occasionally. Leaching from PV module due to improper handling
Traffic and Transportation																	Transportation of construction materials and personnel may create traffic congestion and

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben	
																	occasional accidents around the project area
Impact on Terrestrial Habitat																	Due to constructional work, amphibians and aves may be impacted
Impact on Aquatic Habitat																	Discharge of liquid waste and different constructional waste, chemicals etc. may impact aquatic habitat
Occupational Health and Safety																	Irregularly accidents, injury of laborers' may occur in construction period
Sanitation Hazard & Drinking Water																	Concentration of labour force may create un-hygienic condition and lack of safe drinking water may cause diseases
Labor and Working Condition																	Improper maintenance of standard salary, salary deductions; hours of work; overtime arrangements
Social acceptability of Construction workers to the host communities																	Acceptability problem of Local community may occur due to cultural difference with foreign workers
Community Health, Safety and Security																	Possibility of occurring accidents due to lack of safety

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments	
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben		
																		and security, spread of several contagious and infectious diseases. Possibility of spreading sexually transmitted diseases such as HIV/AIDS. An increase in the number of vehicles for construction work may affect the access of the inhabitants to the infrastructure and service facilities of the community.
Employment Generation																		Major employment opportunity during construction phase
Increase in local business																		Project activity will induce small and medium scale local business opportunity
Operation Phase																		
Air quality																		Generator stack may affect the ambient air quality.
Noise Hazard																		Noise may be generated from substation and transformer room
Impact on Soil Quality																		Improper storage and disposal of hazardous waste, accidental spillage and leaching from PV panel

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments	
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben		
Impact on Surface Water																		Poor management of sewage may deteriorate surface water quality
Impact on Ground Water																		Over abstraction of ground water, accidental spillage of oil or Hazardous substances from transformer and substation room.
Impact due to Solid waste																		Improper management of solid waste from power plant maintenance and operation
Hazardous Materials Managements																		Generation of used lubricating oil from the plant and improper handling and accidental spillage of hazardous waste (i.e., fuel oil, chemical) may occur. Leaching from PV panel may include hazardous material
Restricted land use																		Due to the TL, there will be restriction in land use as the land owners of the RoW cannot construct anything below the TL but as the land along the RoW is used for agricultural purpose so this restriction does not have any negative impact on the land users.

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments	
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben		
Impact of Flood																		As the DSEPL has undertaken “Flood Study and Mitigation Report” and going to implement several mitigation measures so there won’t be any negative impact due to flood
Traffic and Transportation																		Transportation of different materials and personnel may create traffic congestion
Impact due to Hazardous waste and leaching of PV panels																		Leaching from old, defected, or damaged PV panels, improper handling of PV panel can cause leaching of heavy metals
Impact on Terrestrial Habitat																		Terrestrial ecosystem may get disturbed due to project operation (i.e., noise, soil pollution, lighting etc.). Risk of bird collision and electrocution at transmission line may also take place
Impact on Aquatic habitat																		During flood, if any leakage & accidental spillage happens then aquatic habitat will be impacted
Occupational Health and Safety																		Irregular accidents, injury may occur during maintenance

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments	
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben		
																		work. Electrical leakage can cause occasional accidents.
Sanitation Hazard & Drinking Water																		Improper management of sewage waste by workers during and lack of safe drinking water may cause diseases
Labor and Working Condition																		Improper maintenance of standard salary, salary deductions; hours of work; overtime arrangements
Community Health and Safety																		Possibility of occurring accidents and spread of several transmittable and infectious diseases. Transmission line may pose potential hazards such as electrocution, lightning strike, etc.
Social acceptability of workers to the host communities																		Acceptability problem of Local community may occur due to cultural difference with foreign workers
Employment Generation																		Major employment opportunity during operation phase
Social and Economic enhancement																		Benefit to local economy due to employment, community development. Uninterrupted electricity supply to national

Action Affecting Environmental Resources & Values	Impact Duration			Impact Extent			Impact Scale				SEIs Magnitude without Mitigation Measures				Type		Comments
	ST	MT	LT	L	R	N	No	Lo	Med	Hig	Neg	Min	Mod	Maj	Adv	Ben	
																	grid will flourish the overall economy of the country

***Notation**

ST	Short Term (less than 5 years)		Med	Medium	
MT	Medium Term (5~10 years)		Hig	High	
LT	Long Term (More than 10 years)		Neg	Negligible	
L	Local (within 5km radial zone)		Min	Minor	
R	Regional (District level)		Mod	Moderate	
N	National		Maj	Major	
No	None		Adv	Adverse	
Lo	Low		Ben	Beneficial	

6 PREDICTION AND EVALUATION OF IMPACTS

6.1 General Considerations

This chapter defines the details of investigated environmental impacts due to project location, design, construction, and operations of the proposed power plant and measures for minimizing and / or off-setting adverse impacts identified. The Impacts, which are likely to be occurred in the different phases of the project, are identified, and discussed along with mitigation measures in the following sections.

The DSEPL has appointed several contractors to undertake several constructional activities of the project. During their work they follow the policies of DSEPL (i.e., Environmental policy, waste management policy, social policy, emergency preparedness policy and fire safety policy) which is monitored by DSEPL to ensure environmental sustainability.

6.2 Impact due to Project Location/ during Pre-construction Phase

During the pre-construction phase key activities include-

- i. Land purchase for main power plant through willing buyer/willing seller method;
- ii. Negotiated land purchase for transmission tower footing;
- iii. Cutting and filling of the main power plant land;
- iv. Land development work by using outsourced sand;
- v. Vegetation clearance of the main power plant land and tower footing area;
- vi. Boundary work around the main power plant area;
- vii. Access road from main power plant site to nearby LGED road.

Among the above-mentioned activity, the Company has already purchased 229 acres of land till August 2023 through willing buyer and willing seller method and the rest of the land is under process which will be purchased within September 2023. The transmission tower footings require 0.7642 acres of land. Already footing area for 76 towers has been purchased till August 2023 and only purchase of 3 transmission tower footing areas are under process. The construction of tower footing area has been started and out of 79 transmission towers 75 have been completed. Cut/fill activity, vegetation clearance and access road construction of the main power plant site is already complete. The pre-construction phase along the route involves doing MoU with the land owners of the transmission tower footings.

Only dyke will be constructed using sand and geotextile to prevent seepage along the boundary of the main power plant area so that the project does not affect the khal. The dyke will be used for flood protection from the overtopping of the Padma River and flooding due to rainfall. There won't be any concrete construction for dyke.

The project location is beside the existing LGED road which is 200m away from the main power plant site. DSEPL constructed a 200m herringbone road from the existing Local Government Engineering Department (LGED) road on their own land for accessing the Project from the nearby LGED Road.

6.2.1 Land Acquisition and Involuntary Resettlement

In general, land acquisition may affect the environment and people by the following ways:

- Loss of Homestead & Agricultural land;
- Loss of Livelihood.

Total land identified for the main power plant site is 400 acres which is non-agricultural Char land. Among 400 acres, 219.56 acres have already been purchased and the remaining land will be purchased by willing buyer and willing seller process. Total 315 number of plots are at main power plant site and DSEPL has purchased 254 numbers of plots to date. A total of 1054 households (HHs) and 3693 population will be affected due to land purchase of main power plant site. No HHs were affected due to land sale. In addition, they were benefitted as the land price of the surrounding area increased due to the project intervention. Previously the land was fallow land and not used for any cultivation. Involuntary resettlement is not triggered for main power plant as there is no informal land user, structure, trees, vulnerable people. A total of 0.7643 acres of land is required for the construction of the transmission tower footing and 79 HH will be affected for land and trees. A total of 79 HHs comprises of 257 people with average HH size 3.25 will be affected due to land acquisition of the transmission tower footing. A total of 573 different trees are expected to be affected by the TL. During the construction of the tower footing and stringing of the wire there will be limited restriction in land use. As the construction of each angle tower footing takes 7~10 days and suspension tower footing take 4~5days only so the restriction on land use is for a very short period of time. The width of the RoW has been considered as 10m along the TL and allowable height clearance is 8m from lower conductor. As the surrounding land is used for only agricultural work so the height restriction has no impact in land use.

Proposed Mitigation Measures

- ✓ Land and asset price should be considered according to the ADB SPS guideline and the RP study regarding purchase (WB/WS) at the main site and acquisition for the TL where all lost or damaged assets should be compensated for at full replacement value;
- ✓ All affected people should get compensation for the acquisition of proposed land as per Acquisition and Requisition of Immovable Property Act 2017 (ARIPA) and Electricity Act 2018 and ADB SPS SR2;
- ✓ Land of the main power plant area has been purchased following willing buyer and willing seller process and there were no informal land users who will be involuntarily displaced, nor any structures will be displaced. In addition to that, there is no land sellers / users who will be worse off as a result of the land sale / loss;
- ✓ Involuntary resettlement is triggered for land acquisition along TL. Resettlement Plan (RP) should be followed for the compensation related to TL construction and implementation;
- ✓ The project activities should only be initiated after compensating properly to the affected people.

- ✓ Payment of severity allowance for fragmentation of land. Where the remaining land becomes unviable in case of fragmentation, the Project to compensate for the full land parcel;
- ✓ Ensure meaningful consultation with all PAHs and establish a grievance redress mechanism;
- ✓ Prioritization employment of local people at different phases of the project;
- ✓ Prior notification before land development so that crop harvesting does not get impacted.

6.2.2 Landscape and Soil Surface Change

A landscape is a subjective concept that cannot be precisely quantified. However, in general, any project when not designed considering the local landscape, then it creates visual intrusion to the people. The present project may change the local landscape to some extent as the adjacent land area is rural and agricultural type. The land development work has been started and the Company is keeping the land elevation to 12.3 m PWD using cutting and filling method within the project boundary. To raise the main power plant site at elevation 12.3m total 71555m³ sand was required where 67591 m³ was procured from cutting of the main power plant site. additional 3964m³ was outsourced. In addition to that, 50300 m³ (36575m³ + 13725m³) was outsourced for platform development of substation and main control room and 156522 m³ (135966m³ + 20556m³) will be outsourced for dyke and internal road development. In total, 210786 m³ sand will be outsourced. Please see Annexure 26 & 27.

The sand is sourced from bahadurkhali, Mohanagar, Jugia, Mojnupur balumohal (sand stockpiling area) of Kushtia District, Joynabad balumohal of Kumarkhali District, Ghoramara, Minapara, West Bahirchor, dadapur and Char Golapnagar balumohal of Veramara District. These balumohal are Govenemnt approved balumohal and the document for this is attached as Annexure 28.

The last page of the Annexure 29 shows that Mr. Anwarul Hoque has the license from BIWTA to collect sand from the above-mentioned locations. Mr. Anwarul Hoque sold the sand to Fatema Dredging Project Ltd. (Agreement between Mr. Anwarul Hoque and Fatema Dredging Project Ltd. is attached as Annexure 30 and trade license of Fatema Dredging Project Ltd. is attached as Annexure 31). DSEPL bought sand from Fatema Dredging Project Ltd. (Agreement between Fatema Dredging Project Ltd. and DSEPL is attached as Annexure 32). The sand is transferred by vessel to the nearest khal and then the sand is pumped to the power plant site through overland pipes. The pipelines are temporary and laid over the land for sand transfer. Transportation of sand is the responsibility of Fatema Dredging Project Ltd.

Due to land development work particulate matter in the air may increase.

Proposed Mitigation Measures

- ✓ Regular sprinkling of water will be done on open surface and dust grounds.
- ✓ ;
- ✓ Greening of site by planting of local trees/ vegetation.

6.2.3 Impact on Ecological Habitat

Due to land development work terrestrial habitat may get impacted and aquatic habitat may get disturbed due to any surface runoff to the adjacent water body. Land development work has already started. As the adjacent canal is dry during the winter and pre-monsoon season so there is no aquatic

species at the canal during the land development work and hence no impact till now. But during monsoon season mitigation measures should be taken to conserve the aquatic ecology of the canal.

According to the field survey and desktop review of available information, there is no critical and modified habitat present in and around the project area. All existing flora and fauna fall under least concern category according to IUCN. Any endangered, vulnerable, or threatened faunal species were not found during the field visit around the main power plant area as well as transmission line area. There are some nocturnal animals around the project site, but their movement will not be hampered as the construction work will not be undertaken at night time.

According to the Subclause 10 under Clause 3 of the Balumohal and Soil management Rules 2010 (বালুমহাল ও মাটি ব্যবস্থাপনা আইন, ২০১০) of Land Ministry of Bangladesh, the Bangladesh Inland Water Transport Authority (BIWTA) is responsible for regular dredging, supervision and monitoring the activities of sand extraction and ensuring that the dredging is done according to the hydrographic survey conducted by BIWTA. BIWTA also records, what is the effect on the nature of the river course or the flow of the river due to this dredging activity and whether environmental balance is being disturbed or the public interest is being undermined. According to these observations BIWTA should take necessary technical or administrative decisions and also implement them.

According to Clause 4, the district committee of the Government is responsible for-

- a) Preparing the tender form specifying the schedule, plan of the place to be excavated for sand or soil, the probable quantity of excavated sand, the probable Government price or any other matter;
- b) Reviewing and approving the tenders received for Balu mahal lease;
- c) Supervise and monitor sand mining operations and recommend, if deemed necessary cancellation of leases and sand mining permits;
- d) Monitoring the potential impact of sand mining on the environment, taking necessary measures to prevent river bank erosion and to control the noise pollution at sand mining sites;
- e) Monitoring the impact and risk on water quality, fish, and other aquatic life due to sand mining, take necessary measures according the observations;
- f) Taking necessary measures to stop sand mining during fish spawning and spawning areas;
- g) Observing whether the river course is being altered or the people on the river banks are being affected due to alteration and whether the navigation of the waterways is being maintained properly, taking necessary steps according the observation;
- h) Monitoring and taking necessary measures if the embankments, structures, or infrastructure are being damaged or likely to be damaged by sand mining operations.

The above clauses depict that the supplier or leasee does not have any bindings or responsibility toward ecological and physical (stability) sensitivity of sourcing areas.

Proposed Mitigation Measures

- ✓ No waste should be dumped in adjacent water bodies;

- ✓ Site should be kept clean so as no pollutant from site should enter the adjacent water bodies along with run-off;
- ✓ Altered green area can be turned into its original visual quality by plantation of trees;
- ✓ Re-vegetation should be done as soon as possible;
- ✓ Proper access restriction measures should be implemented around the boundary. High fencing prevents jumpers, while small mesh fencing with climbing guards prevents ground-dwelling and climbing;
- ✓ Awareness should be built to the workers in favor of conserving wildlife. During vegetation clearance, killing of any kind faunal species should be prohibited;
- ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area;
- ✓ Lights of the construction area should install downwardly to avoid disturbance to the wildlife and birds.

6.2.4 Solid Waste

Improper disposal of solid waste from the site shall lead to unhygienic conditions and aesthetic tiring in the area. Improper disposal of tree root, branches, leaves, cleared vegetation, bushes, plastics, domestic waste can lead to littering in the project site.

Land development would require clearing of existing vegetation and bushes which would eventually generate a small amount of vegetation and wooden debris. Some office and domestic wastes are to be developed during pre-construction phase. Disposal of such wastes and scraps demands good housekeeping, good management and safeguarding to environment.

Proposed Mitigation Measures

- ✓ Organize disposal of all wastes generated during pre-construction phase in the designated disposal sites approved by the Project company;
- ✓ Waste should be properly segregated in different colored drums;
- ✓ Proper disposal and management of waste i.e., timber, shrubs, bushes, grass etc.;
- ✓ No solid waste should be dumped in water bodies;
- ✓ Difficult to dispose wastes will be minimized where practicable.

6.2.5 Indigenous People

There is no existence of indigenous people in and around the vicinity of the project area. So, there is no impact in this regard.

6.2.6 Cultural Heritage

There is no cultural heritage site within 5km radial zone of the project area and no structure of national cultural heritage will be affected due to project development.

6.3 Impact during Construction Phase

During the construction phase, driving of SPC piles, installation of PV panels, installation of transformer, inverter, DG sets, construction of switchyard, storage yard, main substation, 31 nos. block substations, tower footing, installation of towers etc. are the main works that will be done. There is involvement of several local contractors (but there is no EPC) during construction phase and DSEPL team will monitor their work and ensure that they are following the proposed mitigation measures mentioned in the following section. The local contractors don't have their own ESMP, EHS team. They follow the management policy of the DSEPL and DSEPL monitors and ensures them through their field supervisors. The EHS policy of DSEPL is attached as Annexure 33

Cast in situ piles were used for transmission tower base. There will be two types of towers i.e., angle tower and suspension tower. For each angle tower 8 piles are casted and for each suspension tower 16 piles are casted for the construction of footing of the towers. Construction of each angle tower footing takes 7~10 days and suspension tower footing take 4~5days only. After completing the construction of each tower footing, the contractor cleans up and reinstate the site before leaving.

6.3.1 Air Quality

The air quality in the project area may slightly deteriorate for the time being during construction. The major construction activities from which air emission mostly dust emission and slightly exhaust emission may occur are:

- ✓ Delivery of construction materials to site;
- ✓ Handling and mixing of cement;
- ✓ Cutting/filling and sand storage may cause air pollution;
- ✓ Poorly Paved Service Road;
- ✓ Exhaust Emission from DG sets and machineries.

❖ Potential Environmental Impacts of Dust

Dust produced cement, construction work, from internal roads etc. will potentially negatively affect the following:

1. Effects of Dust to Employees

Dust can affect Employers in the following way:

- ✓ Eye irritation;
- ✓ Skin irritation;
- ✓ Impairment of normal sweating of the skin as it blocks pores on the skin;
- ✓ chocking of the throat;
- ✓ Respiratory difficulties;
- ✓ Difficulty in breathing;
- ✓ Potential course of chest complication and ailment.

2. Dust Impacts to Vegetation

- ✓ Dust settling on plant leaf surface will block leaves stoma hence interfering with normal respiration of the plants;

- ✓ Dust settling on plants will reduce the evapotranspiration of plants and animals such as butterflies, caterpillars, grasshoppers who feed of foliage will be affected as the dust settled on foliage will render the foliage unpalatable;
- ✓ Heavy dust settling on plant matter will impair on normal growth of the plant; and
- ✓ Heavy dust settled on plants will choke and kill plants.

Proposed Mitigation Measures

The impact of construction activities would be temporary and restricted to the construction phase. The impact will be confined within the close vicinity and is expected to be negligible due to its small magnitude. Following mitigation measures will be taken to minimize the air pollution during the construction stage:

- ✓ Regular sprinkling of water will be done on open surface and dust grounds;
- ✓ Transportation of materials in tarpaulin-covered trucks;
- ✓ The sand and other such dispersible material will be stored at site for minimum working period;
- ✓ Removal of soil/mud from trucks and other appliances prior to leaving the project area;
- ✓ Plantation of trees in the construction yard as quickly as possible. Any open area should be planted with appropriate vegetation (trees, flowers, and grasses);
- ✓ Project management and contractor to enforce strict use of personal protective equipment of labors;
- ✓ Construction equipment will be maintained in good operating condition to reduce exhaust emissions;
- ✓ Complains of dust related ailments among employees and neighbors to be given access to medical attention;
- ✓ The equipment design will be chosen for least suspension of dust/sand into atmosphere;
- ✓ All diesel-powered equipment will be regularly maintained and idling time reduced to minimize emissions;
- ✓ Low sulfur diesel ($S < 0.5\%$) will be used in diesel-powered equipment in collaboration with best management practices;
- ✓ Vehicle/equipment air emissions will be controlled by good practice procedures (such as turning off equipment when not in use);
- ✓ Vehicle/equipment exhausts observed emitting significant black smoke in their exhausts will be serviced/ replaced; and
- ✓ Solid waste burning in the project site is strictly prohibited.

6.3.2 Impacts on Acoustic Environment

The proposed solar facility will be located in an area with a rural character which is fairly remote. Increased noise levels are directly linked with various activities associated with the construction phase. The equipment likely required to complete the project construction will typically include Excavator, pile driving machine, crane and various four-wheel drive and service vehicles. Following project activities were considered for the purpose of impact assessment on ambient noise levels during the construction phase:

- ✓ Construction activities including construction of PV foundation, operation of earthmoving and excavation equipment, construction of office buildings, substation and transmission footing;
- ✓ Transportation of PV module, PV module mounting structure and components, construction material, machinery, and personnel;
- ✓ Operation of DG sets;
- ✓ Operation of batching plant;
- ✓ Digging of trenches to accommodate underground power cables.

From the baseline noise level monitoring (Table 4.20), it was found that the noise level inside the main power plant site and the TL route is well below the guideline value. In addition to that, the nearest residents are far from the project boundary so there won't be much impact due to noise emission from the power plant site. The TL route also runs along the agricultural land and residents are far from the TL route. It should be noted that the baseline monitoring for noise level was conducted while the construction work was going on at both main power plant and TL site. Adopting the below mentioned mitigation measure will reduce the noise level further below.

Proposed Mitigation Measures

The following mitigation measures will be implemented to minimize potential noise impacts during the construction phase in all periods:

- ✓ Noisy construction works to be limited to day time hours (from 7.00 am to 7.00 pm) per Sound Pollution (Control) Rules, 2006, noisy construction works (like mixer machine and use of other noisy machineries etc.) are prohibited from 7.00 pm to 7.00 am.
- ✓ Proper Acoustically designed machinery should be used;
- ✓ Machinery and equipment in use to be serviced regularly to ensure that they are in good condition to minimize excessive noise;
- ✓ Cutting pipes and other noise generating works should be done in a safe zone;
- ✓ Where applicable and possible exceptionally noisy machines to be fitted with noise reduction devices;
- ✓ Any employee who may complaint about ear related pain and or complication while at work to access medical attention at the expense of the contractor;
- ✓ Providing suitable hearing protection to all workers exposed to noise levels above 85dB(A);
- ✓ Workers should wear Personal Protective Equipment (PPE) for protecting them from the sound induced hazard;
- ✓ Construction workers should be advised to limit verbal noise or other forms of noise;
- ✓ Noise protection wall or barrier should be constructed in case of long-term noisy construction;
- ✓ A green belt development program with different kinds of trees would be undertaken.

6.3.3 Change in Land use pattern

The project will result in permanently change in land use of the project site from char land to industrial. The direct resultant impact (adverse) of land use change in the project area (and the other planned components) is the reduction in land area available for cultivation and resultant livelihood impacts on land owners and share croppers.

Proposed Mitigation Measures

- ✓ Compensation will be paid to the land owners for the land permanently acquired for the project. Similarly, assistance will be paid to the persons/households losing their livelihoods according to the RP report;
- ✓ If the agricultural crops are at the ripe stage, the project work may be delayed for allowing the farmers to harvest their crops. If the crops are damaged, farmers should be given financial compensation;
- ✓ Transmission lines will be aligned to minimize impacts on cultivation fields and other important areas;
- ✓ Give proper compensation to farmers and sharecroppers as per RP;
- ✓ Income loss can be mitigated by providing alternative job opportunities for PAPs.

6.3.4 Impact on Soil Quality

During construction phase, there is a risk of accidental spills and leakages from paints, lubricants, fuel and oil drums, vehicles and machinery and storage of chemicals used in construction areas, yards, batching plants, and from storage sites. These spills can pollute soils and contaminate surface water and groundwater in the area.

Disturbance of soils during construction including (and particularly) from movement of vehicles, may lead to destruction of the integrity of upper soil layers. Damaged soil is more readily eroded and washed into water courses during rainfall events and can also form dust during dry periods. Waste effluents due to labour influx and offices can also contaminate soil.

Proposed Mitigation Measures

- ✓ Construct appropriate spill containment facilities for all fuel storage areas;
- ✓ Train personnel and implement safe work practices for minimizing the risk of spillage;
- ✓ Develop site specific waste management plan for various waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior construction work;
- ✓ The fuel, chemical and lubricant storage area (fresh and used) will be on hard standing floor and roofing with a secondary containment facility of 110% bigger than the allowable maximum storage capacity;
- ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring;
- ✓ To combat spillage, spill response equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site;
- ✓ Properly stripping of top soil and conserve it for future use (greenbelt development);
- ✓ Municipal solid waste generated from the construction site will be transferred to the disposal site in consultation with the Union Parishad⁵.

6.3.5 Impact on Surface Water

⁵ The smallest rural administrative and local government unit in Bangladesh.

The potential impacts on local hydrology are principally those of altered patterns as a result of onsite construction and earthwork activities. The proposed project may affect natural drainage, surface water quality if not managed the construction works properly. There could be Siltation of water system or drainage from uncovered piles of soil.

As the Padma River is 1.5 km km from the project site so except during river flooding there will not be any negative impact on river water due to project activity. The canal beside the project area remains dry most of the time of the year. The elevated boundary road/ dyke will be constructed within the site using sand and geotextile to prevent seepage. There is no dredging or embankment works on the canal or Padma river.

The project company has installed two septic tanks with soak pits for disposing waste water from the labour camp. Their locations are shown in Figure 1. The capacity of each septic tank is 26.5 m³ and their dimension is 5m X 2.3m X 2.3m. The design has been made considering the 300-number residential workers and 180 liter/day/capita waste water generation. The design considered that amount of waste water generation and discharge is 20.6m³/day from each septic tank and sludge deposition rate is 30 litre/capita/year. Diameter of soak pit is 1.04m and depth is 3.5m.

But the capacity should include waste water generation for 500 non-residential workers at a rate 40 liter/day/capita and 200 residential workers at a rate 120 liter/day/capita according to Bangladesh National Building Code (BNBC) 2020 (chapter VIII, Table 8.5.1(b)). According to this, waste water generation will be 44,000 liters or 44 m³. If the detention period is considered to be 18 hours then required capacity for septic tank is 33,000 liters or 33m³. The installed capacity of the two septic tank is 53 m³. So, the capacity of the septic tanks is sufficient according to BNBC 2020. According to ECR 2023, all water from toilet (including sewage, urination and flushing water, bathing water, sink water) and kitchen should go to septic tank and soak pit as no waste water can be discharged from project area without treatment. Sludge will be disposed once in a year. Detail drawing and design of the existing septic tank and soak pit is provided in Annexure 11.

Proposed Mitigation Measures

- ✓ Stockpiling of spoil soil at a safe distance from the drainage system;
- ✓ Containment of sanitary waste should be adequately disposed of to avoid surface and ground water contamination;
- ✓ Making provision for temporary storage of wastes inside construction yard and disposal of solid wastes in an appropriate manner and at appropriate site at regular interval;
- ✓ Adequate provision has to be retained for the treatment and disposal of cuttings, drilling fluids and other chemicals and lube oil wastes generated during drilling, testing and commissioning stage;
- ✓ Septic tank should be cleaned once in a year and the septic waste will be disposed to the municipal waste dumping yard.

6.3.6 Impact on Ground Water

Spillage and seepage of chemical, over extraction of ground water, oil and lubricants from storage area, waste handling area and generation of sewage / domestic wastes from construction labor camp

area may adversely affect ground water quality in the area. The project would affect ground water quality if the construction works are not managed properly.

From the baseline study it was found (Table 4.15) Pb and Cd of the ground water sample is beyond the Bangladesh standards for drinking water. Right now, Lead (Pb) and Cadmium (Cd) of the ground water sampled from surrounding area extracted from shallow tube well at 70ft is beyond the limit, Previously DSEPL had treatment facility at site for treating ground water for drinking purpose which has less capacity. But now, DSEPL has set up new submersible pump at 220 ft depth along with water treatment plant (WTP) which can treat 1000 litres of drinking water per hour (24m³/day) for the supply of drinking water for the rest of the construction period and operation phase ahead. The capacity of the WTP is sufficient for the workers involved in this project.

DSEPL has already taken permission from Upazila office for tube well installation (attached as Annxure 12). But according to the Bangladesh Water Rules 2018, Chapter 10, Clause 30, Sub-clause 2 “any non-agricultural industry should apply to Zila office for No objection letter in case of extraction of water by suction method for abstraction up to 1 cusec (1ft³/sec) water”. DSEPL will have to apply for the no objection from the Zila (district) office.

Proposed Mitigation Measures

- ✓ Proper spill control and management at site;
- ✓ Storage of hazardous material and waste in proper manner and disposal of the waste at a designated location around the site following the ESMP;
- ✓ Minimize the extraction and proper management (misuse, leakage, reuse, regular inspection of chemical and hazardous waste spillage or leakage) of ground water should be strictly followed;
- ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring.

6.3.7 Impact due to Solid Waste

• Solid waste due to project work

During construction, large amount of construction waste that includes unused construction materials, construction debris, excavated spoils, abandoned or broken machine parts, debris, packaging materials, used home appliances, etc. will be produced. Moreover, plastic, papers, cock sheet, cartons, metal or plastic binders, etc. may be produced as solid waste during this stage. If these wastes are not disposed and maintained properly, these would have impact on surrounding environment.

• Kitchen and Sanitary waste

During construction phase hundreds of labourers will be engaged in different constructional work. Some of them will be living at the labor shed and kitchen waste and sewage will be generated within the project site. If these are not handled properly then it may impact the surrounding environment negatively.

E- Waste

A variety of E-wastes may be generated during the construction of the main power plant area and the TL. Proper handling and Management of E-Waste is required to avoid any damage to human health,

local environment including land, water, and air. Kinds of E-wastes may be generated from different sources/ activities at division/ unit offices/ operational areas are:

- Faulty/used electronic parts and electrical equipment for construction work,
- Cut pieces of wires and electrical parts etc.

The DSEPL has waste collection and dumping facility. Regularly the wastes from bins placed at important locations i.e., office rooms, different locations of labour sheds, kitchen and dining area, medical room, child care room etc. are collected and dumped into the primary dumping location beside the labour camp. After that, it is transferred monthly at nearby municipal solid waste dumping yard. Solid waste is collected by local vendors but they are not certified as in Bangladesh there are no requirements for municipal solid or hazardous waste collectors to be licensed. Location of the municipal solid waste dumping yard is about 20 km from the power plant site, shown in Figure 6.1.

Proposed Mitigation Measures

- ✓ Segregate all wastes, wherever practical according to the waste management plan;
- ✓ Some segregation bins with color coding indicating degradable and non-degradable waste might be installed at labor shed and work places to prevent scattered throwing of wastes according to the waste management plan;
- ✓ Municipal solid waste generated from the project site will be transferred to the designated municipal disposal site
- ✓ Construction materials left over at the end of construction will be used in other projects rather than being disposed off; some of the waste can be sold or donated or recycled/reused by construction companies, local community groups or institutions;
- ✓ Difficult to dispose wastes (plastic and hazardous waste) will be minimized and where practicable and avoided such as plastic wastes;
- ✓ All recyclable waste will be separately collected and sent for recycling
- ✓ Ensure proper disposal for electrical and municipal solid waste according to the management plan;
- ✓ The solid waste collector must dispose the wastes regularly at an approved municipal solid waste disposal site to ensure that waste does not build up on site and result in aesthetic impacts or odors;
- ✓ Hazardous waste will not be mixed with other solid waste generated, be stored at appropriate hazardous waste storage facility per the waste management plan and disposed of accordingly by waste collector or recycler;

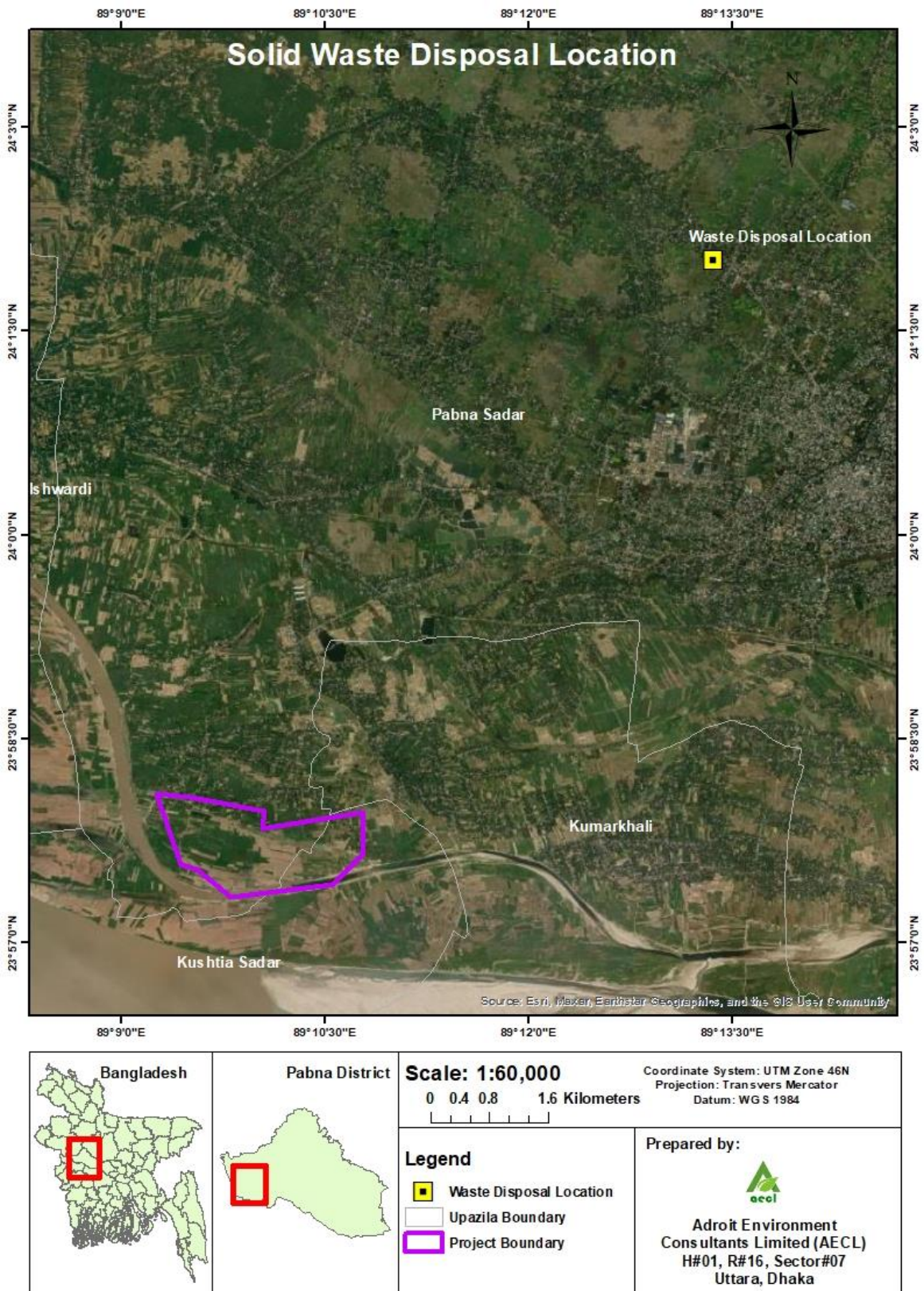


Figure 6.1: Solid Waste Disposal Location

6.3.8 Traffic and Transportation

DSEPL has constructed a 200m herringbone road for accessing the Project from the nearby LGED Road. The LGED Road starts from the Pabna Highway and runs through Heliboard Bazar to Project Site. The route is shown in Figure 3.5. The road up to Bhabanipur is bituminous and after that the rest of the LGED road is earthen and damaged. DSEPL has improved the quality of road after Bhabanipur to Project Site for the transportation of the constructional materials, machineries, and equipment. There are several roads from Pabna sadar to project site but the road which runs through Bhabanipur and Heliboard Bazar towards the project site is wider and better option for heavy vehicular movement than others. For this reason, DSEPL decided to use this route for transporting constructional materials and equipment. Due to the transportation of construction material, machineries and other equipment during construction phase may create heavy vehicular traffic. It also can damage of the earthen road connect to the project site. LGED is responsible for repairing and improving the LGED roads and DSEPL is responsible for the maintenance of the 200m access road. The traffic survey data shows that even during full-fledged construction phase the traffic flow is way less than saturation condition. The details of the traffic survey are presented in Section 4.7.

Potential Negative Environmental Impacts Likely to Result from Increased Vehicular Traffic in the Area

- ✓ Possible traffic congestion of local roads and lanes;
- ✓ Possible of occasional experience of delays on the said local roads;
- ✓ Increased number of vehicles on local roads will result in increased wear and tear of local roads thus reducing lifespan of affected roads;
- ✓ Pedestrians and cyclists using local roads will have to exercise more care with increase of vehicular traffic on the said roads; and
- ✓ There will be an increase of exhaust emission from vehicles, which will pollute local atmospheric air.

Proposed Mitigation Measures

The following measures will be adopted to mitigate possible negative impacts likely to result from increase in vehicular traffic in the area:

- ✓ Contractors, DSEPL's vehicle drivers and labourers and officials should be emphasized on road safety aspects;
- ✓ Only licensed and trained drivers should be appointed;
- ✓ Adequate internal parking provided for all vehicles by DSEPL;
- ✓ Avoid transportation of materials and machinery during the peak traffic periods;
- ✓ Plan suitable traffic routes that has capacity to handle project traffic (including load of each vehicle) to prevent road damage, avoiding narrow routes;
- ✓ Prevent unauthorized access to the construction site;
- ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) within and outside the construction area;
- ✓ All vehicles should have updated fitness certificate;
- ✓ Regular maintenance of vehicles should be conducted;

- ✓ Speed limits, Proper signage, visibility and traffic awareness and pedestrian safety should be followed by the drivers;
- ✓ Each vehicle should not exceed maximum allowable load
- ✓ Should use pilot car and flashing lighting system for carrying the Solar PV mounting piles by large lorries through local narrow roads from the nearest highway to the project site;

6.3.9 Impact on Terrestrial Habitat

According to the field survey and desktop review of available information, there is no critical and natural habitat present in and around the project area. All existing flora and fauna fall under least concern category according to IUCN. Any endangered, vulnerable or threatened faunal species were not found during the field visit around the main power plant area as well as transmission line area. There are some nocturnal animals around the project site, but their movement will not be hampered as the construction work will not be undertaken at night time. There will be no habitat loss due to this project implementation.

Activities during construction phase such as pile driving work, installation of PV panels and transformers, construction of associated facilities and tower footing may generate some negative impact on project area terrestrial habitats i.e., noise, fauna could be adversely affected through construction-related activities (noise, dust, light pollution, and modified habitat loss).

Proposed Mitigation Measures

- ✓ Plantation of local species in surrounding areas of the Project site;
- ✓ Bare surfaces should be grassed as soon as possible after construction to minimize time of exposure;
- ✓ Awareness should be built to the workers in favor of conserving wildlife;
- ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area;
- ✓ Lights of the construction area should install downwardly to avoid disturbance to the wildlife and birds;

6.3.10 Impact on Aquatic Habitat

Source of impacts include:

- ✓ Waste water from labour camp;
- ✓ Surface runoff from construction site, spillage & leakage of oil and lubricants etc.;
- ✓ Runoff erosion from the project site may have negative impact on Aquatic fauna.

The project Company has installed septic tank and soak well for disposing waste water from the labour camp. The government law allows to dispose sanitation water through septic tank and soak pit as the duration of the construction phase is shorter.

Proposed Mitigation Measures

- ✓ Wastewater from labor camp and construction site should be disposed-off through septic tank and soak pits
- ✓ Suggested waste management and disposal in the waste management plan should be followed;
- ✓ Excavation activities should not be undertaken during monsoon season;
- ✓ Piling of raw material at construction site should be avoided;
- ✓ Raw material and debris should be covered, and fuel should be stored per hazardous materials management plan;
- ✓

There is a branch of Padma River (canal) adjacent to the west and south side of the project area. The adjacent land area is predominantly agricultural type. If the above-mentioned mitigation measures are implemented, then it is expected that the impact on aquatic habitat will be negligible. In addition to that, canal beside the project area remains dry most of the time of the year and elevated road around the site boundary within the site will be constructed of sand and geotextile.

6.3.11 Impact due to Hazardous waste and leaching of PV panel

Hazardous material can cause different types of accidents while transporting to or from the project site. They may cause damage during inadequate storage, transportation, treatment, or disposal operations. Improper hazardous-waste storage or disposal frequently contaminates soil, surface water and groundwater supply as harmful water pollution and can also be a source of dangerous land pollution.

There is very minimum possibility of surface water body getting affected due to hazardous waste but soil and ground water may get affected due to it. In addition to that, DSEPL has separate hazardous waste storage area shown in Figure 6.2 The current storage area has hard standing floor, secondary bunding facility, proper safety signage. Hazardous wastes are properly labelled as seen during site visits and is given to hazardous waste collector fortnightly. Hazardous waste which can be reused or have demand in market is sold to authorized dealer approved by DoE.

Despite many advantages, solar photovoltaic (PV) cells used for electricity generation can have negative environmental impacts. Solar panel waste can include heavy metals such as silver, lead, arsenic and cadmium that at certain levels may be classified as hazardous waste. During installation, defects can be found on the panels, improper handling can lead to leaching or more harmful impacts.

Proposed Mitigation Measures

- ✓ All hazardous materials will be kept on hazardous waste storage with hard standing floor and roofing with bunding facility and secondary containment facility of 110% bigger than the allowable maximum storage capacity;
- ✓ An appropriate storage site should be provided for disassembled spare parts (e.g., motors and compressors) that contain oil or other types of fluids. They should be stored in containers that are secured that will not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system;

- ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types;
- ✓ Oil Sludge, spent lubricating oil will be sold only to the DoE approved vendors;
- ✓ Only trained laborers with appropriate PPE should be appointed for unloading work;
- ✓ In case of any spillage, it should be immediately acted up on using spill kits. To combat spillage equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site;
- ✓ Regular inspections of machinery, equipment, pipe work, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring;
- ✓ Installation method and mounting structure should meet the expected load-bearing capacity, which is requisite assurance from PV system installer.
- ✓ Installation bracket system should be tested and inspected by the third-party testing institution with static mechanical analysis capacity in accordance with local national standards or international standards.
- ✓ Handling and mounting of PV panels should be conducted by expert professionals;
- ✓ PV panels should be checked before and after installation for any kind of damage;
- ✓ Modules should be fixed on the bracket solidly;
- ✓ Any damaged or unfit for use panels should be stored as hazardous waste prior to recycling or disposal as hazardous waste;



Figure 6.2: Hazardous Waste Storage Area

6.3.12 Occupational Health and Safety

The safety of the workers may be at risk during construction activities. The movement of trucks to and from the site, the operation of various equipment and machinery and the actual construction activities will expose the workers to work-related accidents and injuries. Pollutants such as dust and noise could also have negative implications for the health of workers and near-by communities.

In addition, falling debris could injure workers if personal protective equipment (PPE) is not provided or properly used. Back injury could occur if workers lift heavy objects using inappropriate body posture. Other potential hazards might be; driving equipment with improper brake system, lack of concentration while working. The protection of head, eye, ear, and hand, foot of the workers, labors and project personnel could be affected if proper and adequate arrangement is not ensured. Workers

in solar power plant have to work on open space where direct sunlight can cause heat stroke. Moreover, other infectious disease like COVID can cause adverse situation at the site.

Presently, labour camp has been set up with necessary facilities within the project area. Approximately 200 constructions laborers are currently residing inside the camps. They have proper dining, cooking, toilet and first aid facilities. For female workers Child care Room has been set up, so that they work without any tension regarding their children. In addition to that there is already an existing emergency medical room with a doctor and a male medical assistant but they are planning to upgrade their medical room which is currently in under construction state. Emergency and first aid medicines and equipment i.e., (sphygmomanometer, thermometer, adhesive bandages, elastic bandages, dual head stethoscope, antiseptic cream, aroclor solution 10%, adhesive tape, face mask, hand gloves, hand sanitizer, sharp scissors, safety pins and saline) are available there. Photographs of the labour camp facilities are shown below. The DSEPL authority has also made an MoU with Shimla Hospital and Diagnostic Centre at Shimla Tower, Thana More, Shalgaria, Pabna Sadar, Pabna which is approximately 12.5 km from the main power plant site. According to the MoU, the hospital will provide emergency treatment for any kind of industrial accident, fire accident and natural disaster. The hospital will also provide ambulance facility, hospital bed, priority treatment, oxygen cylinder, other medical equipment and testing facility etc. The MoU with the hospital is provided as Annexure 13..

There is already fire safety equipment installed at different locations of the project area. Fire drills are conducted monthly during training sessions. Completed training schedule of last three months (June 2023 to August 2023) is given in Annexure 34 Available fire safety equipment at site are fire extinguisher, fire bucket. The project site has security guards at different boundary points along with entrance points in 3 shifts for 24 hours. Currently, an EHS manager along with three supervisors is responsible for the occupational health and safety issues.



Fire extinguisher



Fire bucket



First Aid Facilities



First Aid kits



Child care room



Stored medicine



Existing medical room

Figure 6.3: Present condition of labour camps and its facilities.

Proposed Mitigation Measures

- ✓ Develop an OHS management plan covering OHS management structure, monitoring and reporting of OHS performance, specific procedures and requirements as described (but not limited to) those listed below, incidents reporting and management procedure
- ✓ Emergency response policy of the contractor/ Project company should be developed and followed;
- ✓ Training on job-specific risks and regular reminders should be provided to the workers;
- ✓ All persons working on site will be trained about job-specific risks and mitigations (Trainings on OHS for PPE, weight lifting, gripping, prolonged postures, vibrations, repetitive actions, safety at workstations, slip, trip, and fall, handling flammable chemicals, first-aid, machinery malfunction etc., infectious diseases, housekeeping, Firefighting, Mock drill, emergency situation handling, site security, PV Panel Cleaning etc.) which should be ensured by the DSEPL authority;

- ✓ DSEPL will ensure workers aware of health and safety risks and mitigation requirements at the project site through training and daily briefing;
- ✓ Necessary first aid facilities and staff (like Skin Cleaning Wipes, Cotton Gauze Pads, Pressure Bandage, Triangular Bandage, Wound Closure Strips, weight machine, sugar level machine Scissors, Tweezer, Cotton Ear Swabs, CPR Instructions, First Aid Guide and etc.) should be available at site;
- ✓ Before starting work all the appropriate safety equipment and the first-aid kit will be assembled and checked as being in working order;; All lifting equipment and cranes will be tested and inspected regularly. All hoist ways will be guarded;
- ✓ All scaffolds will be erected and inspected and the appropriate records maintained by the Contractor which should be ensured by the DSEPL authority;
- ✓ Safety hoops or cages will be provided for ladders with a height in excess of two meters;
- ✓ The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress which should be ensured by the DSEPL authority;
- ✓ Supervision of works shall be done regularly by contractors and DSEPL's EHS team to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work;
- ✓ The workers should be provided with appropriate PPE (Personal Protective Equipment) such as safety goggles, hard hats, safety gloves, metal plated shoes, high visibility vest and other necessities per identified OHS risks. List of required PPEs is provided in Figure 6.4.
- ✓ All the labors should follow the safety protocol (i.e., Physical distancing, Face coverings, Gloves, Goggles & Face Shields, Hand hygiene, Coughing/Sneezing hygiene, Personal disinfection, request for cleaning supplies and Face coverings to others) due to the Covid situation;
- ✓ Proper facilities of cool drinking water, short intervals during work, wearing loose and light color dresses can mitigate heat stroke to workers;
- ✓ Material Safety Data Sheets (MSDS) for each chemical used should be available and readily accessible at the facility;
- ✓ Train staff on how to prevent and manage emergency incidences as per the guidance provided in Chapter 12 and Disaster Management Plan;
- ✓ Use signage to warn staff about dangerous places. The signage must be visible and placed strategically;
- ✓ A near miss and accident reporting system will be followed and corrective measures shall be taken to avoid / minimize near miss incidents;
- ✓ Safety measures in the form of DO and Don't Do will be displayed at strategic locations;
- ✓ Firefighting equipment should be available within the power plant area;
- ✓ Fire extinguishers should be kept near all storage area, labour camp area to extinguish the fire at its initial stage;
- ✓ Water hoses should be provisioned with long pipes;
- ✓ Arrangement of firefighting equipment's with training to the staffs from workers to officers;
- ✓ Develop and implement specific work instructions for high-risk activities including but not limited to, work at height, permit to work system on high risk activities, log-out tag-out (LOTO) system, electrical works and for construction of transmission tower for implementation by the construction contractor



Figure 6.4: Suggested PPE for Occupational Health & Safety of the workers.

6.3.13 Sanitation Hazard & Drinking water

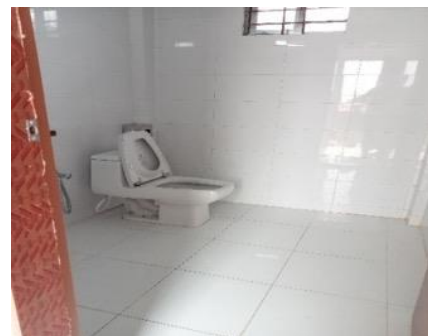
The health of the project personnel, construction workers and laborers living at the labor camp could be impacted. The most common diseases that can be transmitted through water are diarrheal diseases such as bacillary dysentery, typhoid, paratyphoid, cholera, amoebiasis etc. During construction stage, lot of local labors will work and hence they would generate considerable amount of human waste. These are the potential source for spread of diseases, as various insects will play dominating role in the spread of diseases. Presently, COVID-19 is another alarming issue which can spread during the construction phase due to labor influx.

The project Company has installed septic tank and soak well for disposing waste water from the labour camp (see details in Annexure 11). Besides that, bath rooms, toilets for both male and female workers have been constructed within the project site.

The Company has already made arrangement of safe drinking water for laborers. Treated ground water is used for drinking purpose during construction phase and they have treatment facility at site for that. From the baseline study it was found (Table 4.15) Pb and Cd of the ground water sample is beyond the standard value. Right now, Pb and Cd of the ground water of the surrounding area is beyond the limit if water extracted from shallow tube well. The depth of the previous tube well at project site is 70 ft. DSEPL has set up new submersible pump at 220 ft depth along with WTP which can treat 1000 litres of drinking water per hour for the supply of drinking water for the rest of the construction period and operation phase ahead. Drinking water test result is presented in Table 4.16 and attached as Annexure 10 but the test result for Pb and Cd is pending to demonstrate compliance with Bangladesh and WHO drinking water standards.



Wash room



Labour toilet



Ablution Space



Drinking Water Source



Wash Basin at The Dining Space

Figure 6.5: Sanitation Facilities for Staffs and workers

Proposed Mitigation Measures

- ✓ Proper sanitation system with described septic tank and soak pits be provided to ensure sewage is disposed per applicable requirements;

- ✓ Adequate number of gender segregated toilets and bathrooms should be made for the workers. Standards range is 1 unit to 15 persons;
- ✓ Separate Male and female toilets should be available;
- ✓ DSEPL to provide and ensure that drinking water meets national/local and WHO drinking water standards;
- ✓ There should be arrangement of 4~5 liters per person per day potable water for all;

6.3.14 Labor and Working Condition

Working conditions and terms of employment examples are wages and benefits; wage deductions; hours of work; overtime arrangements and overtime compensation; breaks; rest days; and leave for illness, maternity, vacation or holiday.

During construction phase about 700 workers are involved in the project where 200 workers are residential and rest 500 are non-residential (details described in Table 4.4). The non-residential workers live nearby the project site. Residential workers live at labour shed within the main power plant site. During operation phase, about 550 workers will be involved in the project, where 100 workers will be casual cleaners. Details described in Table below. There is no immigrant worker in this project and around 80~90% worker and officials are from North Bengal.

Dynamic Sun Energy Pvt. Ltd.										
Manpower categories										
Steps	Manpower			Manpower Types			Gender Composition		Nature of Residence	
	Total Manpower	Skilled (%)	Unskilled (%)	Permanent	Temporary	Casual Labors	Male	Female	Residential	Non-Residential
Construction Stage	700	70%	30%	40%	60%	-	98%	2%	30%	70%
Operation Stage	450	80%	20%	90%	10%	-	85%	15%	45%	55%
Panel Cleaner (During Operation)	100	80%	20%	-	-	100%	100%	-	-	100%

The accommodation facility at the project site for the laborers include standard beds with a comfortable mattress, pillow, cover and clean bedding facility. Both natural and artificial lighting are available and the rooms are well ventilated. An adequate supply of potable water (180 litre/day/capita) is available in the dormitories. Adequate number of leak proof, non-absorbent, rust and corrosion-resistant waste bins protected from insects and rodents are available at strategic locations. Vector control and disinfection are carried out throughout the living facilities. Sanitary facilities are located within the same buildings and provided separately for men and women. Adequate facilities for washing and drying clothes are provided. There are prayer rooms, medical facility room, dining area, kitchen, children play room etc. are available at the labour camp/dormitory. Photographs of these facilities are shown in Figure 6.6.

The workers who are and will be working at TL route is in responsibility of the contractors. No workers of the contractors stay at site during night along the TL route. All of them are non-residential workers.

Temporary tent facility is provided for day time for resting of the workers in between their work. No other facility (Dry floor, drinking water or food is available there). As they are non-residential worker so there are no legal bindings to provide labour shed facility to them. Only standard work hour, resting hour, wage, breaks, rest day, leave for illness should be provided along with safe drinking water facility and resting facility.



Labour camp (outside)



Labour camp (inside)



Prayer room



Dining room

Figure 6.6: Facilities in Labour Camp

Proposed Mitigation Measures

- ✓ The Contractor should maintain standard wage, wage deductions; hours of work; overtime arrangements and overtime compensation as per the ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006 which should be ensured by the DSEPL authority through contracts;
- ✓ DSEPL will provide appropriate treatment facilities on-site and through arrangements with the nearest hospital and pay compensation according to Bangladesh Labor Law 2006 which should be ensured by the DSEPL authority;
- ✓ Leave for illness, maternity, vacation, or holiday should also be maintained by the contractor which should be ensured by the DSEPL authority;
- ✓ Child labor and forced labor should strictly be avoided;
- ✓ Temporary labor camp should be made for labors following IFC and EBRD Guidance on Worker's Accommodation, ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006;
- ✓ Discrimination between male and female labors should be prohibited by establishment of clear policy provisions on ant-discrimination;

- ✓ Establish internal (worker's) grievance mechanism which should be accessible to all project employees/ workers as well as those hired by the contractors/ subcontractors.

6.3.15 Social acceptability of Construction workers to the host communities

The labor population involved in construction activities may immigrate into the project area from various part of the country having different cultural, ethnic, and social backgrounds. Such a mixture of the population has its own advantages and disadvantages. The differences in the cultures of laborers and workers (in case hiring is required) and local community may create some problems. In the rural area, the local people especially the religiously conservative section of the community will not accept the foreign workers in general.

Proposed Mitigation measures

- ✓ It is recommended to aware the foreign workers (if any) about the social & religious actability in the area so that they could maintain those when they are in touch with local community;
- ✓ Adequate training or awareness would be given to the migratory workers about local culture and behavior. So, there is no major problem raising in dealing with foreign or migratory worker.

6.3.16 Community Health and Safety

Possible sources of impacts to community health and safety during the construction phase are dust, noise emissions, possibility of occurring accidents and local people may come to contact of hazardous material related to the project. Influx of non-local workers may also lead to increased incidence of disease outbreaks and potential security issues. Improper disposal of sewage and waste may lead to contamination of groundwater and surface water. Increased vehicle on access road due to movement of construction materials might also affect easy access of the inhabitants to the local market and houses close to the road and nearby areas temporarily. There will be structural and surface damage to the road due to movement of heavy vehicles and equipment. The flow of concerned skilled technicians from abroad might bring sexually transmitted diseases, e.g., HIV/AIDS, which might become epidemic if preventive measures from the beginning are not taken.

Proposed Mitigation Measures

- ✓ Water spraying on the access roads and at the construction sites would reduce dust emissions considerably;
- ✓ To reduce noise related impacts, night time movement of vehicles and construction activities will be restricted;
- ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) and should be followed to avoid accidents;
- ✓ Creating awareness among children, women, and old age people in particular and the community in general on traffic safety by using existing mediums such as school, women self-help groups, village union and religious occasions;
- ✓ Proper fencing / boundary should be constructed should be done around the project site to control unauthorized access;

- ✓ Construction camps equipped with proper sanitation facilities and regular pest control (i.e., to pest control for mosquitos or other insects for housing workers / labors);
- ✓ The contractor will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the DSEPL authority;
- ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 13;
- ✓ The Contractor should train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS which should be ensured by the DSEPL authority;
- ✓ All wastes should be properly handled and disposed to avoid any outbreak of disease.

6.3.17 Employment Generation

One of the main positive impacts during the construction phase will be the availability of employment opportunities especially to casual workers⁶ and several other specialized workers. Employment opportunities are of benefit both economically and in a social sense. In the economic sense it means abundant unskilled and skilled labor will be used in construction hence economic production.

Proposed Mitigation Measures

- ✓ Prioritization of employment of skilled and non-skilled workers from the local communities;
- ✓ Priority given to residents for both professional and nonprofessional positions;
- ✓ In order to increase the size of local employment, women should also be employed in the construction phase.

6.3.18 Increase in local business

There will be development of Local Infrastructure during construction phase. Moreover, connecting roads and communicating facilities will be upgraded during construction phase. As a result, Local business will also be improved. Business opportunities such as tea-stalls, eating joints and restaurants, fruit and vegetable vendors, grocery stores, electronic goods shops, mechanic, and repair shops (electrical and mechanical), small hotels, etc. are most likely to develop. It is felt that many enterprising locals in the vicinity of the project area would reap the benefits of such business and self-employment opportunities.

Proposed Mitigation Measures

- ✓ Service and materials for construction will be to the extent possible locally sourced;
- ✓ Local businessmen should be given priority in hiring supplying agent for food, vehicles, and other daily supplies;
- ✓ Encourage local people with small-scale business plans.

⁶ A casual worker is a worker on a temporary employment contract with generally limited entitlements to benefits and little or no security of employment.

6.4 Impact during Operation Phase

6.4.1 Air quality

Solar energy technologies for power plants and electricity transmission line do not produce air emissions or greenhouse gases when operating. But there can be is expected that air pollution may occur due to movement of vehicles in the project premises. Due to sweeping and other field activity. There is an on-site DG set for emergency purpose which will have very limited air quality impact form its emissions when it is in operation.

Proposed Mitigation Measures

- ✓ Implementation of a regular watering and sprinkling for dust suppression;
- ✓ Covering of any aggregate or dusty material to reduce dust emissions;
- ✓ All vehicles of power plant should have updated fitness license;
- ✓ Fit vehicles with appropriate exhaust systems and emission control devices;
- ✓ Limit the idling time of vehicles not more than 2 minutes;
- ✓ All the DG sets on site for emergency backup should be regularly checked and maintained for emission within guideline value.

6.4.2 Noise Hazard

Solar panels in and of themselves do not generate sound. The maximum noise generated from central and string solar inverter will be approx. 50-60 decibels, and approx. no noise will be generated from the micro grid solar inverter. During operation, the main source of noise would be from the sub-station and transformer area.

Proposed Mitigation Measures

- ✓ All equipment and mechanical machineries shall have to be maintained in good working order;
- ✓ All the substation and transformer area should be acoustically designed;
- ✓ The green belt should be of at least 3.5 m width consisting two rows of plantation with the gradual increase of height of plant from inside row to outside row.

6.4.3 Impact on Soil Quality

Potential impact on soil quality can arise due to:

- ✓ Accidental spillage of fuel & lubricant from storage facility or from transport vehicles may negatively impact;
- ✓ Maintenance of transmission line may generate hazardous pollutants, which are likely to be spread over the soils;
- ✓ Improper storage and disposal of sewage wastes, hazardous waste;
- ✓ Surface run-off from spillage area into nearby open land.

Proposed Mitigation Measures

- ✓ Spill control and management procedures at site;
- ✓ Hazardous waste should be carefully handled and disposed off following waste management plan;

- ✓ Sewage Treatment Plant (STP) should be installed for management of sewage waste so that it does not affect soil quality;
- ✓ Municipal solid waste generated from the project site will be transferred to the designated disposal site in consultation with the Union Parishad;
- ✓ Ensure proper disposal for electrical and hazardous materials to prevent accidental spillage according to the E-Waste Guideline 2021 and Solid Waste Management Guidelines 2021 by DoE, during maintenance work.

6.4.4 Impact on Surface Water

There will not be any liquid discharge from the power plant nor from the transmission line. Accidental spillage of chemical and waste water may also impact surface water quality negatively. During operation phase, there will be around 200 permanent officials at dormitory and 350 local cleaning and security staffs working in the project area. The Company will install a STP during operation phase. Details of the suggested STP is given in Annexure 14 Capacity of the STP is 15m³/day. The design considered estimated waste water is 12 m³/day for 300 residential workers and officials as there will be 200 residential and 350 non-residential intermittent workers during operation phase. The capacity of the current design of STP is not sufficient as the design considered rate of waste water generation is 40 L/capita/day but according to BNBC 2020 (chapter VIII, Table 8.5.1(b)), waste water generation rate for domestic purpose in staff quarter at Pourashova, Upazilas are 120 L/capita/day. The capacity of the STP should be 40 m³/day because for 200 residential workers and officials required capacity is 30 m³/day (requirement is 24 m³/day and additional 6 m³/day for factor of safety) and for 350 non-residential intermittent workers and officials required capacity is additional 10 m³/day (requirement is 8 m³/day for 50% of non-residential worker as they will work intermittently and additional 2 m³/day for factor of safety). According to the ECR 2023, no waste water can be discharged to the drainage system without proper treatment so all waste water from kitchen, washroom, latrine should be treated through STP before discharge. Treated water from STP will be discharged to the nearest khal through internal drainage system (Layout attached as Annexure 25) The impact of discharge is considered acceptable given the treatment, volume of discharge, sensitivity of the surface water based on its usage if the discharged water complies ECR 2023 guideline values as they were set according to the regular surface water quality characteristics of Bangladesh.

Proposed Mitigation Measures

- ✓ No solid waste should be thrown in the adjacent surface water body;
- ✓ Surface drainage shall be controlled to divert surface runoff away from the project area;
- ✓ Hazardous waste should be carefully handled and disposed off to avoid surface runoff or mixing with waterbody;
- ✓ Strict supervision should be maintained to avoid blockage of natural creeks during the operation period;
- ✓ Sanitary waste should be treated and adequately disposed of in drainage system to avoid surface water contamination;
- ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m³/day to treat the sewage waste to avoid ground water contamination;
- ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site.

The effluent characteristics of the STP should meet both IFC EHS guideline along with Bangladesh standard. The IFC guidelines said the WB EHS standards only apply if no national standards apply. As there is national standard so, it will be applicable. The standard value that should be followed is presented in table below.

Table 6.1: Water parameters before and after treatment in the STP

Parameters	Standard for Liquid waste discharge in Inland surface water as per ECR, 2023	WB EHS guidelines for treated sanitary sewage discharge
pH	6-9	6-9
BOD ₅ at 20°C	30 mg/l	30 mg/l
COD	125 mg/l	125 mg/l
Total Nitrogen	-	10 mg/l
Total Phosphorus	-	2 mg/l
Oil and Grease	10 mg/l	10 mg/l
Total Suspended Solid	100 mg/l	50 mg/l
Total Coliform Bacteria	1000 CFU/100 ml	400 MPN/100 ml

6.4.5 Impact on Ground Water

Continuous discharge of domestic sewage, and waste dump and over exploitation of the resource have badly impact on ground water sustainability. Over utilization of ground water is the key factor for ground water depletion. The Company is planning to install 7 rain water harvesting ponds to minimize the ground water use. Capacity of each rainwater harvesting pond will be 3250 m³ and for the 7 rainwater harvesting ponds will be 22750.00 m³. During the operation & maintenance period, rain water harvesting ponds will be used for cleaning the modules with manual washing and no chemical will be used for cleaning. Approximately 5 liters of water is required to clean each panel. Approximately 2742 m³/month of water will be required for PV modules cleaning during operation phase. According to the water balance diagram (attached as Annexure 7), the amount of water that will be available during each month based on monthly rainfall data and the storage capacity of the 7 ponds, it will be sufficient for panel cleaning round the year. Only 71m³/day (details provided in Annexure 7) ground water will be required for domestic purpose which will be stored at underground tanks.

Proposed Mitigation Measures

- ✓ Minimize the extraction to be within permissible limits per approval by Zila office and proper management of ground water should be strictly followed;
- ✓ Storage of hazardous material and waste in proper manner and disposal of the waste at a designated location around the site;

- ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m³/day to treat the sewage waste to avoid ground water contamination;
- ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring.

6.4.6 Impact due to Solid Waste

- **Domestic and Sanitary waste**

As a result of the operation of the proposed project, it is expected that some domestic solid waste will be generated from dormitory and project site. Some food waste, plastic, papers etc. may be produced as solid waste during this stage. Improper disposal of papers, tissues, packaging materials, boxes, plastics can lead to littering in the project and surrounding areas. Sanitary waste will also be produced.

- **Office waste**

The operation of the power plant itself would generate some solid wastes i.e., paper, cartoons, bags, boxes, office wastes, cartons, metal, plastic binders, pallets etc. Therefore, improper waste sanitization and disposal can cause public health risks due to environmental pollution.

E- Waste

A variety of E-wastes will be generated during the operation of the main power plant area. Proper handling and Management of E-Waste is required to avoid any damage to human health, local environment including land, water and air. Kinds of E-wastes generated from different sources/ activities at division/ unit offices/ operational areas are:

- Household appliances (microwaves, electric stoves, electric shavers, fans, iron etc.) including cooling and freezing appliances
- IT equipment, including laptops, CPU, monitors, printers etc.
- Consumer electronics, including televisions and mobiles
- Monitoring and control instruments
- Lamps and luminaires
- Automatic dispensers
- Faulty/used electronic parts and PV panels;
- Cut pieces of wires and electrical parts etc.

Proposed Mitigation Measures

- ✓ All solid waste will be segregated properly as per the waste management plan;
- ✓ Waste segregation bins with color coding indicating degradable and non-degradable and recyclable waste will be installed at labor shed and work places to collect waste according to the waste management plan;
- ✓ Some solid waste has secondary demand (metals, scrap, e-waste and other recyclable materials) and they should be sold to the secondary dealers. Other solid wastes will be disposed to the designated solid waste dumping yard;
- ✓ Scattered throwing and burning of waste should be prohibited;

- ✓ The solid waste collector will be required to dispose the wastes regularly at an approved municipal solid waste disposal site to ensure that waste does not build up on site and result in aesthetic impacts or odors;
- ✓ The Project company should undertake waste segregation at source to separate hazardous from non-hazardous waste;
- ✓ All type of solid waste which will sold to secondary dealers or disposed to the disposal site should have proper movement register from the site for waste transfer;

6.4.7 Traffic and Transportation

Increase in vehicular traffic in the area is likely to be experience during operation phase of the plant due to the movement of the personnel and other project materials and tools. Potential Negative Environmental Impacts Likely to Result from Increased Vehicular Traffic in the Area are:

- ✓ Possible of occasional experience of delays on the said local roads;
- ✓ Increased number of vehicles on local roads will result in increased wear and tear of local roads thus reducing lifespan of affected roads;
- ✓ Pedestrians and cyclists using local roads will have to exercise more care with increase of vehicular traffic on the said roads; and
- ✓ There will be an increase of exhaust emission from vehicles, which will pollute local atmospheric air.

Proposed Mitigation Measures

- ✓ Management to provide for adequate internal parking, for all vehicles coming to the plant premises;
- ✓ All users of said roads to always observe traffic rules this will give pedestrians and cyclist their space and safety while using the road;
- ✓ Restrict truck deliveries, where practicable, to day time working hours (from 7.00 am to 7.00 pm);
- ✓ Restrict the transport of oversize loads;
- ✓ All vehicles should have updated fitness certificate and regularly checked for any kind of leakage;
- ✓ Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions;
- ✓ Enforce on-site speed limit, especially close to the sensitive receptors, schools, health centers, etc.;
- ✓ Marking of the roads, warning signs / lights, road signs to be clearly used.

6.4.8 Sanitation Hazard & Drinking Water

The health of the project personnel, workers could be impacted if arrangement of sanitation and drinking water is not ensured adequately and properly. During operation stage, workers and officials will generate human waste and other waste. These are the potential source for spread of diseases, as various insects (i.e., flee, mosquito etc.) will play dominating role in the spread of diseases. There are chances for the spread of water borne diseases also. Presently, COVID-19 is another alarming issue which can spread during the operation phase.

Around 550 workers and officials will be working at site. Among them only 200 will be residential and other 350 non-residential intermittent workers will work for one shift at different times. There will be one shift of workers and officials working at site during operation phase except 3 shifts in Security section and PV panel cleaning twice monthly. The Company will install a STP during operation phase. Details of the suggested STP is given in Annexure 14. Capacity of the STP is 15m³/day. The design considered estimated waste water is 12 m³/day for 300 residential workers and officials as there will 200 residential and 350 non-residential intermittent workers during operation phase. The capacity of the STP is not sufficient as the design considered rate of waste water generation is 40 L/capita/day but according to BNBC 2020 (chapter VIII, Table 8.5.1(b)), waste water generation rate for domestic purpose in staff quarter at Paurashova, Upazilas are 120 L/capita/day. The capacity of the STP should be 40 m³/day because for 200 residential workers and officials required capacity is 30 m³/day (requirement is 24 m³/day and additional 6 m³/day for factor of safety) and for 350 non-residential intermittent workers and officials required capacity is additional 10 m³/day (requirement is 8 m³/day for 50% of non-residential worker as they will work intermittently and additional 2 m³/day for factor of safety). According to the ECR 2023, no waste water can be discharged to the drainage system without proper treatment so all waste water from kitchen, washroom, latrine should be treated through STP before discharge.

From the baseline study it was found (Table 4.15) Pb and Cd of the ground water sample is beyond the standard value. Right now, Pb and Cd of the ground water of the surrounding area is beyond the limit if water extracted from shallow tube well. The depth of the previous tube well at project site was 70 ft. DSEPL has set up new submersible pump at 220 ft depth along with WTP which can treat 1000 litres of drinking water per hour for the supply of drinking water for the rest of the construction period and operation phase ahead. Drinking water test result is presented in Table 4.16 and attached as Annexure 10 but the test result for Pb and Cd is pending to demonstrate compliance with Bangladesh and WHO drinking water standards.



Figure 6.7: Submersible pump near the labor camp

Proposed Mitigation Measures

- ✓ Project personnel and workers will follow appropriate means of waste removal and sanitation measures;
- ✓ All the employees should follow the safety protocol (i.e., Physical distancing, Face coverings, Gloves, Goggles & Face Shields, Hand hygiene, Coughing/Sneezing hygiene, Personal disinfection, request for cleaning supplies and Face coverings to others) due to the Covid situation;
- ✓ Adequate number of toilets and bathrooms should be made for the workers. Standards range is 1 unit to 15 persons;
- ✓ Separate Male and female toilets should be available;
- ✓ Sanitary waste should be treated and adequately disposed of in drainage system to avoid surface water contamination;
- ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m³/day to treat the sewage waste per applicable local standards to avoid ground water contamination;
- ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site.
- ✓ Drinking water meets national/local or WHO drinking water standards;
- ✓ There should be arrangement of 4~5 liters per person per day potable water for all;
- ✓ Vector control and disinfection should be carried out throughout the living facility area.

6.4.9 Impact due to Hazardous waste

Though there is very minimum possibility of surface water body getting affected due to hazardous waste but soil and ground water may get affected due to it. In addition to that, the solar power plant produces very minimal amount of hazardous waste i.e., fuel oil, lubricants from machineries, spent oil containers, rags used with oil, waste fluorescent tubes etc. Transformer oil will not be replaced. It will only be refilled for makeup amount once in 5 years.

The operating life of the PV panels is about 20 years and in operation phase. Solar panel waste can include heavy metals such as silver, lead, arsenic, and cadmium that at certain levels may be classified as hazardous waste. During operation and maintenance, defects can be found on the panels, miscarriage can lead to leaching which may impact soil, surface, and ground water quality of the project area.

Proposed Mitigation Measures

- ✓ All hazardous waste will be stored in hazardous waste storage per waste management plan, with hard standing floor and roofing with bunding facility and secondary containment facility of 110% bigger than the allowable maximum storage capacity;
- ✓ An appropriate storage site should be provided for disassembled spare parts (e.g., motors and compressors) that contain oil or other types of fluids. They should be stored in containers that are secured that will not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system;
- ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types;

- ✓ Oil Sludge, spent lubricating oil will be sold only to the DoE approved vendors;
- ✓ Trained laborers with appropriate PPE should be appointed for unloading work;
- ✓ In case of any spillage, it should be immediately acted up on using spill kits. To combat spillage equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site;
- ✓ Regular inspections of machinery, equipment, pipe work, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring;
- ✓ Modules should not be carried by grasping the junction box or the cable;
- ✓ None should stand or walk on the modules;
- ✓ Disassemble of the module or removing the nameplates should be avoided;
- ✓ Applying any kind of paint or adhesive on the module is prohibited;
- ✓ Damaging or scratching the back sheet of the module should be avoided;
- ✓ PV modules should be checked at a regular interval (once monthly) to avoid leaching;
- ✓ Damaged PV modules should be temporarily stored in the hazardous waste storage area and the Company will contact with licensed waste treatment agencies to collect and treat the panels as well as hazardous solid waste in compliance with national regulations.

6.4.10 Labor and Working Condition

Working conditions and terms of employment examples are wages and benefits; wage deductions; hours of work; overtime arrangements and overtime compensation, breaks, rest days and leave for illness, maternity, vacation, or holiday.

Proposed Mitigation Measures

- ✓ The Company will adopt and implement human resources policies and procedures as per the ILO Core Labour Standards Convention, IFC & EBRD Guidance and Bangladesh Labor Act, 2006;
- ✓ The accommodation and management of the workers and officials should follow ILO Core Labour Standards Convention, IFC & EBRD Guidance and Bangladesh Labor Act, 2006 via the Labour Accommodation Management Plan (LAMP);
- ✓ The Company will not make employment decisions based on personal characteristics unrelated to inherent job requirements;
- ✓ Project Company should maintain standard salary, salary deductions; hours of work; overtime arrangements and overtime compensation;
- ✓ Leave for illness, maternity, vacation, or holiday should also be maintained by the Project company;
- ✓ Child labor and forced labor should strictly be prohibited;
- ✓ Discrimination between male and female labor should be avoided;
- ✓ The Company should not employ forced labor, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty;
- ✓ Establish Internal (worker's) grievance mechanism which should be accessible to all project employees/workers hired by DSEPL if no alternative is available.

6.4.11 Occupational Health and Safety

Under sunlight, PV modules will produce direct currents. There will be a high voltage of hundreds of volts after the electrical connection. The module strings maintain a high voltage even in the event of insufficient sunlight, and any equipment that may be attached to the wire faces the concealed risk of electric leakage, which may have negative effects on the environment. In addition to that, elevated PV panel cleaning is working at height from 4-6m above ground can impose risk to cleaning workers.

The protection of head, eye, hand, and foot of the PV panel cleaners is required. Workers in solar power plant must work on open space where direct sunlight can cause heat stroke. Moreover, other infectious disease like COVID can cause adverse situation at the site.

Around 550 workers and officials will be working at site. Among them only 200 will be residential and other 350 non-residential intermittent workers will work for one shift at different times. There will be one shift of workers and officials working at site during operation phase except 3 shifts in Security section and PV panel cleaning twice monthly.

The same medical room facility will be used during the operation phase and the MoU made with the hospital will be continued during the operation phase.

Proposed Mitigation Measures

- ✓ Develop an OHS management plan covering OHS management structure, monitoring and reporting of OHS performance, specific procedures and requirements as described (but not limited to) those listed below, incidents reporting and management procedure
- ✓ The Company will provide appropriate treatment facilities on-site and have arrangements with the nearest local hospital and pay compensation according to ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006;
- ✓ Develop and implement specific work instructions for high-risk activities including but not limited to, work at height, permit to work system on high risk activities, log-out tag-out (LOTO) system, electrical works
- ✓ The workers should wear PPE (Personal Protective Equipment), safety goggles, and other necessities as per requirements;
- ✓ The abnormal records on the system side should be regularly checked thoroughly to make sure that there is no electrical leakage;
- ✓ Proper protective measures (insulated gloves, insulated shoes, etc.) should be taken to avoid direct contact with 30V or higher voltage to ensure personal safety.
- ✓ Provide adequate lighting in all workrooms;
- ✓ Material Safety Data Sheets (MSDS) for each chemical used should be available and readily accessible at the facility;
- ✓ A safety manual for storage and handling of Hazardous chemicals will be prepared and implemented;
- ✓ Necessary first aid facilities (like Skin Cleaning Wipes, Cotton Gauze Pads, Pressure Bandage, Triangular Bandage, Wound Closure Strips, weight machine, sugar level machine Scissors, Tweezer, Cotton Ear Swabs, CPR Instructions, First Aid Guide etc.) should be available at site;
- ✓ The staff will be trained for first-aid and firefighting procedures. The rescue team will support the first-aid and firefighting team;

- ✓ A first-aid center with the trained personnel (doctor and nurse) should be available;
- ✓ Train staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences;
- ✓ Use signage to warn staff and/ or visitors of dangerous places. The signage must be visible and placed strategically;
- ✓ Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area) and automated fire extinguishers will be provided at strategic locations with clear labelling of the extinguisher type;
- ✓ Firefighting system will be tested periodically;
- ✓ Develop emergency response plan including evacuation procedures to handle emergency situations;
- ✓ A near miss and accident reporting system will be followed and corrective measures shall be taken to avoid / minimize near miss incidents;
- ✓ Safety measures in the form of DO and Don't Do will be displayed at strategic locations;
- ✓ A Permit to enter the project area will be established to ensure that only authorized persons can entry to the site;
- ✓ Proper facilities of cool drinking water, short intervals during work, wearing loose and light color dresses can mitigate heat stroke to workers;

6.4.12 Community Health and Safety

Possible sources of impacts to community health and safety during the operation phase, possibility of occurring accidents and local people may come to contact of hazardous material related to the project. Influx of non-local workers may also lead to increased incidence of disease outbreaks and potential security issues. Improper management of solid waste, sanitation system may lead to different contagious diseases in local people. As the power plant will be constructed near the bank of river on a low land side at the south, rain water drainage at the higher side of the bank in the north may be impacted. DSEPL thus conducted a third-party water drainage study. The new drainage study proposes ditches and a pipe culvert to be constructed on the north side of the power plant connected to the southern sumps to channel the extra water through the site towards the canal therefore avoid flooding the community area.

Presence of transmission line may pose potential hazards such as electrocution, lightning strike, etc., due to accidental failure of power transmission. Overhead transmission lines have always been associated with concerns on health risks from exposure to electromagnetic field (EMF) from overhead transmission lines and substations. However, despite all the studies that have been carried out over the past 30 years, there is still no persuasive evidence that the fields pose any health risks.

Proposed Mitigation Measures

- ✓ Isolate local people from project area for safety purpose;
- ✓ Proper fencing /boundary work should be done around the project site to control the movement of local people;

- ✓ Creating awareness among children, women, and old age people and the community in general on traffic safety by using existing mediums such as school, women self-help groups, village union and religious occasions;
- ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) and should be followed to avoid accidents;
- ✓ Kitchen waste and sanitary waste should be properly handled and disposed at designated area to avoid outbreak of diseases;
- ✓ The community must be kept informed of emergency procedures and protocol in case of an accident in the plant;
- ✓ The DSEPL EHS team should train all operation workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS
- ✓ The EHS team will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the DSEPL authority;
- ✓ Clear and visible danger and warning signs will be posted at designated areas to alert the community of the safety risks. In addition, transmission towers should be equipped with danger boards, barbed wire, and galvanized ground wire for earthing purposes;
- ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 13.

6.4.13 Impact on Terrestrial Habitat

Solar panel glare can put negative impact on birds, flying above the solar panel. In researches it was found that solar installations appear to contribute to bird mortality. Scientists aren't entirely sure why this is, but one prevailing idea, known as the "lake-effect" hypothesis, is that large solar panel areas make illusion to the birds and make them mistake the installations for bodies of water and crash into them. The concentrating solar reflection acts as mirror which generates so much heat that it can incinerate insects and burn the feathers of birds that fly through. In addition to that, improper management of solid waste may adversely impact the fauna of that area, they may get affected or infected due to disposal of hazardous waste. Illumination at night time for operation work may also disturb the eco-system and the nocturnal species of the surrounding area.

According to our study *Pteropus giganteus* (Indian Flying Fox) was found in the study area. But the population of them was not significant, it was rarely common and there is no large roost of them. According to a study (Hasan, M. K., Feerez, M. M., Datta, A. K., Saha, A., & Ahmed, T. (2014). Indian flying fox (*Pteropus giganteus*) roosts in north Bengal of Bangladesh.) *Pteropus giganteus* (Indian Flying Fox) roosters are not present in the Pabna District. The wingspan of *Pteropus giganteus* (Indian Flying Fox) is 1.2 ~1.5m and the span between two wires of TL is 4m. If the two wings are not touched with the two wires at a time, then no species can get electrified. So, there is no possibility of electrification of *Pteropus giganteus* (Indian Flying Fox) species. DSEPL is installing bird guards on the transmission line which will resist birds to perching on the line.

The project company will use Photo-voltaic Panels, which are less reflective than all other solar panels used for solar power plants. For reducing the electrocution problem, they are planning to use bird guards on the transmission line which will resist birds to perching on the line.

Proposed Mitigation Measures

- ✓ Anti-reflective coating on solar panels will be used to reduce the solar glare negative impact on flying birds;
- ✓ Proper disposal and management of solid and liquid waste should be maintained;
- ✓ No waste should be dumped here and there within the project area during operation;
- ✓ Lights of the power plant area should install downwardly to avoid disturbance to the wildlife and birds;
- ✓ Plantation of local species in within the Project site;
- ✓ A greenbelt area should be developed along the project boundary;
- ✓ Awareness should be built to the workers in favor of conserving wildlife and no poaching is allowed;
- ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area;
- ✓ Proper installation of bird guards on the transmission line should be implemented to discourage birds from perching or nesting in unsafe locations and to prevent birds' wings to touch the line or the ground components.

6.4.14 Impact on Aquatic Habitat

- ✓ Aquatic habitat would be affected due to disposal of solid waste into adjacent surface water body;
- ✓ If any hazardous waste is thrown to the surface water body, then it may greatly impact the aquatic flora and fauna;
- ✓ Runoff erosion from the project site may have negative impact on aquatic fauna.

The proposed project will not discharge any liquid waste. The elevated road around the site boundary will be made of sand and geotextile. The canal beside the project area remains dry most of the time of the year and only during monsoon period there is a very low flow. During flooding, the substation, transformer, office room and PV panels will be above the flood level according to the Flood study report, so there won't be any impact from the project even during the flooding occurs.

Proposed Mitigation Measures

- ✓ Specific procedures and necessary preparedness to contain any accidental spill at source and to prevent their spread in the surrounding environment;
- ✓ Site should be kept clean so as no pollutant from site should enter the water bodies along with run-off;
- ✓ Wastewater should not be disposed-off in the water bodies without proper treatment.

6.4.15 Social acceptability of workers to the host communities

The officials and workers involved in operation period may immigrate into the project area from various part of the country having different cultural, ethnic and social backgrounds. Such a mixture of the population has its own advantages and disadvantages. The differences in the cultures of officials and workers (in case hiring is required) and local community may create some problems. In the rural

area, the local people especially the religiously conservative section of the community will not accept the foreign workers in general.

Proposed Mitigation measures

- ✓ It is recommended to aware the foreign officials and workers (if any) about the social & religious actability in the area so that they could maintain those when they are in touch with local community;
- ✓ Adequate training or awareness would be given to the migratory workers about local culture and behavior. So, there is no major problem raising in dealing with foreign or migratory worker.

6.4.16 Employment Generation

One of the main positive impacts during the operation phase will be the availability of employment opportunities. The increase in temporary and permanent jobs in staffs, engineers and officers would result in more transaction of money locally for purchasing of different goods and services. Several local people will be engaged in project related activities i.e., cleaning of PV panels, office staff, security personnel and crop cultivation work under the PV panels. Employment opportunities are of benefit both economically and in a social sense.

Proposed Mitigation Measures

- ✓ Encourage local and equitable employment;
- ✓ Salaries and other benefits based on qualification and experience;
- ✓ In order to increase the size of local employment, women should also be employed;
- ✓ Priority given to residents for both professional and nonprofessional positions.

6.4.17 Social and Economic enhancement around project area

Energy is one of the major factors fostering economic development in Bangladesh. After the completion of the project national grid will gain around 100 MW electricity which will be distributed all over the country. This additional input will increase the electricity coverage area. It will speed up economic development around the project area and a lot of people around the project site will be benefitted through improved employment system, small business (tea-stalls, eating joints and restaurants, fruit and vegetable vendors, grocery stores, electronic goods shops, mechanic, and repair shops (electrical and mechanical), small hotels, etc.) and socio-economic development of the locality. The cumulative positive impacts of the project will result in increased mobility, employment generation, and above all better economic integration of the area with the major market and trade centers within and outside the districts. Aid in the development of the power sector in Bangladesh as well as the infusion of the financial capital, this project will result in the increase of the overall growth of the GDP in the country.

Proposed Mitigation Measures

- ✓ Service and materials for construction will be to the extent possible locally sourced;

- ✓ Local businessmen should be given priority in hiring supplying agent for food, vehicles and other daily supplies;
- ✓ Encourage local people with small-scale business plans;
- ✓ Ensure uninterrupted electricity generation and supply.

Chapter 7

7 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 General Considerations

In the context of a project, Environmental Management Plan (EMP) is concerned with the implementation of the measures necessary to minimize and offset the adverse impacts and to enhance beneficial impacts. Unless the mitigation and benefit enhancement measures are identified in IEE and fully implemented, the prime function of the IEE cannot be achieved. Thus, the objectives of ESMP for the present project are:

- ✓ Identification of monitoring requirements and Monitoring indicators;
- ✓ Mitigation measures to reduce or eliminate negative impacts; and
- ✓ Enhancement measures to maximize positive impacts.

List of contractors are attached as **Annexure 15**.

7.3 Mitigation/Benefit Enhancement Measures

For effective and environmentally friendly operation of a project, a set for guiding tools and suggestions are necessary which need to be followed at various stages of project installation, operation, and maintenance. This plan generally has various components of management depending on the type of project activity and types of discharge and their pollution potential. The Project company may also be needed to expand the suggested outline of the ESMP proposed in this report.

All beneficial and adverse impacts which may likely to occur at different phases of the project are identified and aspect of mitigation and benefit enhancement measures has also been discussed in section 6.0. In view of the earlier discussion summary of recommended mitigation and benefit enhancement measures, proposed ESMP are presented in **Table 7.1**.

Table 7.1: Recommended environmental mitigation/enhancement measures

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
Pre-Construction Phase							
Land Acquisition and Involuntary Resettlement	Within the project site	<ul style="list-style-type: none"> ✓ Land and asset price should be considered as per current market price of land according to the ADB SPS guideline and the RP study regarding purchase (WB/WS) at the main site and acquisition for the TL where all lost or damaged assets should be compensated for at full replacement value; ✓ All affected people should get compensation for the acquisition of proposed land as per Acquisition and Requisition of Immovable Property Act 2017 (ARIPA) and Electricity Rules, 2020Act 2018 and ADB SPS SR2; ✓ Land should be of the main power plant area has been purchased by following willing buyer and willing seller process and there were no informal land users who will be involuntarily displaced, nor any structures will be displaced. In addition to that, there is no land sellers / users who will be worse off as a result of the land sale / loss; ✓ Involuntary resettlement is triggered for land acquisition along TL. Resettlement and Restoration Plan (RRP) should be followed for the compensation related to TL construction and implementation; ✓ The project activities should only be initiated after compensating properly to the affected people. ✓ Payment of severity allowance for fragmentation of land. Where the remaining land becomes unviable in case of fragmentation, the Project to compensate for the full land parcel; ✓ Ensure meaningful consultation with all PAHs and Establishing a grievance redress mechanism; ✓ Prioritization employment of local people at different phases of the project; ✓ Prior notification before land development so that crop harvesting does not get impacted. 				Project Company / Contractor	Project Company
Landscape and Soil Surface Change	Within the project site	<ul style="list-style-type: none"> ✓ Any built up part Regular sprinkling of the Plant water will be done on open surface and dust grounds. ✓ Project should be designed considering key criteria of landscape like coherence, readability, hierarchy, and stability. It is understood that Dynamic Sun Energy Private Ltd. will have a modern architectural view, which does not provide any significant visual intrusion. One simple way by which the altered; ✓ Altered green area can be turned into its original previous visual quality is the to an extent possible by plantation of local trees around the project area. 				Project Company / Contractor	Project Company
Impact on Ecological Habitat	Within the project site	<ul style="list-style-type: none"> ✓ No waste should be dumped in adjacent water bodies; ✓ Site should be kept clean so as no pollutant from site should enter the adjacent water bodies along with run-off; ✓ Altered green area can be turned into its original visual quality by plantation of trees; ✓ Re-vegetation should be done as soon as possible; ✓ Proper access restriction measures boundary work should be implemented around the boundary. High fencing prevents jumpers, while small mesh fencing with climbing guards prevents ground-dwelling and climbing; ✓ Awareness should be built to the workers in favor of conserving wildlife. During vegetation clearance, killing of any kind faunal species should be prohibited.; ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area; ✓ Lights of the construction area should install downwardly to avoid disturbance to the wildlife and birds. 				Project Company / Contractor	Project Company
Solid Waste	Within the project site	<ul style="list-style-type: none"> ✓ Organize disposal of all wastes generated during pre-construction phase in the designated disposal sites approved by the Project authority company; ✓ Waste should be properly segregated in different colored drums; ✓ Proper disposal and management of waste i.e., timber, shrubs, bushes, grass etc.; 				Project Company / Contractor	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ No solid waste should be dumped in water bodies; ✓ Difficult to dispose wastes will be minimized where practicable. 					
Indigenous People	Around the project site	<ul style="list-style-type: none"> ✓ No management plan required. 				-	-
Cultural Heritage	Around the project site	<ul style="list-style-type: none"> ✓ No management plan required. In case of any archeological artifacts are found during excavation at the project site, IFC's Chance Find Protocol should be followed. 				-	-
Construction Phase							
Impact on Air Quality	Within project area	<ul style="list-style-type: none"> ✓ Regular sprinkling of water will be done on open surface and dust grounds; ✓ Transportation of materials in tarpaulin-covered trucks; ✓ The sand and other such dispersible material will be stored at site for minimum working period; ✓ Removal of soil/mud from trucks and other appliances prior to leaving the project area; ✓ Plantation of trees in the construction yard as quickly as possible. Any open area should be planted with appropriate vegetation (trees, flowers, and grasses); ✓ Project management and contractor to enforce strict use of personal protective clothing and equipment of labors; ✓ Construction equipment will be maintained in good operating condition to reduce exhaust emissions; ✓ Complains of dust related ailments among employees and neighbors to be given access to medical attention; ✓ The equipment design will be chosen for least suspension of dust/sand into atmosphere; ✓ All diesel-powered equipment will be regularly maintained and idling time reduced to minimize emissions; ✓ Low sulfur diesel (S<O.5%) will be used in diesel-powered equipment in collaboration with best management practices; ✓ Vehicle/equipment air emissions will be controlled by good practice procedures (such as turning off equipment when not in use); ✓ Vehicle/equipment exhausts observed emitting significant black smoke in their exhausts will be serviced/ replaced; and ✓ Solid waste burning in the project site is strictly prohibited. 	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5} at baseline monitoring locations	Air Pollution (Control) Rules 2022 (Schedule-1) & IFC EHS Guideline, 2007	Once in 3 months	3 rd party consultant	Project Company
Impacts on Acoustic Environment	Within project area	<ul style="list-style-type: none"> ✓ Noisy construction works to be limited to day time hours (from 7.00 am to 7.00 pm); ✓ Proper Acoustically designed machinery should be used; ✓ Machinery and equipment in use to be serviced regularly to ensure that they are in good condition to minimize excessive noise; ✓ Cutting pipes and other noise generating works should be done in a safe zone; ✓ Where applicable and possible exceptionally noisy machines to be fitted with noise reduction devices; ✓ Any employee who may complaint about ear related pain and or complication while at work to access medical attention at the expense of the contractor; ✓ Providing suitable hearing protection to all workers exposed to noise levels above 85dB(A); ✓ Workers should wear Personal Protective Equipment (PPE) for protecting them from the sound induced hazard; ✓ Construction workers should be advised to limit verbal noise or other forms of noise; ✓ Noise protection wall or barrier should be constructed in case of long-term noisy construction; ✓ A green belt development program with different kinds of trees would be undertaken; ✓ ECoP 10 should be strictly followed by the contractor which should be ensured by the DSEPL. 	Noise at baseline monitoring locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Once in 3 months	3 rd party consultant	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
Change in Land use pattern	In and around the project site	<ul style="list-style-type: none"> ✓ Compensation will be paid to the land owners for the land permanently acquired for the project. Similarly, assistance will be paid to the persons/households losing their livelihoods according to the RP report; ✓ If the agricultural crops are at the ripe stage, the project work may be delayed for allowing the farmers to harvest their crops. If the crops are damaged, farmers should be given financial compensation; ✓ Transmission lines will be aligned to minimize impacts on cultivation fields and other important areas; ✓ Give proper compensation to farmers and sharecroppers as per RP; ✓ Income loss can be mitigated by providing alternative job opportunities for PAPs. 					
Impact on Soil Quality	Within project area	<ul style="list-style-type: none"> ✓ Construct appropriate spill containment facilities for all fuel storage areas; ✓ Train personnel and implement safe work practices for minimizing the risk of spillage; ✓ Develop site specific waste management plan for various waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior construction work; ✓ The fuel, chemical and lubricant storage area (fresh and used) will be on hard standing floor and roofing with a secondary containment facility of 110% bigger than the allowable maximum storage capacity; ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring; ✓ In case of any spillage, it should be immediately acted up on. To combat spillage, spill response equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site; ✓ Properly stripping of top soil and conserve it for future use (greenbelt development); ✓ Municipal solid waste generated from the construction site will be transferred to the disposal site in consultation with the Union Parishad . 	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si at baseline monitoring locations	WHO (1996) Permissible limit of Heavy Metals in Soil and Plants	Once in 6 months	3 rd party consultant	Project Company
Impact on Surface Water	Near Project Site	<ul style="list-style-type: none"> ✓ Stockpiling of spoil soil at a safe distance from the drainage system; ✓ Strict supervision should be maintained to avoid blockage of natural drainage during the construction period; ✓ Containment of sanitary waste should be adequately disposed of to avoid surface and ground water contamination; ✓ Making provision for temporary storage of wastes inside construction yard and disposal of solid wastes in an appropriate manner and at appropriate site at regular interval; ✓ Adequate provision has to be retained for the treatment and disposal of cuttings, drilling fluids and other chemicals and lube oil wastes generated during drilling, testing and commissioning stage; ✓ There should be 3 septic tanks of 26.5m³ capacity; ✓ Septic tank should be cleaned once in a year and the septic waste will be disposed to the municipal waste dumping yard; ✓ ECoP 3 & 4 should be followed by the contractor which should be ensured by the DSEPL. 	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate at baseline monitoring locations Visual: Maintaining proper drainage	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and IFC EHS Guideline, 2007.	Once in 6 months	3 rd party consultant	Project Company
Impact on Ground Water	Within project area	<ul style="list-style-type: none"> ✓ Proper spill control and management at site; ✓ Storage of hazardous material and waste in proper manner and disposal of the waste at a designated location around the site following the ESMP; ✓ Minimize the extraction and proper management (misuse, leakage, reuse, regular inspection of chemical and hazardous waste spillage or leakage) of ground water should be strictly followed; ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring. 	Drinking water: Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC at	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and WHO Drinking Water Guidelines	Quarterly	3 rd party consultant	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
			baseline monitoring locations				
Impact due to Solid Waste	Within project area	<ul style="list-style-type: none"> ✓ Segregate all wastes, wherever practical according to the waste management plan; ✓ Some segregation bins with color marking coding indicating degradable and non-degradable waste might be installed at labor shed and work places to prevent scattered throwing of wastes according to the waste management plan; ✓ Municipal solid waste generated from the project site will be transferred to the designated municipal disposal site; ✓ The contractor should be committed to ensure construction materials left over at the end of construction will be used in other projects rather than being disposed off; some of the waste can be sold or donated or recycled/reused by construction companies, local community groups or institutions; ✓ Difficult to dispose wastes (plastic and hazardous waste) will be minimized and where practicable and avoided such as plastic wastes; ✓ All recyclable waste will be separately collected and sent for recycling Electrical waste should be recycled; ✓ Ensure proper disposal for electrical and municipal solid waste according to the management plan; ✓ The solid waste collector must dispose the wastes regularly at an approved refuse municipal solid waste disposal site to ensure that waste does not build up on site and result in aesthetic impacts or odors; ✓ Hazardous waste will not be mixed with other solid waste generated, be stored at appropriate hazardous waste storage facility per the waste management plan and disposed of accordingly by waste collector or recycler; 	Quantity of solid waste, segregation, disposal process and transfer		Quarterly	EHS Team	Project Company
Traffic and Transportation	In and around the project site	<ul style="list-style-type: none"> ✓ Emphasizing Contractors, DSEPL's vehicle drivers and labourers and officials should be emphasized on road safety aspects; ✓ Only licensed and trained drivers should be appointed; ✓ Management to provide for Adequate internal parking provided for all vehicles by DSEPL; ✓ Avoid transportation of materials and machinery during the off-peak traffic periods; ✓ Plan suitable traffic routes that has capacity to handle project traffic (including load of each vehicle) to prevent road damage, avoiding narrow routes; ✓ Prevent unauthorized access to the construction site; ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) within and outside the construction area; ✓ All vehicles should have updated fitness certificate; ✓ Regular maintenance of vehicles should be conducted; ✓ Speed limits, Proper signage, visibility and traffic awareness and pedestrian safety should be followed by the drivers; ✓ Each vehicle should not exceed maximum allowable load ✓ Should use pilot car and flashing lighting system for carrying the Solar PV mounting piles by large lorries through local narrow roads from the nearest highway to the project site; 	Incoming & outgoing traffic, traffic movement records		Monthly	EHS Team	Project Company
Terrestrial Habitat	In and around the project site	<ul style="list-style-type: none"> ✓ Plantation of local species in surrounding areas of the Project site; ✓ Bare surfaces should be grassed as soon as possible after construction to minimize time of exposure; ✓ Only locally occurring, indigenous grasses should be used; ✓ The construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation; ✓ Awareness should be built to the workers in favor of conserving wildlife; 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area; ✓ Lights of the construction area should install downwardly to avoid disturbance to the wildlife and birds 					
Aquatic habitat	In and around the project site	<ul style="list-style-type: none"> ✓ Wastewater from labor camp and construction site should not be disposed-off through septic tank and soak pits in natural water bodies; ✓ Proper disposal and Suggested waste management of construction waste and disposal in the waste management plan should be followed; ✓ No solid, liquid or hazardous waste should be dumped in water bodies during construction; ✓ Excavation activities should not be undertaken during monsoon season; ✓ Piling of raw material at construction site should be avoided; ✓ Raw material and, debris should be covered, and fuel should be stored on paved surfaces under covered areas per hazardous materials management plan; 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Impact due to Hazardous waste and leaching of PV panel	Within the project site	<ul style="list-style-type: none"> ✓ All hazardous materials will be kept on hazardous waste storage with hard standing floor and roofing with bunding facility and secondary containment facility of 110% bigger than the allowable maximum storage capacity; ✓ An appropriate storage site should be provided for disassembled spare parts (e.g., motors and compressors) that contain oil or other types of fluids. They should be stored in containers that are secured that will not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system; ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types; ✓ Oil Sludge, spent lubricating oil will be sold only to the DoE approved vendors; ✓ Skilled Only trained laborers with appropriate PPE should be appointed for unloading work; ✓ In case of any spillage, it should be immediately acted up on using spill kits. To combat spillage equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site; ✓ Regular inspections of machinery, equipment, pipe work, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring; ✓ Installation method and mounting structure should meet the expected load-bearing capacity, which is requisite assurance from PV system installer. ✓ Installation bracket system should be tested and inspected by the third-party testing institution with static mechanical analysis capacity in accordance with local national standards or international standards. ✓ Handling and mounting of PV panels should be conducted by expert professionals; ✓ PV panels should be checked before and after installation for any kind of damage; ✓ Modules should be fixed on the bracket solidly.; ✓ Any damaged or unfit for use panels should be stored as hazardous waste prior to recycling or disposal as hazardous waste; 	Fuel tank and chemical storage operation, maintenance and leakage inspection, Storage area condition, availability of spill kit, inventory		Monthly	EHS Team	Project Company
Occupational Health and Safety	Within the project site	<ul style="list-style-type: none"> ✓ Develop an OHS management plan covering OHS management structure (including for contractors), monitoring and reporting of OHS performance, specific procedures and requirements as described (but not limited to) those listed below, incidents reporting and management procedure ✓ DSEPL will provide appropriate of treatment facilities on-site and through arrangements with the nearest hospital and pay compensation ✓ Emergency response policy of the contractor/ Project authority company should be developed and followed; 	Daily inspection on PPE usage Review of implementation records of specific		Daily for PPE usage Weekly inspection of transmission	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ Training on job-specific risks and regular reminders should be provided to the workers; ✓ All persons working on site will be provided information about risks on Site and arrangements will be made for workers to discuss health and safety with the Contractor which should be ensured by the DSEPL authority; ✓ DSEPL should will ensure that, the contractor is making the workers aware of health and safety risks and implementing mitigation requirements at the project site including training and daily briefing and monitoring; ✓ Necessary first aid facilities and staff (like Skin Cleaning Wipes, Cotton Gauze Pads, Pressure Bandage, Triangular Bandage, Wound Closure Strips, weight machine, sugar level machine Scissors, Tweezer, Cotton Ear Swabs, CPR Instructions, First Aid Guide and etc.) should be available at site; ✓ Before starting work all the appropriate safety equipment and the first-aid kit will be assembled and checked as being in working order; , ✓ All lifting equipment and cranes will be tested and inspected regularly. All hoist ways will be guarded; ✓ All scaffolds will be erected and inspected and the appropriate records maintained by the Contractor which should be ensured by the DSEPL authority; ✓ Safety hoops or cages will be provided for ladders with a height in excess of two meters; ✓ The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress which should be ensured by the DSEPL authority; ✓ Supervision of works shall be done regularly by contractors and DSEPL’s EHS team to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work; ✓ The workers should be provided with appropriate PPE (Personal Protective Equipment),) such as safety goggles, hard hats, safety gloves, metal plated shoes, high visibility vest and other necessities per identified OHS risks. List of required PPE is provided in Figure..... ✓ All the labors should follow the safety protocol (i.e., Physical distancing, Face coverings, Gloves, Goggles & Face Shields, Hand hygiene, Coughing/Sneezing hygiene, Personal disinfection, request for cleaning supplies and Face coverings to others) due to the Covid situation; ✓ Proper facilities of cool drinking water, short intervals during work, wearing loose and light color dresses can mitigate heat stroke to workers; ✓ Material Safety Data Sheets (MSDS) for each chemical used should be available and readily accessible at the facility; ✓ Train staff on how to prevent and manage emergency incidences as per the guidance provided in Chapter 12 and Disaster Management Plan; ✓ Use signage to warn staff about dangerous places. The signage must be visible and placed strategically; ✓ A near miss and accident reporting system will be followed and corrective measures shall be taken to avoid / minimize near miss incidents; ✓ Firefighting equipment should be available within the power plant area; ✓ Fire extinguishers should be kept near all storage area, labour camp area to extinguish the fire at its initial stage; ✓ Water hoses should be provisioned with long pipes; ✓ Arrangement of firefighting equipment’s with training to the staffs from workers to officers; ✓ Develop and implement specific work instructions for high risk activities including but not limited to, work at height, permit to work system on high risk activities, log-out tag-out (LOTO) system, electrical works and for construction of transmission tower for implementation by the construction contractor. 	<p>high-risk procedures (including photos)</p> <p>Inspection of transmission tower construction contractor safety performance against OHS plan</p> <p>Documented record of all incident, accident and its remedial process</p> <p>Proper fencing, isolation of site from general access, marked passage for workers and visitors, Internal Grievance,</p>		<p>tower construction safety</p> <p>Monthly for others</p>		

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
Sanitation Hazard and Drinking Water	Within the project site	<ul style="list-style-type: none"> ✓ Proper sanitation system with described septic tank and soak pits be provided to ensure sewage is disposed per applicable requirements; ✓ Adequate number of gender segregated toilets and bathrooms should be made for the workers. Standards range is 1 unit to 15 persons; ✓ Separate Male and female toilets should be isolated as per requirement available; ✓ DSEPL to provide and ensure that dDrinking water meets national/local and WHO drinking water standards; ✓ There should be arrangement of 4~5 liters per person per day potable water for all; 	<p>Drinking water quality against Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & WHO Drinking Water Guidelines</p> <p>Septic tank/wastewater disposal, outlet characteristics and sanitation facility to the workers</p>	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & WHO Drinking Water Guidelines	Quarterly	EHS Team	Project Company
Labor and Working Condition	Within the project site	<ul style="list-style-type: none"> ✓ The Contractor should maintain standard wage, wage deductions; hours of work; overtime arrangements and overtime compensation as per the ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006 which should be ensured by the DSEPL authority through contracts; ✓ DSEPL will provide appropriate treatment facilities on-site and through arrangements with the nearest hospital and pay compensation according to Bangladesh Labor Law 2006 which should be ensured by the DSEPL authority; ✓ Leave for illness, maternity, vacation, or holiday should also be maintained by the contractor which should be ensured by the DSEPL authority; ✓ Child labor and forced labor should strictly be avoided; ✓ Temporary labor camp should be made for labors following IFC and EBRD Guidance on Worker's Accommodation, ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006 2006; ✓ Discrimination between male and female labors should be prohibited by establishment of clear policy provisions on ant-discrimination; ✓ Establish internal (worker's) grievance mechanism which should be accessible to all project employees/ workers as well as those hired by the contractors/ subcontractors. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Social acceptability of Construction workers to the host communities	Within the project site	<ul style="list-style-type: none"> ✓ It is recommended to aware the foreign workers (if any) about the social & religious actability in the area so that they could maintain those when they are in touch with local community; ✓ Adequate training or awareness would be given to the migratory workers about local culture and behavior. So, there is no major problem raising in dealing with foreign or migratory worker. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Community Health and Safety	Around the project site	<ul style="list-style-type: none"> ✓ Water spraying on the access roads and at the construction sites would reduce dust emissions considerably; ✓ To reduce noise related impacts, night time movement of vehicles and construction activities will be restricted; ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) and should be followed to avoid accidents; ✓ Creating awareness among children, women, and old age people in particular and the community in general on traffic safety by using existing mediums such as school, women self-help groups, village union and religious occasions; <p>Proper fencing / boundary should be constructed should be done around the project site to control unauthorized access;</p>	<p>Site inspection of implementation of the described measures</p> <p>Review of community GRM records</p>		<p>Weekly site inspection</p> <p>Monthly on community GRM</p>	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ Construction camps equipped with proper sanitation facilities and regular pest control (i.e., to pest control for mosquitos or other insects for housing workers / labors); ✓ The contractor will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the DSEPL authority; ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 13; ✓ The Contractor should train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS which should be ensured by the DSEPL authority; ✓ All wastes should be properly handled and disposed to avoid any outbreak of disease 					
Employment Generation	In and around the project site	<ul style="list-style-type: none"> ✓ Prioritization of employment of skilled and non-skilled workers from the local communities; ✓ Priority given to local residents for both professional and nonprofessional positions; ✓ In order to increase the size of local employment, women should also be employed in the construction phase. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Increase in local business	In and around the project site	<ul style="list-style-type: none"> ✓ Service and materials for construction will be to the extent possible locally sourced; ✓ Local businessmen should be given priority in hiring supplying agent for food, vehicles, and other daily supplies; ✓ Encourage local people with small-scale business plans. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Operation Phase							
Air quality	Within the project site	<ul style="list-style-type: none"> ✓ Implementation of a regular watering and sprinkling for dust suppression; ✓ Covering of any aggregate or dusty material to reduce dust emissions; ✓ All vehicles of power plant should have updated fitness license; ✓ Fit vehicles with appropriate exhaust systems and emission control devices; ✓ Limit the idling time of vehicles not more than 2 minutes.; ✓ All the DG sets on site for emergency backup should be regularly checked and maintained for emission within guideline value. 	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5} at baseline monitoring locations	Air Pollution (Control) Rules 2022 (Schedule-1) & IFC EHS Guideline, 2007	Once in 6 months	3 rd party consultant	Project Company
Noise Hazard	Within the project site	<ul style="list-style-type: none"> ✓ All equipment and mechanical machineries shall have to be maintained in good working order; ✓ All the substation and transformer area should be acoustically designed; ✓ The project authority/Project company will have to optimize the plant layout in such way that the noise impact will be minimized; ✓ Project boundary wall should be more than man height; ✓ The green belt should be of at least 3.5 m width consisting two rows of plantation with the gradual increase of height of plant from inside row to outside row. 	Noise at baseline monitoring locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Once in 6 months	3 rd party consultant	Project Company
Impact on Soil Quality	Within the project site	<ul style="list-style-type: none"> ✓ Spill control and management procedures at site; ✓ Hazardous waste should be carefully handled and disposed off; following waste management plan; ✓ Sewage Treatment Plant (STP) should be installed for management of sewage waste so that it does not affect soil quality; ✓ Municipal solid waste generated from the project site will be transferred to the designated disposal site in consultation with the Union Parishad; ✓ Ensure proper disposal for chemical, electrical and hazardous materials to prevent accidental spillage according to the E-Waste Guideline 2021 and Solid Waste Management Guidelines 2021 by DoE, during maintenance work. 	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si at baseline monitoring locations	World Health Organization (WHO) (1996) Permissible Limits of Heavy Metals in Soil and Plants.	Once in 6 months	3 rd party consultant	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
Impact on Surface Water	Around the project site	<ul style="list-style-type: none"> ✓ No solid waste should be thrown in the adjacent surface water body; ✓ Surface drainage shall be controlled to divert surface runoff away from the project area; ✓ Hazardous waste should be carefully handled and disposed off to avoid surface runoff or mixing with waterbody; ✓ Strict supervision should be maintained to avoid blockage of natural creeks during the operation period; ✓ Sanitary waste should be treated and adequately disposed of in drainage system to avoid surface water contamination; ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m³/day to treat the sewage waste to avoid ground water contamination; ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site 	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate at baseline monitoring locations Visual: Maintaining proper drainage	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and IFC EHS Guideline, 2007	Once in 6 months	3 rd party consultant	Project Company
Impact on Ground Water	Within the project site	<ul style="list-style-type: none"> ✓ Minimize the extraction to be within permissible limits per approval by Zila office and proper management of ground water should be strictly followed; ✓ Storage of hazardous material and waste in proper manner and disposal of the waste at a designated location around the site; ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m³/day to treat the sewage waste to avoid ground water contamination; ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring. 	Drinking water: Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC at baseline monitoring locations Visual: Make an inventory of water usage (groundwater and rainwater) and wastewater discharge	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and IFC	Once in 3 months	3 rd party consultant	Project Company
Impact due to Solid Waste	Within the project site	<ul style="list-style-type: none"> ✓ All solid waste will be segregated properly as per the waste management plan; ✓ Waste segregation bins with color coding indicating degradable and non-degradable and recyclable waste will be installed at labor shed and work places to collect waste according to the waste management plan; ✓ Some solid waste has secondary demand (metals, scrap, e-waste and other recyclable materials) and they should be sold to the secondary dealers. Other solid wastes will be disposed to the designated solid waste dumping yard; ✓ Scattered throwing and burning of waste should be prohibited; ✓ The solid waste collector will be required to dispose the wastes regularly at an approved municipal solid waste disposal site to ensure that waste does not build up on site and result in aesthetic impacts or odors; ✓ The Project company should undertake waste segregation at source to separate hazardous from non-hazardous waste; ✓ All type of solid waste which will sold to secondary dealers or disposed to the disposal site should have proper movement register from the site for waste transfer.; ✓ 	Monthly inspection of waste collection and storage areas, review of waste inventory and monitor final disposal location		Monthly	EHS Team	Project Company
Traffic and Transportation	In and around the project site	<ul style="list-style-type: none"> ✓ Management to provide for adequate internal parking, for all vehicles coming to the plant premises; 	Incoming & outgoing traffic, traffic movement records		Once in 6 months	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ All users of said roads to always observe traffic rules this will give pedestrians and cyclist their space and safety while using the road; ✓ Restrict truck deliveries, where practicable, to day time working hours; (from 7.00 am to 7.00 pm); ✓ Restrict the transport of oversize loads; ✓ All vehicles should have updated fitness certificate and regularly checked for any kind of leakage; ✓ Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions; ✓ Enforce on-site speed limit, especially close to the sensitive receptors, schools, health centers, etc.; ✓ Marking of the roads, warning signs / lights, road signs to be clearly used 					
Sanitation Hazard & Drinking Water	Within the project site	<ul style="list-style-type: none"> ✓ Project personnel and workers will follow appropriate means of waste removal and sanitation measures; ✓ All the employees should follow the safety protocol (i.e., Physical distancing, Face coverings, Gloves, Goggles & Face Shields, Hand hygiene, Coughing/Sneezing hygiene, Personal disinfection, request for cleaning supplies and Face coverings to others) due to the Covid situation; ✓ Adequate number of toilets and bathrooms should be made for both malethe workers. Standards range is 1 unit to 15 persons; ✓ Separate Male and female workers willtoilets should be madeavailable; ✓ Sanitary waste should be treated and adequately disposed of in drainage system to avoid surface water contamination; ✓ A Sewage Treatment Plant (STP) should be installed and maintained of capacity 40 m3/day to treat the sewage waste per applicable local standards to avoid ground water contamination; ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site. ✓ Drinking water meets national/local or WHO drinking water standards; ✓ There should be arrangement of 4~5 litres per person per day potable water for all; ✓ Vector control and disinfection should be carried out throughout the living facility area. 	<p>Drinking water quality against Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007</p> <p>Sewage treatment plant output sampling against ECR 2023 (Schedule-3), WB EHS guidelines for treated sanitary sewage discharge once in 3 months</p>	<p>Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007</p> <p>ECR 2023 (Schedule-3), WB EHS guidelines for treated sanitary sewage discharge</p>	Quarterly	EHS Team	Project Company
Impact due to Hazardous Waste and leaching of PV pane	Within the project site	<ul style="list-style-type: none"> ✓ All hazardous waste will be stored in hazardous waste storage per waste management plan, with hard standing floor and roofing with bunding facility and secondary containment facility of 110% bigger than the allowable maximum storage capacity; ✓ An appropriate storage site should be provided for disassembled spare parts (e.g., motors and compressors) that contain oil or other types of fluids. They should be stored in containers that are secured that will not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system; ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types; ✓ Oil Sludge, spent lubricating oil will be sold only to the DoE approved vendors; ✓ Trained laborers with appropriate PPE should be appointed for unloading work; ✓ In case of any spillage, it should be immediately acted up on using spill kits. To combat spillage equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site; ✓ Regular inspections of machinery, equipment, pipe work, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring; ✓ Modules should not be carried by grasping the junction box or the cable; ✓ None should stand or walk on the modules; 	<p>Review hazardous waste inventoryFuel tank and chemical storage operation, maintenance and leakage inspection</p>		Monthly	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ Disassemble of the module or removing the nameplates should be avoided; ✓ Applying any kind of paint or adhesive on the module is prohibited; ✓ Damaging or scratching the back sheet of the module should be avoided; ✓ PV modules should be checked at a regular interval (once monthly) to avoid leaching; ✓ Damaged PV modules should be temporarily stored in the hazardous waste storage area and the Company will contact with licensed waste treatment agencies to collect and treat the panels as well as hazardous solid waste in compliance with national regulations. 					
Labor and Working Condition	Within the project site	<ul style="list-style-type: none"> ✓ The proponent Company will adopt and implement human resources policies and procedures as per the ILO Core Labour Standards Convention, IFC & EBRD Guidance and Bangladesh Labor Act, 2006; ✓ The proponent accommodation and management of the workers and officials should follow ILO Core Labour Standards Convention, IFC & EBRD Guidance and Bangladesh Labor Act, 2006 via the Labour Accommodation Management Plan; ✓ The Company will not make employment decisions based on personal characteristics unrelated to inherent job requirements; ✓ Proponent Project Company should maintain standard salary, salary deductions; hours of work; overtime arrangements and overtime compensation; ✓ Leave for illness, maternity, vacation, or holiday should also be maintained by the project authorityProject company; ✓ Child labor and forced labor should strictly be prohibited; ✓ Discrimination between male and female labor should be avoided; ✓ The proponent willCompany should not employ forced labor, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty.; ✓ Establish Internal (worker's) grievance mechanism which should be accessible to all project employees/workers hired by DSEPL and contractors and subcontractors if no alternative is available. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Occupational Health and Safety	Within the project site	<ul style="list-style-type: none"> ✓ Develop an OHS management plan covering OHS management structure, monitoring and reporting of OHS performance, specific procedures and requirements as described (but not limited to) those listed below, incidents reporting and management procedure ✓ The Company will provide appropriate treatment facilities on-site and have arrangements with the nearest local hospital and pay compensation according to ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006; ✓ Develop and implement specific work instructions for high risk activities including but not limited to, work at height, permit to work system on high risk activities, log-out tag-out (LOTO) system, electrical works ✓ The workers should wear PPE (Personal Protective Equipment), safety goggles, and other necessaries as per requirements; ✓ The abnormal records on the system side should be regularly checked thoroughly to make sure that there is no electrical leakage; ✓ Proper protective measures (insulated gloves, insulated shoes, etc.) should be taken to avoid direct contact with 30V or higher voltage to ensure personal safety. ✓ Provide adequate lighting in all workrooms; ✓ Material Safety Data Sheets (MSDS) for each chemical used should be available and readily accessible at the facility; 	Daily inspection on PPE usage Review of implementation records of specific high-risk procedures (including photos) Proper fencing, isolation of site from general access, marked passage for workers and visitors, Documented record of all incident, accident and its remedial process, OHS training records & orientation of workers for safety		Daily for PPE use Monthly for Others	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility		
						Implementation	Supervision	
		<ul style="list-style-type: none"> ✓ A safety manual for storage and handling of Hazardous chemicals will be prepared and implemented; ✓ Necessary first aid facilities (like Skin Cleaning Wipes, Cotton Gauze Pads, Pressure Bandage, Triangular Bandage, Wound Closure Strips, weight machine, sugar level machine Scissors, Tweezer, Cotton Ear Swabs, CPR Instructions, First Aid Guide and etc.) should be available at site; ✓ The staff will be trained for first-aid and firefighting procedures. The rescue team will support the first-aid and firefighting team; ✓ A first-aid center with the trained personnel (doctor and nurse) should be available; ✓ Train staff on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences; ✓ Use signage to warn staff and/ or visitors of dangerous places. The signage must be visible and placed strategically; ✓ Firefighting systems, such as sprinklers, portable extinguishers (appropriate to the flammable hazard in the area) and automated fire extinguishers will be provided at strategic locations with clear labelling of the extinguisher type; ✓ Firefighting system will be tested periodically; ✓ Develop emergency response plan including evacuation procedures to handle emergency situations; ✓ A near miss and accident reporting system will be followed and corrective measures shall be taken to avoid / minimize near miss incidents; ✓ Safety measures in the form of DO and Don't Do will be displayed at strategic locations; ✓ A Permit to enter the project area will be established to ensure that only authorized persons can entry to the site; <p>Proper facilities of cool drinking water, short intervals during work, wearing loose and light color dresses can mitigate heat stroke to workers;</p>						
Community and Safety	Health	Around the project site	<ul style="list-style-type: none"> ✓ Isolate local people from project area for safety purpose; ✓ Proper fencing /boundary work should be done around the project site to control the movement of local people; ✓ All users of said roads to always observe traffic rules this will give pedestrians and cyclist their space and safety while using the road; ✓ Marking of the roads to be clearly done; ✓ Speed limit and proper sign board should be provided along the said road; ✓ Creating awareness among children, women, and old age people in particular and the community in general on traffic safety by using existing mediums such as school, women self-help groups, village union and religious occasions; ✓ Implementation of a safety program (speed restrictions, lights on trucks, truck load restrictions etc.) and should be followed to avoid accidents; ✓ Kitchen waste and sanitary waste should be properly handled and disposed at designated area to avoid outbreak of diseases.; ✓ The community must be kept informed of emergency procedures and protocol in case of an accident in the plant and in case of increased emissions from the project operations; 	<p>Site inspection of implementation of the described measures</p> <p>Review of community GRM records</p>		<p>Weekly site inspection</p> <p>Monthly on community GRM</p>	EHS Team	Project Company

Issues/aspects	Location	Mitigation measures	Monitoring Parameters	Applicable Standards	Frequency of Monitoring	Responsibility	
						Implementation	Supervision
		<ul style="list-style-type: none"> ✓ The DSEPL EHS team should train all operation workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS which should be ensured by the DSEPL authority; ✓ The EHS team will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the DSEPL authority; ✓ Clear and visible danger and warning signs will be posted at designated areas to alert the community of the safety risks. In addition, transmission towers should be equipped with danger boards, barbed wire, and galvanized ground wire for earthing purposes; ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 13. 					
Impact on Terrestrial Habitat	In and around the project site	<ul style="list-style-type: none"> ✓ Anti-reflective coating on solar panels will be used to reduce the solar glare negative impact on flying birds; ✓ Lights of the power plant area should install downwardly to avoid disturbance to the wildlife and birds; ✓ Plantation of local species in surrounding areas of within the Project site; ✓ A greenbelt area should be developed along the project boundary; ✓ Awareness should be built to the workers in favor of conserving wildlife and no poaching is allowed; ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Replacing bright lighting at the sites with LED lights to avoid attracting insects and use of netting to exclude birds from the panel area; ✓ Proper installation of bird guards on the transmission line should be implemented to discourage birds from perching or nesting in unsafe locations and to prevent birds' wings to touch the line or the ground components. ✓ 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Impact on Aquatic Habitat	In and around the project site	<ul style="list-style-type: none"> ✓ Specific procedures and necessary preparedness to contain any accidental spill at source and also to prevent their spread in the surrounding environment; ✓ Site should be kept clean so as no pollutant from site should enter the water bodies along with run-off; ✓ Wastewater should not be disposed-off in the water bodies without proper treatment. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Social acceptability of workers to the host communities	In and around the project site	<ul style="list-style-type: none"> ✓ It is recommended to aware the foreign officials and workers (if any) about the social & religious actability in the area so that they could maintain those when they are in touch with local community; ✓ Adequate training or awareness would be given to the migratory workers about local culture and behavior. So, there is no major problem raising in dealing with foreign or migratory worker. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Employment Generation	In and around the project site	<ul style="list-style-type: none"> ✓ Encourage local and equitable employment; ✓ Salaries and other benefits based on qualification and experience; ✓ In order to increase the size of local employment, women should also be employed; ✓ Priority given to local residents for both professional and nonprofessional positions. 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company
Social and Economic enhancement around project area	National & local	<ul style="list-style-type: none"> ✓ Service and materials for construction will be to the extent possible locally sourced; ✓ Local businessmen should be given priority in hiring supplying agent for food, vehicles and other daily supplies; ✓ Encourage local people with small-scale business plans; ✓ Ensure uninterrupted electricity generation and supply . 	Implementation status of the mitigation measures		Quarterly	EHS Team	Project Company

7.4 Waste Management Plan

A waste management plan outlines how waste materials should be handled, collected, treated, and disposed of in an environmentally responsible and efficient manner. This waste management plan has been developed according to Solid Waste Management Rules, 2021, E-waste Management Rules, 2021 and World Bank Group's Environmental, Health, and Safety (EHS) Guidelines for Waste Management Facilities (2007) for both construction and operation phase.

In a broad sense, the solid waste of the project can be classified into three categories. They are:

- (i) Municipal Waste/Kitchen Waste/Office Waste
- (ii) Hazardous Waste
- (iii) E-Waste
- (iv) Construction waste

7.4.1 Municipal Waste/Kitchen Waste/Office Waste

(a) Segregation: Project management should implement a good house-keeping practice, such as, sorting and placing loose materials generated from different activities in the established areas away from common workspace, cleaning up excessive waste debris and oil from generator regularly, metal scraps and paint containers. The production of waste materials should be minimized by 3R (Reduce, Recycle and Reuse) approach. Suppliers should be requested to minimize packaging where practicable. All solid waste should be segregated properly in different colored bins. Refuse containers should be provided at each worksite. Wastes should be segregated into Biodegradable waste, Recyclable waste, and non-recyclable waste;

- **Biodegradable waste:** food waste, dry leaves, etc. for composting and reuse;
- **Recyclable waste:** paper, wood, cotton, reusable hardware, glass, metal scrap, etc.
- **Non-recyclable waste:** Polythene and plastics which cannot be treated for reuse.

Biodegradable	Green Container	
Recyclable	Yellow Container	
Other (Inorganic/Hazardous waste)	Red Container	

Difficult to dispose wastes (plastic and hazardous waste) should be minimized and where practicable and avoided such as plastic wastes. Potable water should be supplied in bulk containers to reduce the quantity of plastic waste (plastic bins). Plastic bag use should be avoided in kitchen and offices. All metals, scrap and other recyclable materials should be recycled to authorized dealers and records should be maintained. The waste should be finally collected and handed over a licensed/authorized (by DoE) waste handler.

(b) Storage: All sites should be maintained clean, tidy and safe and be provided and maintained with appropriate facilities as temporary storage of all wastes before transporting to final disposal. All wastes generated during construction should be disposed of in the designated disposal sites approved by the Project management. All type of solid waste which should be sold

or disposed to the disposal site should have proper movement register from the site for waste transfer.

- (c) Dumping:** Prior to the disposal sites reach their full capacity, all wastes should be transferred to the designated waste dumping yard of Upazila parishad. Vehicles transporting solid waste should be via an enclosed vehicle or should be fully covered with a tarp to prevent spilling waste along the route. All personnel in waste management practices and procedures should be trained and instructed as a component of the environmental induction process. Waste which could be sold or donated or recycled/reused by construction companies, local community groups or institutions should prioritise such opportunity. All type of solid waste which should be sold or disposed to the disposal site should have proper movement register and waste transfer challan.
- (d) Waste Inventory –** A waste inventory should be maintained to keep records of wastes being dumped, transferred or replaced from the project site. Amount of the wastes, dumping date with time, transferring or replacing date with time, type of waste, dumping truck number etc. should be recorded in the inventory.

EHS manager should be responsible to maintain this waste management plan in the project site with the coordination of workers, staffs and project management, and requires that construction contractor (including for transmission line) apply the same.

7.4.2 Hazardous Waste

- (a) Segregation:** Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types. Any damaged or unfit for use panels should be stored as hazardous waste prior to recycling or disposal as hazardous waste.
- (b) Storage:** An appropriate hazardous waste storage should be provided for all hazardous waste including waste PV panel, disassembled spare parts (e.g., motors and compressors) that contain oil or other types of fluids.
- (c) Dumping:** Skilled labourers should be appointed for unloading work. Oil sludge, spent lubricating oil should be sold only to the DoE approved vendors. All type of hazardous waste which should be sold or disposed to the disposal site should have proper movement register and waste transfer challan.
- (d) Waste Inventory:** A waste inventory should be maintained to keep records of wastes being dumped, transferred or replaced from the project site. Amount of the wastes, dumping date with time, transferring or replacing date with time, type of waste, dumping truck number etc. should be recorded in the inventory.

EHS manager should be responsible to implement the hazardous waste management plan in the project site with the coordination of workers, staffs and project management.

7.5 Hazardous Material Management Plan

All hazardous materials should be kept in a container which has facility of secondary containment. They should be stored in containers that are secured that should not allow oil and other fluids to escape with an impermeable surface and a sealed drainage system. In case of any spillage, it should be immediately acted up on using spill kits. To combat spillage equipment i.e. safety goggles, gloves,

PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site. MSDS should be maintained in both storage area and main office building so that every staff and workers should be aware of the material storage. An inventory should be maintained to record the amount of usage and newly stored material. EHS manager should be responsible to monitor the inventory once in a week.

7.6 Labour Management Plan

A labour management plan, also known as a workforce management plan, is a strategic approach that an organization employs to effectively manage its workforce. This plan outlines the strategies, policies, and practices that ensure the organization has the right number of employees with the right skills in the right place and at the right time to meet its operational needs and goals. The plan aims to optimize labour resources while ensuring employee satisfaction and compliance with labour laws and regulations.

This Labour Management Plan has been developed according to Bangladesh Labour Act, 2006 (Amended in 2013 and 2018), ILO Core Labour standards and IFC Performance Standard 2: Labour and Working Conditions, 2012 for all workers and labourers involved in main power plant and TL site.

7.6.1 Overview of Labour Involved in the Project

The LMP applies to all Project workers whether full-time, part-time, temporary, seasonal or migrant workers. The LMP is applicable to the Project in the following manner:

- Direct Workers: People employed or engaged directly by the Project Implementation Unit (PIU) on its behalf to work specifically in relation to the Project;
- Contracted Workers: People employed or engaged by contractors to perform work related to core function i.e. construction of buildings, driving piles, installing PV panels, etc. for the project, regardless of location;

The project will engage primary suppliers, skilled and unskilled labor (local and international), security forces. However, in case of workers are engaged, it should be ensured that no child and/or force labor are engaged and OHS plan for the labors should be followed.

7.6.4 Policies and Procedures

This section outlines main policies and procedures to be followed during the implementation of the project.

As specified in the Bangladesh Labour Act, 2006 and ILO Core Labour standards the employment of project workers will be based on the principles of non-discrimination and equal opportunity. There will be no discrimination with respect to any aspects of the employment relationship, such as recruitment, compensation, working conditions and terms of employment, access to training, promotion or termination of employment. The following measures will be developed by the contractors and monitored by PIU to ensure fair treatment of all employees:

- As per Labour Code requirements, recruitment procedures will be transparent, public and non-discriminatory with respect to ethnicity, religion, disability, gender, and other grounds included in the Labour Code
- Applications for employment will be considered in accordance with the application procedures established by the Contractor
- Labour will be preferentially recruited from the local areas
- The contracted workers will not pay any hiring fees. If any hiring fees are to be incurred, these will be paid by the Contractor
- The labour contracts will be developed in Bangla so as to be understandable by all workers
- In addition to written documentation, an oral explanation of conditions and terms of employment will be provided to workers who may have difficulties with understanding the documentation
- While communicating with women workers, it is to be ensured that they understand their rights and process of raising issues and grievances related to their employment

7.6.4.1 Age of Employment

In the Bangladesh Labor Act, 2006, Section 34, it is mentioned that no child shall be employed to work in any occupation. Section 44 mentions that anyone under age 14 is considered as child and under 18 but over 14 is considered as adolescent. World Bank strictly prohibits child labor and clearly mentioned that the minimum age of 18 years is required for anyone to get employment in such works. Section 37 of the act suggests a fitness certificate required for adolescents to get employed and they can be appointed to do the light works.

According to the World Bank standards and guidelines, the minimum age of employment for this project shall be 18 years (given the potential hazardous situation posed by COVID-19) and to ensure compliance, all employees will be required to produce National Identification Cards as proof of their identity and age which is the national identification document required for employment.

If any contractor employs a person under the age of 18 years, measures to address the same will be taken by the PIU.

7.6.4.2 Working Hours

- No adult worker should ordinarily be required or allowed to work in a workplace for more than eight hours in any day.
- No adult worker should ordinarily be required or allowed to work in a workplace for more than forty-eight hours in any week. Provided that the total hours of work of an adult worker shall not exceed sixty hours in any week and on the average fifty-six hours per week in any year.
- Any worker in any workplace should not be liable to work either-
 - for more than six hours in any day unless he has been allowed an interval of at least one hour during that day for rest or meal;
 - for more than five hours in any one day unless he has been allowed an interval of at least half an hour during that day for rest or meal; or

- for more than eight hours unless he has had an interval under clause (a) or two such intervals under clause (b) during that day for rest or meal.
- No women should, without her consent, be allowed to work in a site between the hours of 10.00 PM and 6.00 AM.

7.6.4.3 Time of Payment of Wages

- The wages of every worker should be paid before the expiry of the seventh day after the last day of the wage period in respect of which the wages are payable.

7.6.4.4 Extra-allowance for overtime

- Where a worker works in a workplace on any day or week for more than the hours fixed under this Plan, he should, in respect of overtime work, be entitled to allowance at the rate of twice his ordinary rate of basic wage and dearness allowance and ad-hoc or interim pay, if any.

7.6.4.5 Shelter and Rooms for Child

- In every workplace wherein more than fifty workers are ordinarily employed, adequate and suitable shelters or rest rooms, and a suitable lunch room, with provision for drinking water, where workers can eat meals brought by them, should be provided and maintained for the use of the workers.
- In the workplaces wherein more than 25 female workers are employed, separate shelter rooms are to be maintained and in site wherein less than 25 female workers are employed, separate and adequate spaces with screen should be provided.
- In every workplace, wherein forty or more workers are ordinarily employed, there should be provided and maintained a suitable room or rooms for the use of children under the age of six years of such women.

7.6.4.6 Drinking Water Facilities

- In every workplace effective arrangement should be made to provide and maintain at a suitable point conveniently situated for all workers employed therein, a sufficient supply of wholesome drinking water;
- In every workplace wherein two hundred fifty or more workers are ordinarily employed, provision should be made for cooling the drinking water during the hot weather by effective means and for distribution thereof;
- In every workplace, there should be provision of 80-180 liter per capita per day for potable use.

7.6.4.7 Latrines and Urinals

During construction and operation phase, every establishment should have-

- Conveniently situated and accessible sufficient latrines and urinals at the ratio of 1:15 should be provided to workers at all times while they are in the workplace;

- such latrines and urinals should be provided separately for male and female workers;
- such latrines and urinals should be adequately lighted and ventilated.

7.6.4.8 Dust and Fume

- Effective measures should be taken to prevent its accumulation in any work-room and its inhalation by workers, and if any exhaust appliance is necessary for this purpose, it should be applied as near as possible to the point of origin of the dust, fume or other impurity, and such point shall be enclosed so far as possible.

7.6.4.9 First-Aid Appliances

- In every workplace there should be provided and maintained first-aid appliances, so as to be readily accessible during all working hours first-aid boxes or cupboards equipped with the contents prescribed by rules.
- Every first-aid box or cupboard should be kept in charge of a responsible person who is trained in first-aid treatment and who should always be available during the working hours of the workplace site.
- In every workplace wherein three hundred or more workers are ordinarily employed, there should be provided and maintained a sick room with dispensary of the prescribed size, containing the prescribed equipment or similar facilities, in the charge of such medical and nursing staff as may be prescribed.

7.6.4.10 Right to, and liability for, payment of maternity benefit

- Every woman employed in a workplace site shall be entitled to and her employer shall be liable for, the payment of maternity benefit in respect of the period of eight weeks preceding the expected day of her delivery and eight weeks immediately following the day of her delivery.

7.6.6 Grievance Redress Mechanism

An internal grievance redress mechanism should be formed to resolve workers' and staffs' complaints or problems regarding the workplace or any other issues. A complaint box should be set near the working site, where workers' can provide their grievances in written format. A two-tier project-specific Grievance Redress Mechanism (GRM) should be established. The first tier is the grass-roots level mechanism. At this level, the grievances are reported to GR & CSR Manager and EHS Manager. If the issue/s cannot be resolved by the GR & CSR Manager and EHS Manager within 7 days, they will be brought to second tier which is grievance redress committee (GRC) at Dynamic Sun Energy Pvt. Ltd. established committee for potential resolution. This internal grievance redress committee will consult properly with workers and staffs to ensure issues are managed in an amicable way. Any grievance should be addressed and resolved within the shortest possible time to avoid unrest in workplace among workers and staffs. Details provided in Chapter 12.

7.6.7 Contractor's Responsibility

The below mentioned clauses are incorporated in all the agreements made with several contractors for labor management by DSEPL:

- All workmanship must be of good standard and acceptable to Engineer-in-Charge. All workers employed must of the best skilled level. Any below standard workers will be expelled from the site;
- Contractor must run his works in full swing. No plea, no argument whatsoever will be entertained/allowed in this case;
- If personal injury is caused to a worker by accident arising out of and in the course of his employment, his contractor should be liable to pay compensation in accordance with the provisions;
- DSEPL has a zero tolerance policy for not employing child labour and force labour for its own business as well as all of its contractors and subcontractors;
- Contractor must ensure that he or his workers do not involve themselves in any kinds of antisocial activities.

7.7 Labour Accommodation Management Plan

A Labour Accommodation Management Plan (LAMP) is a strategic document or framework that outlines the management and maintenance practices for accommodations provided to labourers, workers, or employees by companies, especially those engaged in construction, industrial, or other labour-intensive sectors.

The primary goal of a Labour Accommodation Management Plan is to ensure the well-being, safety, and overall living conditions of the labour force. This Labour Accommodation Management Plan has been developed according to Bangladesh Labour Act, 2006 (Amended in 2018) and IFC & EBRD Guidance Note on Workers' Accommodation: Processes and Standards (2009).

(a) General Living Facilities

- The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards.

(b) Room/Dormitory Facilities

- 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 meters (volume) or 4 to 5.5 square meters (surface).
- A minimum ceiling height of 2.10 meters should be provided.
- In collective rooms, which are minimized, in order to provide workers with some privacy, only a reasonable number of workers should be allowed to share the same room. Standards range from 2 to 8 workers.
- Every resident should be provided with adequate furniture such as a table, a chair, a mirror and a bedside light.

- Separate sleeping areas should be provided for men and women, except in family accommodation.
- Sanitary facilities should be located within the same buildings and provided separately for men and women.
- It is the responsibility of the EHS manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

(c) Bed Arrangements and Storage Facilities

- Each worker should be provided with a comfortable mattress, pillow, cover and clean bedding. There should be a minimum space between beds of 1 meter.
- Double and triple deck bunks are not advisable for fire safety and hygiene reasons, and their use should be 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 meters.
- Facilities for the storage of personal belongings for workers should be provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 meter of shelf unit.
- Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.

(d) Heating, Air-Circulation, Ventilation and Light

- For facilities located in hot weather zones, adequate ventilation and/or air circulation systems should be provided.
- Both natural and artificial lighting should 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.

(e) Toilet Facilities

- An adequate number of toilets should be 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.
- Toilet facilities should be conveniently located and easily accessible. Standards range from 30 to 60 meters from rooms/dormitories.
- Toilet rooms should 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 dormitories.

(f) Showers/Bathrooms and Other Sanitary Facilities

- An adequate number of shower/bathroom facilities should be provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.

- An adequate number of hand wash facilities should be provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Hand wash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
- Shower/bathroom facilities should be provided with an adequate supply of cold and hot running water.
- The flooring for shower facilities should be of hard washable materials, damp-proof and properly drained. Shower/bathroom flooring is made of anti-slip hard washable materials.

(g) Canteen, Cooking and Laundry Facilities

- Canteen, cooking and laundry facilities should be built in adequate and easy to clean materials.
- There should be at least one canteen for every one hundred workers nearby the site.
- Kitchen should be kept neat and clean with sufficient cooking facilities and ventilation.
- Adequate facilities for washing and drying clothes should be provided.

(h) Drainage

- The labour accommodation area should have adequate drainage facilities to avoid the accumulation of stagnant water.

(i) Rooms for Children

- In every establishment, wherein forty or more workers are ordinarily employed, there should be a suitable room or rooms for the use of children under the age of six years of such women.

(j) Water Facilities

- An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet ECR, 2023 and WHO drinking water standards.
- Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day should be available.
- Drinking water quality should be regularly monitored.

(k) Wastewater and Solid Waste

- Wastewater, sewage, food and any other waste materials should be adequately discharged, in compliance with local or World Bank standards – whichever is more stringent.
- Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers should be protected from insects and rodents.
- It is best practice to locate rubbish containers 30 meters 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 odours associated with decaying organic materials.

- Pest extermination, vector control and disinfection should be carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

(l) Cleanliness

- The labour accommodation area should be cleared in the morning every day.
- If the area remains dirty for three consecutive days, EHS manager should be informed immediately.

(m) Communicable Disease Management

- The prevention and control of communicable diseases should be accomplished by proper sanitation, safe water and food supply, isolation, vaccination and immunization.
- If any personnel get affected with communicable disease, proper treatment should be provided in isolated room far from the accommodation area. Source of the disease should be found out by a medical investigation team to terminate the spread out.

7.8 Occupational Health and Safety Plan

An Occupational Health and Safety (OHS) plan outlines procedures for ensuring the health, safety, and well-being of its employees, visitors, contractors, and anyone else who may be affected by its operations. The primary goal of an OHS plan is to prevent workplace accidents, injuries, illnesses, and potential hazards. Such a plan is essential for maintaining a safe and productive work environment while complying with legal and regulatory requirements. This OHS Plan has been developed according to National Occupational Health and Safety Policy, 2013 and World Bank Group's General Environmental, Health, and Safety (EHS) Guidelines, 2007.

7.8.1 Personal Protective Equipment (PPE)

The purpose of personal protective equipment (PPE) is to provide an effective barrier between a worker and potentially dangerous objects, substances, and processes. GPL will ensure all personnel have the right PPE while performing the job.

7.8.1.1 Basic Personal Protective Equipment

At a minimum, basic PPE for all workers involved in project activities (whether they are employed by DSEPL or contractors) must include:

- Hard hat;
- Safety Glasses;
- High vis vests;
- Gloves (applicable to task); and
- Safety footwear.

Supervisor of each work task should ensure suitable PPE for each task is worn at all times, and DSEPL EHS team will conduct site inspection to ensure PPE is worn.

Note: All personal protective equipment must meet the applicable standard as defined by legislation and policy.

7.8.1.2 Inspection Defective/Damaged PPE

Workers must inspect PPE prior to use to verify it is fit for use. Defective or damaged PPE must be immediately removed from use. All PPEs removed from service will be tagged as out of service.

7.8.1.3 Selecting Personal Protective Equipment

PPE will be selected based on the following information:

- Hazard assessments;
- Material safety data sheet (MSDS);
- Legislative jurisdictional and ADB SPS requirements

7.8.1.4 Mandatory Full Time PPE Requirements

❖ Head Protection

- Personnel should wear hard hats that are in good condition and meet legislative jurisdictional requirements and standards.
- Only head apparel designed to be worn under a hard hat should be allowed.
- Hardhats are required while welding. They are to be fitted with the appropriate shield
- Eye and Face Protection
- All personnel must wear properly fitting eye and face protection commensurate with PCL policy on active work sites.
- Face and eye protection should be kept clean and in good repair.
- If a worker cannot wear safety glasses, as documented by a physician's note, alternate arrangements must be made to verify the individual's face and eyes are protected.
- All components of prescription glasses that are being used for eye protection must meet approved applicable regulatory standards.
- The prescription glasses will include side-shields that must meet the applicable regulatory standards.
- Coverall glasses or goggles shall be required for prescription glasses that do not meet the standard.
- Face shields are required when grinding/cutting steel, concrete, chemical use.
- When using a face shield, safety glasses are also required under the face shield.

❖ Hand Protection

- All personnel must have appropriate gloves available for their task on their persons.
- Gloves should be worn when conducting work activities with hazards that may cause injury to hands.

❖ Foot Protection

- All personnel on a work site must wear safety footwear.
- The minimum is a CSA approved, Grade one (green triangle), 6" high cut boot appropriate to the task.
- No running shoes of any kind are permitted on work sites.

- Safety footwear must be in good repair. It is the responsibility of the supervisor to verify that their footwear is in proper working condition.

- ❖ **High Visibility Vests**
 - High visibility apparel should be worn whenever worker and mobile equipment are working in a common area.

- ❖ **Hearing Protection**
 - Personnel should receive an overview of hearing protection requirements during the project orientation.
 - The training should include identification of any hearing protection required areas, the hazards associated with noise exposure, and the purpose, use, maintenance, and limitations of the protective equipment provided on site.
 - Personnel should not be exposed to noise in excess of the occupational exposure limits (OEL) listed below: 85 dBA Lex daily noise exposure level; 140 dBC peak sound level.

- ❖ **Limb and Body Protection**
 - Where there is risk of injury to a worker's limb and/or body, adequate limb and body protection must be worn and equipment designed to protect employees from injury to their limbs and body must be used (i.e. chainsaw chaps).
 - Where there is risk of injury due to congested work area and/or the movement of heavy equipment in and/or around the work area, all employees must wear high visibility apparel. When work is being done in extreme hot or cold temperatures, the protective clothing being worn must be reviewed to verify that it is adequate.
 - Personnel must be informed of any special precautions that need to be taken or special protective clothing that needs to be worn. At a minimum a 4-inch sleeve is required (no tank tops / muscle shirts are permitted).

- ❖ **Fire Retardant Clothing**
 - Fire retardant clothing (FRC) must be used where there is risk of fire (i.e., welding) or explosion, legislative requirements dictate, or client requirements dictate.
 - Where FRC is required, the outer layer of worker's clothes, including rain gear, must be made of fire retardant material.

- ❖ **Clothing and Jewelry**

For personal protection and to limit the spread of construction related contaminants throughout the facility, workers will not be permitted to wear:

 - loose fitting clothing or jewelry
 - greasy or oily clothing;
 - torn or ragged clothing;
 - cut-off or "muscle" shirts (4" sleeve shirt is the minimum sleeve length allowed);
or
 - short pants

Work site personnel wearing shirts, other clothing and stickers displaying any offensive language or opinion will be asked to remove the offensive material or leave the site immediately.

7.8.2 Internal Grievance Redress Mechanism

An internal grievance redress mechanism should be formed to resolve workers' and staffs' complaints or problems regarding the workplace or any other issues. A complain box should be set near the working site, where workers' can provide their grievances in written format. This internal grievance redress committee will consult properly with workers and staffs to ensure issues are managed in an amicable way. The committee should be comprised of 4 members including Dynamic Sun Energy Pvt. Ltd. Director (convener), Plant manager, EHS Manager, member from contractor, and Grievance Redress (GR) & Corporate Social Responsibility (CSR) Manager. Any grievance should be addressed and resolved within the shortest possible time to avoid unrest in workplace among workers and staffs.

7.8.3 Document and Record Management

- EHS Manager is responsible for all the project E&S documentation and records, authorizing, issuing and maintaining these documents. The EHS Manager should also be responsible for coordinating function and local documentation to minimize repetition.
- All documentation should be controlled documents, and will be given a unique reference number;
- All controlled documentation should contain the following:
 - A creation date;
 - A revision date and number;
 - A unique reference number;
 - A title describing the document.
- Details of accident or incident, or near-miss should be properly recorded and their mitigations followed-up;
- Details of defective machines and equipment should be recorded with date of installation, date of commissioning, duration of performance, date of failure, duration of absence, reinstallation and recommissioning date, manufacturing company, supplier/dealer contact information should be recorded;
- Installation of new machines and equipment should be recorded;
- Details of construction materials with proper amount and supplier details should be recorded;
- Performance report of health and safety equipment should be checked and recorded twice in every month;
- A near miss and accident reporting system will be followed and corrective measures should be taken to avoid / minimize near miss incidents;
- All the reports and record files should be reviewed twice in a year by the project management.

7.8.4 Working at Heights

- Suitable, stable and strong enough equipment should be used for the job which should be maintained and checked regularly;
- Precautions should be taken when working on or near fragile surfaces;

- Protection should provided from falling objects;
- A ladder should not be rest against weak upper surfaces, for example glazing or plastic gutters;
- For strenuous or heavy tasks, ladders or stepladders should be used but maximum of 30 minutes at a time;
- Incompetent person (who doesn't have the skills, knowledge and experience to do the job) should not be involved in this type of tasks;
- Overreach on ladders or stepladders should be prohibited.

7.8.5 Electrical Works

- Energized electrical circuits should be avoided from contacts;
- All electrical devices should be treated as if they are lived or energized;
- The power source should be disconnected before servicing or repairing electrical equipment;
- Only tools and equipment with non-conducting handles should be used when working on electrical devices;
- Metallic pencils or rulers should not be used while dealing with electrical equipment;
- Rings or metal watchbands should not be worn during electrical works;
- When it is necessary to handle equipment that is plugged in, hands should be dry and nonconductive gloves, protective clothes and shoes with insulated shoes should be worn;
- If water or a chemical is spilled onto equipment, power should be shut off at the main switch or circuit breaker and the equipment should be unplugged as soon as possible;
- If an individual comes in contact with a live electrical conductor, the equipment, cord or the person should not be touched. The power source should be disconnected from the circuit breaker or the plug should be pulled out using a leather belt;
- Equipment producing a "tingle" should be disconnected and reported promptly for repair.
- A defective circuit should not be attempted to correct by interstation of another fuse or breaker, particularly one of larger capacity;
- Capacitors should be drained before working near them and the short circuit should be kept on the terminals during the work to prevent electrical shock;
- Another person's equipment or electrical control devices should not be touched unless instructed to do so;
- All electric contacts and conductors should be enclosed so that no one can accidentally encounter them;
- Electrical equipment should never be handled when hands, feet, or body are wet or perspiring, or when standing on a wet floor;
- When it is necessary to touch electrical equipment (for example, when checking for overheated motors), the back of the hand should be used. Thus, if accidental shock were to cause muscular contraction, none would freeze to the conductor;
- Highly flammable liquids should not be stored near electrical equipment;

7.8.6 PV Panel Cleaning

- Cleaners should brush any loose dirt off before spraying them with water which will make the squeegeeing process quicker and easier;
- Panels should be cleaned twice in a month;

- Exposure to sun and direct heat should be avoided while panel cleaning. Dawn and dusk period is considered to be the best time of panel cleaning.
- Workers cleaning panel should adhere to the working at height procedures

7.8.7 Medical/First Aid Facilities

- Workers and staffs should have access to medical/first aid facilities within the project site;
- Doctors and nurses should be available 24/7 at the medical center;
- A standby ambulance should be maintained during working period;
- Nearby hospitals should be communicated to get rapid and proper assistance from that side in case of any kind of occurrence and incident;
- Bed facilities at the site should be available to take proper treatments;
- Common medicines should be made available in the medical center;
- Necessary first aid facilities (like Skin Cleaning Wipes, Cotton Gauze Pads, Pressure Bandage, Triangular Bandage, Wound Closure Strips, weight machine, sugar level machine Scissors, Tweezer, Cotton Ear Swabs, CPR Instructions, First Aid Guide and etc.) should be available at site;
- Health Care Card should be issued to all the workers and staffs for availing free-health check-up once in a month and other facilities;
- In case of emergencies, medical staffs should move to the incident place for treatment and rescue operation;
- Details of each patient with provided treatment and medicine list should be recorded in the medical center and reviewed by the EHS manager or Assistant EHS manager once in a month.
- At least 5 qualified first aiders should be maintained on site

7.8.8 Workmanship and Health related issues

7.8.8.1 Over-exertion

Over-exertion, ergonomic injuries and illnesses, such as repetitive motion and manual handling, are among the most common causes of injuries in construction and decommissioning sites.

- Trainings should be providing to workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Tools and workstation should be selected and designed to reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Administrative controls should be implemented into work processes, such as job rotations and rest or stretch breaks.

7.8.8.2 Slip and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes

on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites.

- Good house-keeping practices should be implemented, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths;
- Excessive waste like debris and liquid spills should be cleaned up regularly;
- Electrical cords and ropes should be located in common areas and marked corridors;
- Slip retardant footwear should be used.

7.8.8.3 Work in Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction or decommissioning sites. If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard.

- Trainings should be provided regarding the use of temporary fall prevention devices, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface;
- Trainings should be provided regarding the use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards as well as fall rescue procedures to deal with workers whose fall has been successfully arrested;
- Control zones and safety monitoring systems should be used to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces.

7.8.8.4 Struck by Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities.

- A designated and restricted waste drop or discharge zone should be used for safe movement of wastes from upper to lower levels;
- Sawing, cutting, grinding, sanding, chipping should be conducted with proper guards and anchoring as applicable;
- Clear traffic ways should be maintained to avoid driving of heavy equipment over loose scrap;
- Temporary fall protection measures should be used in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged.

7.8.8.5 Moving Machineries

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle.

- The location of vehicle traffic, machine operation, and walking areas should be planned and segregated;
- Vehicle traffic should be controlled through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- The visibility of personnel should be ensured through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle;
- Inspected and well-maintained lifting devices should be used which are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

7.8.8.6 Training

- Job-specific trainings should be provided to workers and staffs;
- When new machineries are introduced, workers should be aware of it's details;
- Workers and staffs should be aware of emergency management plan of their workplace;
- Workers and staffs should be able to handle any adverse situation which may occur;
- They should be well-known and trained about fire extinguishing process, rescue plan and communication matrix.

7.8.8.7 Proper Signage and Safety

- Safety measures in the form of DO and Don't Do will be displayed at strategic locations;
- Firefighting equipment should be available within the power plant area;
- Fire extinguishers should be kept near all storage area, labour camp area to extinguish the fire at its initial stage;
- Water hoses should be provisioned with long pipes;
- Arrangement of firefighting equipment's with training to the staffs from workers to officers;
- Supervision of works should be done regularly by contractors and DSEPL's EHS team to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work;

7.8.9 Security

- Proper fencing and/or physical barriers should be provided to keep the general public off the site and to keep materials and equipment inside the site;
- Entrance and exit points should be closed when not in use and opened only when required for specific deliveries or other authorized entries.
- Walkway areas and workplace areas should be illuminated to an adequate degree of brightness. For safe access & egress, each site should have specific identified emergency route lighting which will automatically initiate when there is an electrical power loss.
- All visitors must report to the project office prior to going on site and be provided with an escort. All visitors should be required to sign in and out at the project area.
- Any personnel and sub-contractors/trade contractors that return to the project after hours or on weekends must be authorized to do so by the project superintendent or operations designate.

- Only authorized vehicles should be allowed on site

7.9 Green Belt Development

In the surrounding areas, trees of specific species can reduce the pollution as well as can provide enhanced oxygen for the surrounding area. Suitable plant species for green belt development is presented in **Table 7.2**

Table 7.2: Suitable plant Species for "Green Belt Development"

Sl No.	Name of the Plant	Name in Bangla	Type	Function
1.	Australian Wattle	আকাশমণি	Tree	Reduces Particulate Matter
2.	Bael tree	বেলগাছ	Tree	Reduces Particulate Matter
3.	The Siris Tree	শিরিষগাছ	Tree	Reduces Particulate Matter
4.	White Siris	করই	Tree	Reduces Particulate Matter
5.	Sugar Apple	আতাগাছ	Tree	Reduces Particulate Matter
6.	Kadam	কদম	Tree	Reduces Particulate Matter
7.	Nim	নিম	Tree	Reduces Particulate Matter
8.	Bamboo	বাঁশ	Tree	Reduces Particulate Matter
9.	Australian Whistling Pine	বাউ	Tree	Reduces Particulate Matter
10.	Rangan	রঙ্গুন	Shrub	Noise Attenuation
11.	Kamini	কামিনী	Shrub	Noise Attenuation
12.	Karabi	করবি	Shrub	Noise Attenuation
13.	Guava tree	পেয়ারা	Shrub	Noise Attenuation
14.	Tagar	টগর	Shrub	Noise Attenuation
15.	Mastered Green	সরিষা	Forb/Herb	NO _x Absorption

According to the layout of the project site there will be green area of 4.2 acres of the total project area. During operation phase, proponent intends to cultivate local crops to enhance the land use which will also add to green coverage of the project area. After starting the crop cultivation activity, total coverage of greenery will become more.

7.10 3R (Reduce, Reuse, Recycle) Plan

Minimizing the use of resources in the manufacture, distribution and use of products consumed by factories with maximum reuse, recycling and recovery has embodied as a concept of 3Rs (Reduce, Reuse and Recycle). In recent days, the 3Rs principle has started to gain more attention due to the depletion of natural resources and increase of pollution level in the environment.

Only domestic and sanitary waste water will be generated from the project site during operation phase. DSEPL has installed septic tank and soak well for domestic and sanitary waste water for construction period. DSEPL will install STP for sewage treatment during operation phase. The project proponent is going to install 7 rain water harvesting ponds to minimize the usage of ground water. Capacity of each rainwater harvesting pond will be 3250 m³. They will reserve 22,750 m³ of water for

PV panel cleaning. There will be no other chemical in the washing water and will be collected to reuse in plantation and cropping purpose. To optimize the use of electricity, they will use LED lights. Other than this, the project already committed to make no liquid discharge from the process and implement zero liquid discharge.

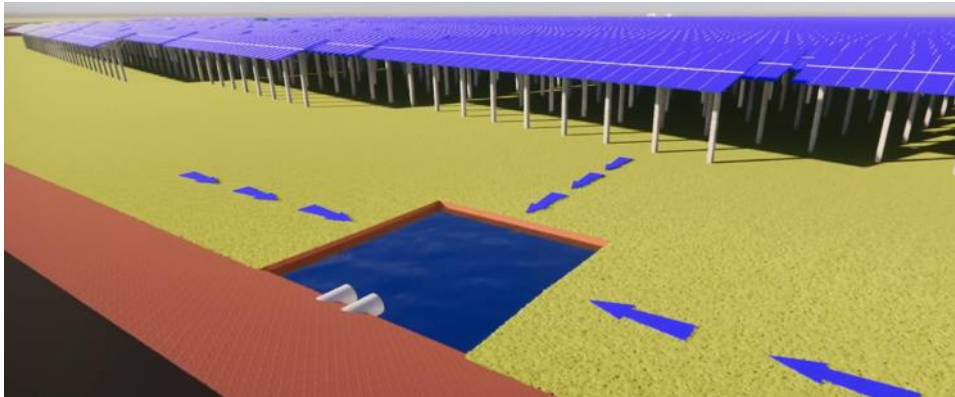


Figure 7.1: Proposed Rainwater Harvesting Pond

7.11 Corporate Social Responsibility (CSR)

Corporate Social Responsibility (CSR) activities have significant implications for a company's internal and external stakeholders, including nearby communities, civil society organizations, regulators, international financial organizations, NGOs and news media. Local people have the concern about corporate accountability and the impact of corporate strategies and operations on the physical, economic, and socio-political environments.

The Project company under "Corporate Social Responsibility (CSR)" to improve the quality of life of the local community will take some initiatives as mentioned below:

- Project company will donate to local schools, colleges, mosques, madrasas and temples.
- Providing financial assistance in technical education and scholarships to meritorious students of local educational institutions.
- Assist to arrange regular free health check-up camps in collaboration with local NGOs and hospitals.
- Support for installation of deep tube wells at important places in surrounding areas for clean drinking water. Technical training will be imparted to the local youth.
- Farming of cash crops will be arranged on vacant land under solar panels and local men and women will be employed in farming activities.
- The Project company will co-ordinate with the relevant government officials in maintenance work of the surrounding roads connected to the project site; Service and materials for construction will be to the extent possible locally sourced;
- Local businessmen should be given priority in hiring supplying agent for food, vehicles and other daily supplies.

7.12 ESMP Implementation Team

For proper implementation of the ESMP, there should be a core group of people in the power plant who should be well trained on environmental issues but all personnel at site should be given basic training on environmental and health & safety. The skills of staff should be refreshed and upgraded periodically through need-based training program. There will be separate team for construction and operation phase. Both teams are shown in **Figure 7.2** and **7.3** The responsibility of the ESMP implementation team is presented in the **Table 7.3** below.

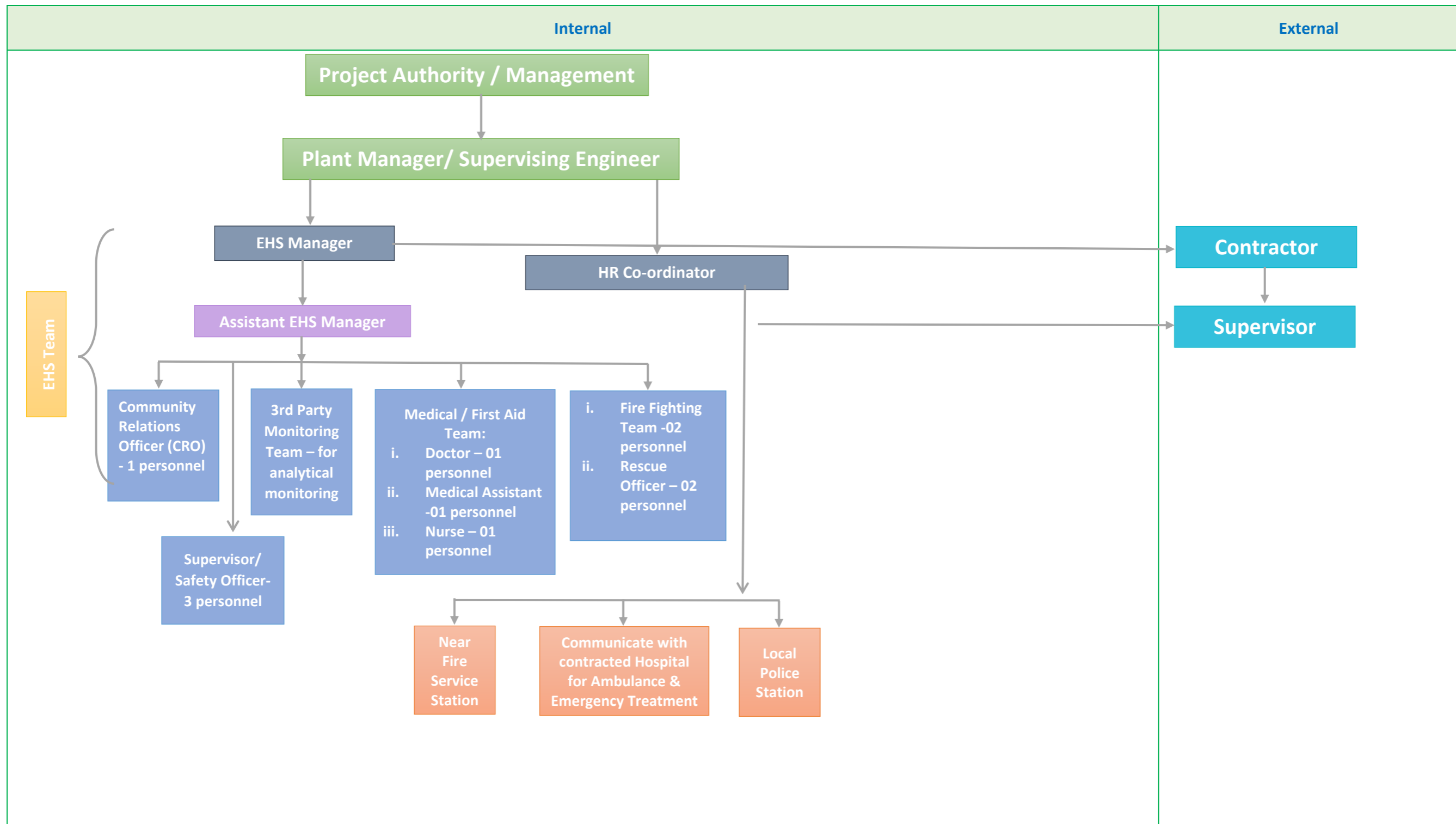


Figure 7.2: EMP Implementation Team (Construction Phase)

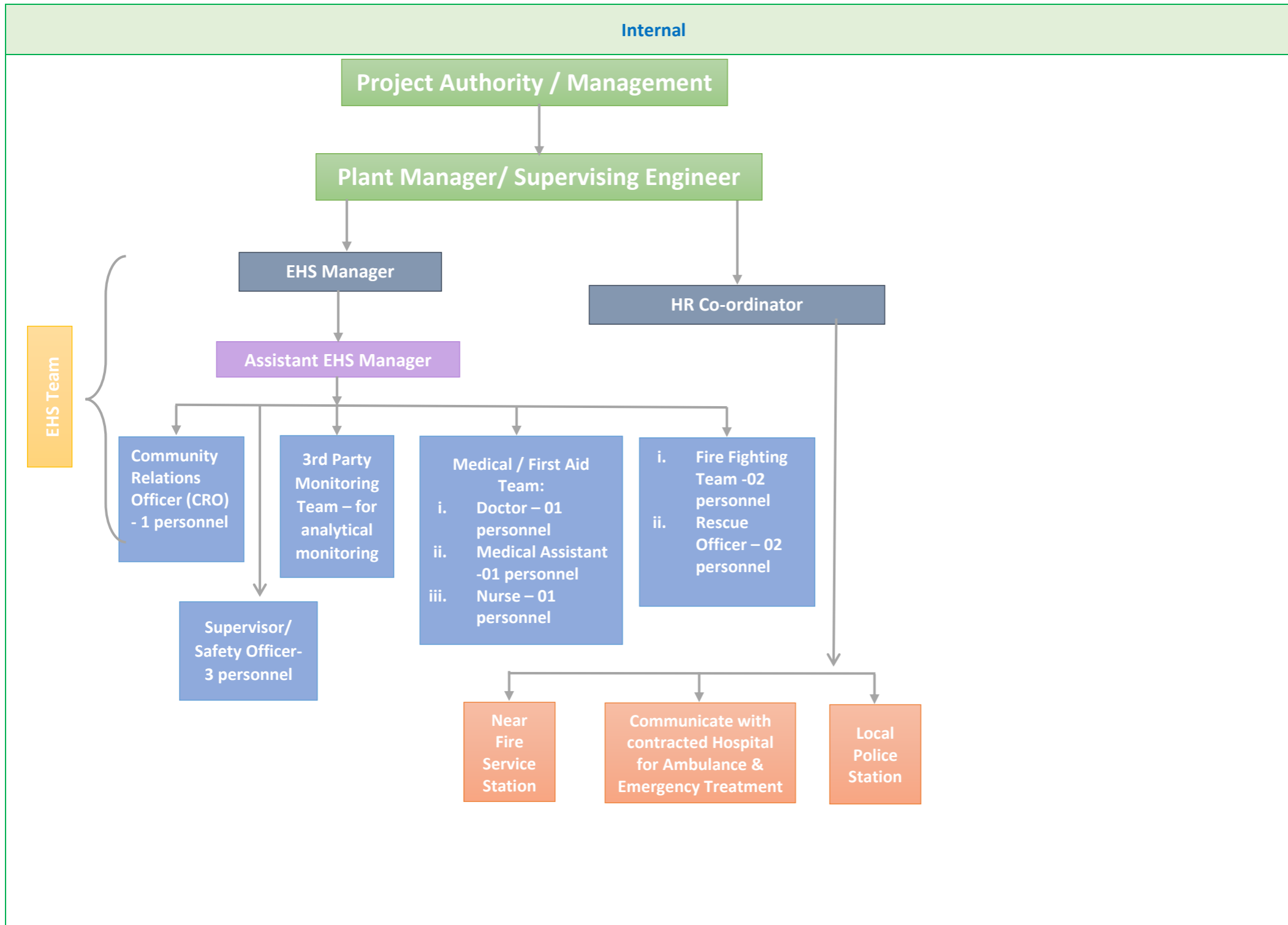


Figure 7.3: EMP Implementation Team (Operation Phase)

Table 7.3: Responsibility of Team Members

Sl. No.	Person	Responsibility
1.	Project Authority (Director)	<ul style="list-style-type: none"> Project Authority/ Management is overall responsible for complying with all local and ADB requirements. Should take final decision in any kind of emergency.
2.	Plant Manager/Supervising Engineer	<ul style="list-style-type: none"> Responsible to oversee implementation of the project on time and furnishing both financial and physical progress; has the overall responsibility and accountability for environmental and social performance of the Project through effective management and well-established project review and oversight mechanisms; should review ESMP implementation status; Contact with higher management and take necessary steps during any emergency. Ensure training and sufficient resources are provided to implement the ESMP
3.	Environmental Health and Safety Manager (Team Leader)	<ul style="list-style-type: none"> Inspect the facility to identify safety, health, and environmental risks; Develop and implement inspection policies and procedures, and a schedule of routine inspections; Develop and implement health and safety procedures for all areas of the company; Maintain records of employee exposure to hazardous waste and/or pollutants, as required; Conduct visual monitoring according to Table 8.1 and 8.3 during construction and operation phase; Should take actions and instruct relevant officials for several activities during emergency situation; Monitor the performance of EPC Contractor during construction phase. Ensure training plan is implemented
4.	Assistant Environmental Health and Safety Manager	<ul style="list-style-type: none"> Assist EHS Manager to inspect the facility to identify safety, health, and environmental risks Prepare and schedule training to cover emergency procedures, workplace safety, and other relevant topics; Monitor compliance with safety procedures; Ensure that material safety data sheets are maintained and readily accessible when needed;

Sl. No.	Person	Responsibility
		<ul style="list-style-type: none"> • Make reports on visual monitoring according to Table 8.1 and 8.3 during construction and operation phase; • Review 3rd Party Monitoring Reports and send them to EHS Manager; • Ensure undertaking suggested monitoring and prepare monitoring reports during operation phase and supervise monitoring during construction phase;
5.	Community Relations Officer (CRO)	<ul style="list-style-type: none"> • Will maintain the Grievance logbook; • Will try to resolve the grievances at root level; • In case of unsolved complaints, arrange GRC meeting and keep the records of the meetings; • Monitor the status of the commitments made during the GRC meetings; • Regular consulting with project related peoples regarding their views about the project; • Undertake and implement CSR activities.
6.	3 rd Party Monitoring Team	<ul style="list-style-type: none"> • Conduct analytical monitoring according to Table 8.2 and 8.4 during construction and operation phase; • Make reports and submit them to the EHS manager.
7.	Medical/First Aid Team	<ul style="list-style-type: none"> • Provide primary health check-up and medicine facilities; • Treat patients affected with common illnesses; • Provide first-aid to the affected persons before sending them to actual medical aid;
8.	Fire Fighting Team (consists of 2 fire fighting officers)	<ul style="list-style-type: none"> • Conduct mock drills on a regular basis to make workers and staffs aware of fire emergency response; • Rescue affected personnel during any kind of fire hazard; • Check fire extinguishers at the strategic locations regularly; • Check proper signage and markings around the fire prone areas; • Carry out a fire risk assessment of the premises and review it regularly; • Provide staff information, fire safety instruction and training; • Mitigate the Fire as per procedure (Trained). • Report to EHS Manager about any kind of unusualness and scarcity of extinguishers immediately.

Sl. No.	Person	Responsibility
9.	Rescue Officer	<ul style="list-style-type: none"> • Solely dedicated to rescue personnel during any adverse situation such as, earthquake, flooding, fire hazard, terrorist attack and so on; • Provide trainings to workers and staffs about basic lifesaving hacks and methods; • Report to EHS Manager about any kind of unusualness immediately.
10.	Human Resources (HR) Coordinator	<ul style="list-style-type: none"> • Reports to the project management & plant manager and responsible for providing information and managing all human resources matters pertaining to the emergency situation; • Responsible for communicating with contracted hospital for ambulance and emergency treatment including arranging meeting and transportation of casualties and medical cases to hospital; • Responsible for communicating with local police station; • Responsible for providing welfare support and advice to employees and their families; • Responsible for arranging temporary accommodation, and assistance for personnel being evacuated from emergency site; • Responsible for coordinating with the nearby fire service station in case of any emergency.
11.	EPC Contractor (during construction)	<ul style="list-style-type: none"> • Manage and supervise environmental health & safety issues during their work; • Ensure a safe and healthy working environment and systems of work through sensitizing employees on occupational health and safety during construction phase.
12.	Supervisor	<ul style="list-style-type: none"> • Monitor workers' performance and safety issues related to them; • Ensure that workers are wearing proper PPEs during construction works; • Report to EPC Contractor and Assistant EHS Manager regarding any near miss or accidents take place.
13.	Security	<ul style="list-style-type: none"> • Stop entry of all external vehicles and personnel from outside the premises; • During emergency situation shall stand in readiness for further instructions from EHS Manager and shall act as per the instructions given by him;

Sl. No.	Person	Responsibility
		<ul style="list-style-type: none"> • Direct all the vehicles (such as ambulances, fire tenders etc.) coming for help from outside organizations to the incident spot; • During nights if any incident happens which is alarming or which can cause emergency, security guard should immediately inform the same to the EHS Manager by mobile phone and act as directed by him.

7.13 ESMP Monitoring and Review

The environmental unit of Dynamic Sun Energy Private Limited shall periodically review, monitor and audit the effectiveness of the ESMP, including all sub-plans. The frequency of audits should reflect the intensity of activities (typically more common during construction), severity of environmental and social impacts and non-compliances raised in prior audits.

7.13.1 Review of the ESMP

The review of the ESMP should consider the following:

- Adequacy of data collection, analysis and review;
- Documentation review
- Reporting;
- Identification of non-compliances; and
- Corrective actions implemented.

The ESMP shall also be reviewed periodically by Dynamic Sun Energy Private Limited to evaluate environmental controls and procedures to make sure they are still applicable to the activities being carried out. Reviews will be undertaken by the EHS Manager of Dynamic Sun Energy Private Limited as follows:

- The full ESMP implementation shall be reviewed at least annually;
- Relevant parts of the ESMP shall be reviewed following a non-compliance, reportable incident or near miss or complaints;
- Relevant parts of the ESMP shall be reviewed following the receipt of an updated sub plan;
- Relevant parts of the ESMP shall be reviewed on request of stakeholders, Contractor, Supervising Engineer, DOE or the lender;

The review shall include analysis of the data collection and analysis of data, monitoring reports, incident reports, complaints/grievances and feedback from stakeholders, community reports, and consultation meeting minutes and training records to evaluate the effectiveness of ESMP procedures. Site visits, interviews and other auditing methods may also be used.

7.14 Cost of ESMP implementation

Table 7.4: ESMP Implementation Cost

Item	Number	Duration	Total cost per year (Taka)
Construction Phase			
Environmental monitoring during Construction period	Refer Table 8.5	6 months	5,50,000.00
Occupational Health, Safety and Security implementation	Lump sum	6 months	500,000.00
Community Health Safety and Security implementation	Lump sum	6 months	250,000.00
Capacity Building and Training	02	6 months	200,000.00
First Aid, Emergency medicine & Medical services	Lump sum	6 months	50,000.00
CSR Activity	Lump sum	6 months	250,000.00
Sub-Total =			18,00,000.00
Contingency budget (10% of subtotal cost)			1,80,000.00
Total			19,80,000.00
Operation Phase			
Environmental monitoring during Operation period	Refer Table 8.6	Yearly	860,000.00
Occupational Health, Safety and Security implementation	Lump sum	Yearly	500,000.00
Community Health Safety and Security implementation	Lump sum	Yearly	500,000.00
Capacity Building and Training	04	Yearly	400,000.00
First Aid, Emergency medicine & Medical services	Lump sum	Yearly	100,000.00
Greenbelt development	Lump sum	Yearly	500,000.00
CSR Activity	Lump sum	Yearly	500,000.00
Sub-Total=			33,60,000.00
Contingency budget (10% of subtotal cost)			3,36,000.00
Total			36,96,000.00

7.15 Contingency plan

A contingency plan is a plan devised for an outcome other than in the usual (expected) plan. It is often used for risk management for an exceptional risk that, though unlikely, would have catastrophic consequences. Contingency budget will be 10% of subtotal estimated cost of ESMP implementation cost mentioned in **Table 7.4**

7.16 Decommissioning and Dismantling

At the stage of the project planning & implementation process, the necessity for planning and timing of the decommissioning of the construction equipment & structures after the completion of construction and end of life power plant project is important. Dynamic Sun Energy Private Limited authority should plan to prepare a full-scale decommissioning plan for the project after construction and after the life expectancy of the project to clean up the site.

7.16.1 After Completion of the Construction of Plant

The project proponent/designated contractor is responsible for the decommissioning of the Equipment and temporary structure at the project site. After the completion of the construction, there will have plenty of construction equipment, scrap metal, construction materials, different types of waste chemicals. It will be ensured by the project proponent/designated contractor that no hazardous substance will be discharged to the atmosphere.

7.16.2 At the End of Plant's Life

After the power plant reaches its end of life, Project company should dismantle the entire project and restore the project site back to the normal unless otherwise mentioned by the BPDB. Decommissioning may involve adverse impacts not perceived fully at this stage of the project. As the environmental and social condition of that time is not fully predictable, so a detail time & project specific decommissioning plan should be prepared prior to closure of the power plants. Such a plan might consider:

i. Damage to Solar Panels:

Depending on the type used, photovoltaic cells may contain toxic substances such as silver, arsenic, lead and cadmium. If any solar panel is damaged during the dismantling of the facility, these toxins are likely to spill and leach into the soil and water of the area, posing a serious threat to environmental and public health.

ii. Unsafe Disposal of Solar Panels:

If the solar panels are not handled or disposed of properly during the decommissioning phase, any toxic substances contained within them are likely to escape into the surrounding air, water or soil, creating serious environmental and public health risks

Proposed mitigation measures that should be considered are as follows:

- ✓ Strict adherence to all appropriate waste management techniques, including the reuse and recycling of materials wherever possible;
- ✓ Disposable of hazardous waste materials in a legal and responsible manner;
- ✓ Damaged and old PV modules should be temporarily stored in the hazardous waste and give them to licensed waste treatment agencies to treat the panels as well as hazardous solid waste in compliance with national regulations;
- ✓ All the dismantled infrastructures and debris shall be segregated and stored separately with cover facility to negotiate with contamination effects of such wastes;
- ✓ The metal structure will be sold out to the approved recyclers, whereas, debris will be disposed-off as per their characteristics;
- ✓ All waste generated from decommissioning phase shall be collected and disposed of at the nearest identified disposal site;
- ✓ All necessary Personal Protection Equipment (PPE) shall be used by the workers during demolition work;
- ✓ Solar Panels as utilized for the project even after 20 years will have the 70 – 80% power generation capacity. Due to technology improvement, after 20 years recycling or reutilization of these panels are very much likely;

- ✓ Remediation of soil and/or groundwater contamination (if applicable); and
- ✓ Rehabilitation and enhancement of terrestrial habitats within the power plants footprints;
- ✓ It is to be ensured that dismantling is carried out during the non-monsoon season and all the drainage channels will keep intact by creating bunds around them;
- ✓ Mitigation measures to control dust and air emissions during the construction phase will be implemented;
- ✓ Soil and groundwater monitoring to determine subsurface impacts (if any) for the restoration to baseline conditions;
- ✓ Impacts during the decommissioning phase will be similar to those for the construction phase. So, mitigation measures suggested for construction phase should be followed.

8 MONITORING, EVALUATION AND REPORTING

8.1 Introduction

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are-

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are effective in practice;
- To provide a means whereby impacts which were subject to uncertainty at the time of preparation of IEE, or which were unforeseen, can be identified, and steps to be taken to adopt appropriate control measures;
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

There are two basic forms of monitoring:

- Visual observation or checking, coupled with inquiries
- Physical measurement of selected parameters

In the case of industrial projects in general, monitoring is done by physical measurement of some selected parameters like air, water, noise etc. It should be mentioned here that the monitoring program should be such so that it can ensure 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 providing a database of operations and maintenance, which can be utilized if unwarranted complaints are made. The monitoring locations will be same as the baseline study and the standard value mentioned in the baseline study should be considered to compare the achieved data via monitoring.

8.2 Monitoring During Construction

The environmental monitoring during the construction phase should primarily be focused on addressing the possible negative impacts arising from:

- Deterioration of Air Quality
- Increased traffic
- Generation of noise
- Generation and disposal of sewage, solid waste and construction waste

The environmental monitoring should also focus on enhancing the possible beneficial impacts arising from employment of local workforce for construction works. **Table 8.1 & 8.2** summarizes the potentially significant environmental parameters needed to be monitored during the construction

phase. DSEPL is responsible for overall environmental monitoring during the construction phase of the project for which they will appoint a 3rd party consultant team.

Table 8.1: Monitoring Plan during Construction Phase of the Project (Visual)

Issue	Key aspects	Monitoring Frequency	Responsibility
Traffic volume	Incoming & outgoing traffic, traffic movement records	Monthly	DSEPL
Site Security	Proper fencing, isolation of site from general access, marked passage for workers and visitors	Quarterly	
Personal Protective Equipment	Ensure every single person involved in the construction activity wear proper PPE	<ul style="list-style-type: none"> • daily inspection by supervisors • weekly/ monthly inspection by manager/ engineers 	
Incident record & reporting	Documented record of all incident, accident and its remedial process.	Quarterly	
Solid waste	Quantity of solid waste, segregation, disposal process and transfer	Quarterly	
Access to medical facility	Check access to medical facility with contracted hospital and first aid facility at site	Quarterly	
Grievance Redress Mechanism	Any significant complaint from External (neighbours) and Internal (workers) and their remedial procedure	<ul style="list-style-type: none"> • Monthly for internal • Monthly on Community GRM 	
Safety orientation & training of workers	Frequency of training & orientation of workers for safety	Quarterly	
Sanitation & drinking water facility to workers	Availability of safe drinking water and it's quality, septic tank/wastewater disposal and sanitation facility to the workers Septic tank/wastewater disposal, outlet characteristics and sanitation facility to the workers	Quarterly	
Chemical Storage and Management	Fuel tank and chemical storage operation, maintenance and leakage inspection	Monthly	
Hazardous Waste Storage	Storage area condition, availability of spill kit, inventory	Monthly	

Issue	Key aspects	Monitoring Frequency	Responsibility
Site Drainage	Maintaining proper drainage	Quarterly	
Occupational Health and Safety	Daily inspection on PPE usage	Daily for PPE usage	
	Review of implementation records of specific high-risk procedures (including photos)	Weekly inspection of transmission tower construction safety	
	Inspection of transmission tower construction contractor safety performance against OHS plan	Monthly for others	
	Documented record of all incident, accident and its remedial process		
Community Health and Safety	Site inspection of implementation of the described measures	Weekly site inspection	
	Review of community GRM records	Monthly on community GRM	
Terrestrial Habitat	Implementation status of the mitigation measures	Quarterly	
Aquatic Habitat	Implementation status of the mitigation measures	Quarterly	
Labor and Working Condition	Implementation status of the mitigation measures	Quarterly	
Social acceptability of Construction workers to the host communities	Implementation status of the mitigation measures	Quarterly	
Employment Generation	Implementation status of the mitigation measures	Quarterly	
Increase in local business	Implementation status of the mitigation measures	Quarterly	

Table 8.2: Monitoring Plan during Construction Phase of the Project (Analytical)

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
Ambient Air Quality	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5}	Air Pollution (Control) Rules 2022 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.17	Once in 3 months	DSEPL and implemented by 3 rd party consultant
Noise level	Noise at different locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.19	Once in 3 months	

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
Soil	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si	World Health Organization (WHO) (1996) Permissible Limits of Heavy Metals in Soil and Plants.	Given in Table 4.23	Once in 6 months	
Surface water	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate.	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and IFC EHS Guideline, 2007	Given in Table 4.12	Once in 6 months	
Ground water	Usage volume, Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and WHO Drinking Water Guidelines	Given in Table 4.14	Once in 6 months	
Drinking water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and WHO Drinking Water Guidelines	Given in Table 4.16 (a), 4.16 (b)	Once in 3 months	
Waste water (Septic tank outlet)	pH, BOD5 at 20°C, COD, Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, TC	ECR 2023 (Schedule-3), WB EHS guidelines for treated sanitary sewage discharge	2 Outlet of 2 Septic tanks	Once in 3 months	

8.3 Monitoring During Operation

Post construction monitoring is limited to a number of impact parameters to see the actual performance of the project. Environmental monitoring requires set of indicators that could be conveniently measured, assessed and evaluated periodically to observe the trends of change in base line environmental quality. The project company should be responsible for overall environmental monitoring during the operation phase of the project for which they will appoint a 3rd party consultant team. The environment monitoring during the operation phase should primarily be focused on addressing the following issues:

▪

- Air and noise emission from Transformer and substation area
- Solid waste generation
- Fire hazard or any medical emergency

Table 8.3 & 8.4 summarizes the potentially significant environmental parameters needed to be monitored during the operation phase.

Table 8.3: Monitoring plan during Operational Phase of the Project (Visual)

Issue	Key aspects	Minimum Monitoring Frequency	Responsibility
Hazardous Waste	Review hazardous waste inventory, Check and document PV module that leaches in an inventory, Storage area condition, availability of spill kit, inventory monthly	Monthly	DSEPL
Traffic volume	Incoming & outgoing traffic, traffic movement records	Once in 6 months	
Site Security	Proper fencing, isolation of site from general access, marked passage for workers and visitors	Once in 6 months	
Personal Protective Equipment	Ensure every single person involved in the construction activity wear proper PPE	<ul style="list-style-type: none"> • daily inspection by supervisors • weekly/ monthly inspection by manager/ engineers 	
Incident record & reporting	Review the documented record of all incident, accident and its remedial process.	Monthly	
Solid waste	Monthly inspection of waste collection and storage areas, review of waste inventory and monitor final disposal location	Monthly	
Access to medical facility	Check access to medical facility with contracted hospital and first aid facility at site	Once in 6 months	
Grievance Redress Mechanism	Any significant complaint from External (neighbours) and Internal (workers) and their remedial procedure	<ul style="list-style-type: none"> • Monthly for internal • Monthly Community GRM 	
Safety orientation & training of workers	Review implementation of training & orientation of workers for safety	Monthly	

Issue	Key aspects	Minimum Monitoring Frequency	Responsibility
Sanitation & drinking water facility to workers	Drinking water quality against Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and IFC EHS Guideline, 2007 Sewage treatment plant output sampling against ECR 2023 (Schedule-3), WB EHS guidelines for treated sanitary sewage discharge once in 3 months	Quarterly	
Chemical Storage and Management	Fuel tank and chemical storage condition and operation, maintenance and leakage inspection	Quarterly	
Site Drainage	Maintaining proper drainage	Quarterly	
Water inventory	Review water usage record, Make an inventory of water usage (groundwater and rainwater) and wastewater discharge	Monthly	
Occupational Health and Safety	Daily inspection on PPE usage Review of implementation records of specific high-risk procedures (including photos) Proper fencing, isolation of site from general access, marked passage for workers and visitors, Documented record of all incident, accident and its remedial process, OHS training records & orientation of workers for safety	Daily for PPE use Monthly for Others	
Community Health and Safety	Site inspection of implementation of the described measures Review of community GRM records	Weekly site inspection Monthly on community GRM	
Labor and Working Condition	Implementation status of the mitigation measures	Quarterly	
Terrestrial Habitat	Implementation status of the mitigation measures	Quarterly	
Aquatic Habitat	Implementation status of the mitigation measures	Quarterly	
Social acceptability of workers to the host communities	Implementation status of the mitigation measures	Quarterly	
Employment Generation	Implementation status of the mitigation measures	Quarterly	

Issue	Key aspects	Minimum Monitoring Frequency	Responsibility
Social and Economic Enhancement around project area	Implementation status of the mitigation measures	Quarterly	

Table 8.4: Monitoring plan during operational phase of the Project (Analytical)

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
Ambient Air Quality	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5}	Air Pollution (Control) Rules 2022 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.17	Once in 6 months	Project company by 3 rd party consultant
Noise level	Noise at different locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.19	Once in 6 months	
Soil	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si.	World Health Organization (WHO) (1996) Permissible Limits of Heavy Metals in Soil and Plants.	Given in Table 4.23	Once in 6 months	
Surface water	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate.	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and & IFC EHS Guideline, 2007	Given in Table 4.12	Once in 6 months	
Ground water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni,	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & WHO Drinking Water Guidelines	Given in Table 4.14	Once in 6 months	

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
	Nitrate, TC, and FC.				
Drinking water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and WHO Drinking Water Guidelines	Given in Table 4.16	Once in 3 months	
Wastewater	pH, BOD5 at 20°C, COD Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, TC	ECR 2023 (Schedule-3), WB EHS guidelines for treated sanitary sewage discharge	2 Outlets of STPs	Once in 3 months	

8.4 Cost of Monitoring

The following are the cost of monitoring for the environmental parameters during construction and operation period of the proposed project respectively:

Table 8.5: Cost Estimate for Environmental Monitoring during Construction

Item	Parameter	Unit cost (Taka)	Unit per year	Total cost per year (Taka)
Ambient Air Quality	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5}	15,000.00	24	3,60,000.00
Noise level	Noise at different locations at day and night	5,000.00	24	1,20,000.00
Soil	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si.	25,000.00	02	50,000.00
Surface water	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate.	30,000.00	04	1,20,000.00

Item	Parameter	Unit cost (Taka)	Unit per year	Total cost per year (Taka)
Drinking water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	35,000.00	04	1,40,000.00
Ground water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	35,000.00	02	70,000.00
Waste water from Septic tank	pH, BOD5 at 20°C, COD Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, TC	30,000.00	08	2,40,000.00
Total cost				11,00,000.00

Table 8.6: Cost estimate for Environmental Monitoring during Operational Phase

Item	Parameters	Unit cost (Taka)	Unit per year	Total cost per year (Taka)
Ambient Air Quality	SO ₂ , NO _x , CO, SPM, PM ₁₀ and PM _{2.5}	15,000.00	12	1,80,000.00
Noise level	Noise at different locations at day and night	5,000.00	12	60,000.00
Soil	pH, Cd, Cr, Pb, Zn, Al, Cu, Ni, and Si.	25,000.00	02	50,000.00
Surface water	Temperature, pH, TDS, TSS, DO, BOD, COD, EC, Fe, Cr, Pb, Cd, Zn, Al, Cu, Ni, Sulphate, Nitrate, and Phosphate.	30,000.00	04	1,20,000.00
Drinking water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	35,000.00	04	1,40,000.00
Ground water	Temperature, pH, TDS, As, Hardness, Cr, Pb, Alkalinity, Fe, Cd, Sulphate, Zn, Al, Phosphate, Cu, Ni, Nitrate, TC, and FC.	35,000.00	02	70,000.00
Wastewater	pH, BOD5 at 20°C, COD Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, TC	30,000.00	08	2,40,000.00
Total Cost				8,60,000.00

9 ALTERNATIVE ANALYSIS

9.1 Alternative Analysis

Assessments of alternatives involve evaluating different options related to project concept, design and site selection. This helps in finalizing the best option that is techno-commercially viable having minimum impact on the local environmental and social conditions.

Analyses of alternatives were considered for the following aspects of the Power Plant Project-

- ✓ No build scenario
- ✓ Site Location Alternatives
- ✓ Technology Alternatives

9.2 The 'No Build' Scenario

From a purely physical environmental point of view, the 'do-nothing' is preferable to any project implementation, since it would avoid creation of any of the adverse impact associated with the project. However, the potential socio-economic benefits to the nation would be foregone. A comparison between "With Build Scenario" and "No Build Scenario" has been presented in the table below.

Table 9.1: Comparison of "With Build Scenario" and "No Build Scenario" options

Description	"With Build Scenario"	"No Build Scenario"
Establishment of 100 MW ac Solar Power Plant	Generation of additional 100 MW electricity, which will be added to National Grid.	No additional power generation capacity
Transmission of Electricity to the PGCB substation from 100 MW ac Solar Power Plant	Provides a stable and reliable flow of electricity for fulfilling power demand	No additional power generation capacity
Economic Development	More opportunities for the Char Bhabanipur, Hemayetpur, Pabna Sadar Upazila as a result of reliable power supply	Minimal due to lack of reliable power supply
Electricity Coverage	A new portion of factories and homestead will become under the electricity coverage.	No coverage development.
Potential impacts to ecologically sensitive areas	No protected areas or national parks around the plant area and along the transmission route. Associated potential impacts can be readily mitigated by adherence to applicable design standards and specifications, compliance to relevant regulations, and implementation of best	None.

Description	“With Build Scenario”	“No Build Scenario”
	practice engineering processes and procedures.	
Potential impacts to terrestrial flora and fauna	Green belt will be set up around the Solar Power Plant area and transmission towers will be set at a moderate height which may not affect the regular movement of fauna, as the area is not considered under any endangered zone.	None
Fugitive Greenhouse Gas (GHG) Emissions	No chance of GHG emissions from the Power Plant and Transmission Line.	No GHG contribution.
Disruption to local residents along the transmission line route	Impacts or disruption to daily activities will be minimal (i.e., temporary, and short duration during construction/installation). Any disruption can be mitigated by proper construction planning and scheduling of activities.	None.
Employment	Job opportunities will be created during and after project implementation.	None

Demand of electricity is increasing rapidly due to enhanced economic activities in the country. This proposed 100 MW ac Solar Power Plant at Bhabanipur, Hemayetpur, Pabna Sadar will add electricity to the national grid that will improve the present electricity generation significantly and will help the government achieve its goals in the power sector and as well as trigger the national economic development. Not only that, industrial development will be induced after the implementation of the proposed power plant. Additionally, it will create Employment opportunity to the local people and improve transportation system in the project area, which will ultimately play an important role in poverty reduction and develop social safety condition.

The No Action Alternative would have no negative impacts on the existing environmental and social resources but the positive socio-economic and beneficial commercial impacts would also not be realized as well. There would be no additional megawatts added to the national system, and the accompanying benefits of enhanced electricity production would not be achieved.

As future economic growth crucially depends on the long-term availability of electricity; however, choosing the "No Action" option will not bring these huge changes and other benefits to the power sector. After considering the above issues, it can be concluded that the ‘No Project Scenario’ 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 minimize to an allowable level.

9.3 Consideration of Alternatives

9.3.1 Site Alternative

The proposed solar power plant project requires such a vacant land where no interruption will be found between the Sun and PV modules, so that electricity can be produced efficiently. In this context, Char lands of Bangladesh is the most favorable places for setting up Solar Power Plants. Moreover, there is a good equipment, machineries and fuel transportation route to the project site via road way. Due to the rural setup and using environment friendly technology, the project won't hamper the environmental condition much. It is over 50km from the nearest protected area. In addition to that, the proponent was able to acquire 229 acres of land and the rest of the land is under acquisition process.

9.3.2 Technology alternative

a. Hydroelectricity:

Hydroelectricity is produced by harnessing the gravitational force of flowing water. Compared to fossil fuel-powered energy plants, hydroelectric power plants emit fewer greenhouse gases. But the construction of hydroelectric power plants and dams requires huge investment and may have high environmental cost. Moreover, the country is having relatively limited potential for hydroelectricity.

b. Geothermal Plant:

The three main types of geothermal plants include dry steam power stations, flash steam power stations and binary cycle power stations, all of which use steam turbines to produce electricity. Geothermal power plants are considered to be environmentally friendly and emit lower levels of harmful gases compared with coal-fired power plants. But unfortunately, no active suitable geothermal site has been found.

c. HFO Fired Plant:

Heavy fuel oil (HFO) is a petroleum distillate, or hydrocarbon fuel, that is produced from crude oil, from which lighter hydrocarbon products like diesel and gasoline are also extracted. HFO is a cost-effective, reliable fuel that is used in power generators. Power plants that make use of hydrocarbon fuels, such as HFO, can operate solely on the energy that they create; during the electricity creation and supply process, they can remain entirely off the grid. Though HFO fired power plants have high negative environmental impacts.

d. Coal-Fired Plant:

If Coal is used as the fuel in this power plant, it will be cost effective because coal is quite cheap but it will pollute the atmosphere due to the production of a large amount of smoke. Besides, coal handling and ash disposal is quite difficult and requires large area. Coal is environmentally less friendly as it gives high emission of carbon dioxide and leads to acid rain because of high Sulphur content.

e. Gas fired Plant:

A gas-fired power plants burns natural gas to generate electricity. Although natural gas is a fossil fuel, the emissions produced from its combustion are much lower than those from coal or oil. Gas based combined-cycle power plant using both gas and steam turbines, they produce higher amounts of electricity from a single fuel source compared to a traditional power plant. They capture heat from the gas turbine to increase power production and are also found to release low amounts of harmful gases into the atmosphere.

f. Solar Power Plant

The environment is harmed by pollution that occurs during the production of electricity or other forms of energy. In contrast to that, the source of solar energy does not provide such a challenge. It is encouraging for the ecosystem and the environment because demand for alternative energy sources has decreased since the development of solar energy and its greater use. Solar power systems do not require much maintenance. Just needs to be cleaned twice every month. Inverters are also a part of the system, to be replaced in five to 10 years, that is, very little is spent on maintenance and repair work in addition to the initial cost. Solar power is more secure than conventional power sources, whether it is for use or maintenance and repair. Solar energy is actually a source of renewable energy. Solar energy is a never-ending energy source. In addition to that solar power does not involve any emission from the plant.

Comparing all the available technology, it can be concluded that, solar power is the most suitable, sustainable and environment friendly option.

Chapter 10

10 EMERGENCY RESPONSE AND DISASTER MANAGEMENT PLAN

10.1 Emergency Response

The purpose of having an Emergency Response Plan (ERP) is to:

- Guide personnel in determining the appropriate response to emergencies
- Notify the appropriate Company Emergency Response Team personnel and regulatory/ Govt. agencies
- Manage public and media relations
- Minimize the effects that disruptive events can have on company operations by reducing recovery times and costs
- Respond to immediate requirements to safeguard the subtending environment and community

Generally, the initial response is guided by three priorities Ranked in importance these priorities are:

1. People
2. Property
3. Environment

Emergency Response Procedures will identify who does what and when in the event of an emergency. Responsibility for who is in charge and their coordination of emergency actions shall be identified. Nature of Emergency & Hazardous Situations may be of any or all of the following categories:

I. Emergency

- ❖ Fire,
- ❖ Electric shock,
- ❖ Inverter Battery Explosion,
- ❖ Solar Panel Damage,
- ❖ Medical emergency.

II. Natural Disasters

- ❖ Flood,
- ❖ Earthquake/ cyclone,
- ❖ Storm/ typhoon/ tornados.

III. External Factors

- ❖ Food poisoning/water poisoning
- ❖ Sabotage, and
- ❖ War

10.1.1 Six Steps in Emergency Response

Step-1

- a) Determine the potential hazards associated with the incident, substance or circumstances and take appropriate action identify the type and qualities of dangerous goods involved and any known associated hazards.
- b) Determine potential hazards stemming from local conditions such as inclement weather water bodies etc. and ensure that the initial response team is aware of these conditions.

Step-2

Determine the source/ cause of the event resulting to the emergency and prevent further losses.

Step-3

Conduct an assessment of the incident site for any further information on hazards or remedies.

Step-4

Initiate redress procedures.

Step-5

Report the incidence; its nature, impact, applied redress procedures and any further assistance required etc. to the appropriate company, government and/or land owner.

Step-6

Take appropriate steps with respect to hazards to wildlife, other resources and addressing public and media concerns and issues, as applicable. Response priorities are to protect human lives, property and the environment.

10.2 Reporting Incidents and Accidents

All accidents and incidents shall be investigated to determine what caused the problem and what action is required to prevent a recurrence. employees required to perform investigations shall be trained in accident investigation techniques. The incident/accident investigation should be a fact-finding exercise rather than faultfinding. The investigations will focus on collection of evidence to find out the “root cause” of the incident. The recommendations of the investigation report are implemented in phases.

10.3 Approaches to Emergency Response

For this project, emergency response systems should be in place to deal with natural calamities, fires and injuries. There should be trained personnel, specific contingency plans and incidence specific equipment packages in place to cope with these types of emergencies. In case of an emergency incident occur, immediate action must be taken to mitigate the impacts.

In order to minimize the possibility of injury to the responders and others, it is important that emergency responders follow a specific sequence of actions as stepped out in the preceding paragraphs.

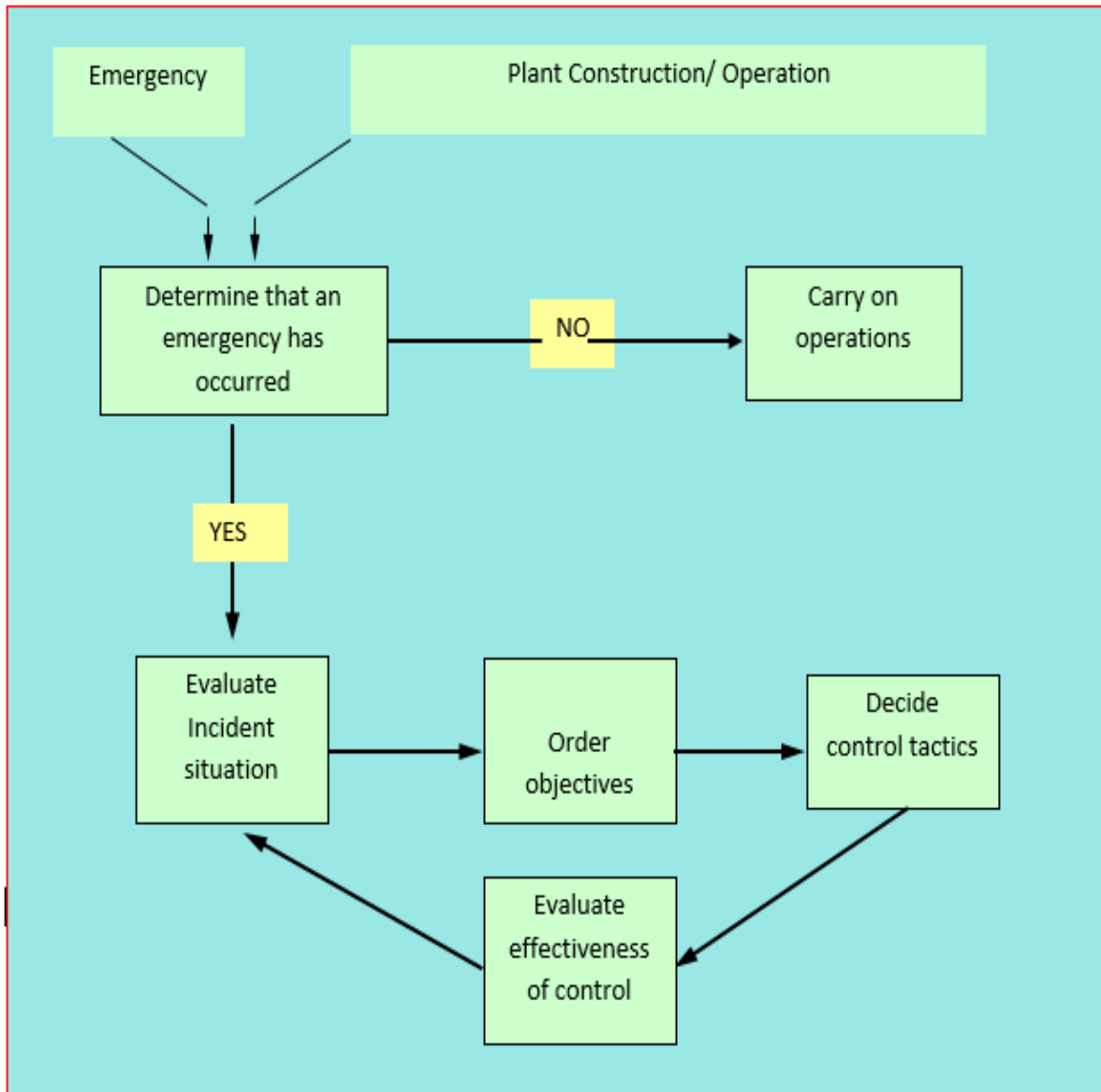


Figure 10.1: Illustrates an Example System Approach to Plant Construction & Operations

10.4 Emergency Response Plan

An Emergency Response Plan (ERP) is to provide a systematic approach to the protection of employees, assets and the environment from impact of serious incidents. A well-constructed ERP will prevent a minor incident from becoming a disaster, save lives, prevent injuries and minimize damage to property and the environment. The goals of the ERP are to:

- Provide for clear lines of authority, responsibilities and communication during incident and crisis events;
- Provide a means by which trained people and resources are available to those managing the incident or crisis event;
- Possible emergency events that have been identified for this Project are; immediate medical evacuation due to personnel injury, traffic accidents (road), leakage of hazardous chemicals, fire, earthquake, flooding, civil disturbance/riot, terrorist events/threats and gas leak/explosion.

The EHS Team and HR Coordinator will handle the emergency. During any kind of emergency situation all the personnel related to DSEPL will follow the communication matrix given below:

Table 10.1: Communication Matrix during Emergency

Incident	1 st Receiver	2 nd Receiver	3 rd Receiver (if needed)	4 th Receiver (if needed)
Traffic Accidents	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform to Medical/First Aid Team, Rescue Officer and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	-
Spill/leak of Hazardous Materials in Land and Water	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform to Rescue Officer, Firefighting team and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	-
Terrorist Events/Threats	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform HR Coordinator	Plant Manager will report to Project Management	Rapid Action Battalion (RAB)
Earthquake	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform to Fire Fighting Team, Medical/First Aid Team, Rescue Officer, and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	Fire Service & Civil Defence
Flooding	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform to Fire Fighting Team, Medical/First Aid Team, Rescue Officer, and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	Fire Service & Civil Defence
Fire Hazard	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform to Fire Fighting Team, Medical/First Aid Team, Rescue Officer and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	Fire Service & Civil Defence
Bomb Threat	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform HR Coordinator	Plant Manager will report to Project Management	Bomb Disposal Unit via Police and Rapid Action Battalion (RAB)
Kidnap/ Extortion	EHS Manager/ Assistant EHS Manager	Report to Plant Manager Inform HR Coordinator	Plant Manager will report to Project Management	Bangladesh Police and Rapid Action Battalion (RAB)

The emergency response plan for this project is described in the following sections.

10.4.1 Emergency Prevention

Project risks are prevented through implementation of risk mitigation measures to address events such as, flooding, traffic accidents, structural failure and other minor structural issues. The potential risks and measures to reduce each type of risk are given in the **Table 10.2** below.

Table 10.2: Risk and Preventative Mitigation Measures

Risk	Preventative Mitigation Measure
Traffic Accidents (Road)	<ul style="list-style-type: none"> • Traffic Control devices (road signs and markings, speed signs, stop signs, speed bumps and safety barriers); • Escort the big vehicles by motorbike for avoiding unnecessary congestion and easier movement of them.
Spill/leak of Hazardous Materials in Land and Water	<ul style="list-style-type: none"> • All hazardous materials will be kept in a tank which has facility of secondary containment; • The hazardous waste will be stored on hard standing floor and roofing with a secondary containment facility; • Regular inspections of machinery, equipment, pipe work, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring; • PV modules should be checked at a regular interval (once monthly) to avoid leaching;
Fire	<ul style="list-style-type: none"> • Keep good conditioned fire hoses and Fire Extinguishers readily available; • Arrangement of firefighting equipment's should be available with training to the all the staffs; • Adoption of fire safety measures for each of the equipment's and machinery subject to fire hazard; • Prevent the loose electrical connections and multiple connections from one source; • Safe handling and storage of flammable chemicals and fuels; • Regular inspection of the fire extinguishing system should be made to see if they are functioning properly or not. Any defect should be reported to the manger and should be replaced immediately.
Terrorist Events/Threats	<ul style="list-style-type: none"> • There should be strict security check at the key points of the power plant area • CCTV cameras should be installed at all the crucial points and 24-hour monitoring facilities should be implemented • Regular contact and updates from National intelligence agencies regarding threats • Project authority should maintain regular contact and liaison with Bangladesh Army and Police personnel so that they quickly respond to terrorist emergency events; • Regular contact and updates from National intelligence agencies regarding threats.

10.4.2 Emergency Preparedness

Preparedness includes emergencies from fire related disasters and the necessary steps required to prepare for such emergencies. For this, it is required to design, manufacture, deliver to the site, install, and test and commission the fire-fighting and fire detection equipment to protect the steam & gas turbine, generating units and all associated equipment. The following **Table 10.3** includes the list of preparedness measures to be included:

Table 10.3: Risk and Preparedness Measures

Risk	Preparedness Measures
Traffic Accidents (Road)	<ul style="list-style-type: none"> • Identify the amount of loss due to the accident; • Identify the cause of accident to minimize same type of incidents further; • Provide compensation to the injured personnel; • Make drivers aware of traffic rules and signage.
Spill/leak of Hazardous Materials in Land and Water	<ul style="list-style-type: none"> • In case of any spillage, it should be immediately acted up on. To combat spillage equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site; • Damaged PV modules should be temporarily stored in the hazardous waste storage area and the proponent will contact with licensed waste treatment agencies to collect and treat the panels as well as hazardous solid waste in compliance with national regulations.
Fire	<ul style="list-style-type: none"> • An automatic Carbon Dioxide (CO₂) gas fire protection system should be provided in all machinery enclosures. The Protection System should consist of a fire detector and an automated fire extinguishing mechanism once fire/smoke is detected. • High risk areas should be marked as “fire protection zones” and should have a separate fire protection system independent of others. • Emergency firefighting system should be ensured in the project site; • Firefighting equipment should be available at strategic locations i.e., hazardous storage area, transformers, sub-station area, kitchen, dining area within the power plant area according to Table 10.4; • Fire exit passages should always be easily accessible and usable and free of any kind of obstructions.
Terrorist Events/Threats	<ul style="list-style-type: none"> • Bangladesh Army and Police personnel will be appropriately resourced and trained to quickly respond to terrorist emergency events.

Checklists and forms for emergency situation are provided in Annexure 17.

10.4.2.1 Fire Hazard & Fire Evacuation Plan

❖ Fire Hazard

Fire hazards such as electrical hazards, combustible dusts, sparks, voltage up/down are common in electrical interconnection facility. Although fires are not a daily occurrence, they usually will cause severe property damage and business interruption. Sometimes the fire protection equipment systems have not received attention since they were installed. If these systems are needed, however, they are counted upon to perform reliably and protect vital plant equipment from fire. Fire protection systems are a combination of mechanical and electrical components and, like power generation equipment, need regular attention. There will be 12 fire hydrants which will be connected to the reservoir pond, near to the main control building of the project.

❖ Fire Evacuation Plan

In this case, the proponent needs to consider how you will arrange the evacuation of the premises in the light of your risk assessment and the other fire precautions they have or intend to put in place. Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly. Possible fire evacuation plan can be as follows:

- Simultaneous Evacuation
- Vertical Phased Evacuation
- Staff Alarm Evacuation
- Defend in Place

The table below is a list of fire equipment that should be in the premises of the project site for the management of fire safety:

1. Fire extinguisher	8. Equipment box	15. Gas mask
2. Fire extinguisher (CO2)	9. Stature	16. Gum boot
3. Fire extinguisher (Foam)	10. Lock cutter	17. Hand gloves
4. Hose box	11. Fire bitter	18. Fire blanket
5. Hydrant point	12. Fire hook	19. Sand/Water bucket
6. Fire alarm bell	13. Shovel	20. Sand/Water stand
7. Fire alarm switch	14. Helmet	



Figure 10.2: Various Fire Fighting Equipment

Table 10.4 shows the types of fire extinguishers which are suggested to be provided in specific locations of the project site, so that fire can be prevented as soon as possible.

Table 10.4: Types of Fire Extinguishers and their Uses

Type	Solid combustibles (such as wood, paper & textiles)	Flammable liquids (such as petrol, diesel & paraffin)	Flammable gases (such as methane, propane & hydrogen)	Flammable metals (such as magnesium, aluminum & lithium)	Electricals (such as computers & electric heaters)	Cooking oil (such as deep fat fryers & chip pans)
Water	✓	✗	✗	✗	Only if di-electrically tested	✗
Water Mist	✓	✓	✓	✗	✓	✓
AFFF Foam	✓	✓	✗	✗	Only if di-electrically tested	✗
ABC Powder	✓	✓	✓	✗	✓	✗
Carbon Dioxide (CO2)	✗	✓	✗	✗	✓	✗
Wet Chemical	Sometimes	✗	✗	✗	✗	✓

10.4.3 E&S Orientation and Training Plan

All employees and contractors shall attend E&S orientation. The EHS Manager, Assistant EHS Manager supported by the Supervisor/ Safety Officer, will be responsible for the development of an E&S training plan. The Assistant EHS Manager are responsible for ensuring that the appropriate employees receive training required under the plan. The company's HR Co-ordinator will be responsible for ensuring that all employees receive introductory training on the EHS Management System.

10.4.3.1 E&S Training Procedure

- A critical first step in developing a training program is to assess employee training needs. The EHS Manager and Assistant EHS Manager will review past training and the nature of the employee's work. Based on this review, specific training requirements for each employee or type of employee will be documented.
- The Assistant EHS Manager will document the ESMP Training Program.
- The training plan will be implemented by the EHS Manager, Assistant EHS Manager in conjunction with the Supervisor/ Safety Officer. Upon completion of training by employees, the area and functional managers shall make the Plant Manager aware of the training completed.
- The EHS Manager will document the training completed form and Training Log and review the detail documentation on the Training Program prepared by Assistant EHS Manager.
- Training effectiveness will be evaluated to ensure that the changes made to significant risks, objectives, targets or operational controls are working effectively. Improvements to the training plan will be made accordingly by EHS Manager and Assistant EHS Manager.

10.4.3.2 E&S Training Plan

The training plan shall be updated whenever changes are made to the significant risks, objectives, targets, or operational controls. E&S training shall be made available on a continual basis to ensure that new employees are made aware of the ESMP.

Table 10.5: Proposed Annual E&S Training Plan

Training Subject	Target Personnel	Duration	Instructor/Trainer
Construction Phase			
Health & Safety: Use of PPE	All construction staff	Four Trainings (quarterly)	EHS Manager, Asst. EHS Manager & Supervisor
Health & Safety: Safe way to work & hazard awareness	All construction staff	Two Trainings (quarterly)	EHS Manager & Asst. EHS Manager
Handling, use & disposal of hazardous material	Construction workers with authorized access to hazardous material storage areas and who uses	Two trainings (quarterly)	Supervisor & Asst. EHS Manager

Training Subject	Target Personnel	Duration	Instructor/Trainer
	hazardous material during their works.		
Waste Management	All staff (construction and camp staff)	Two Trainings (monthly)	Supervisor & Asst. EHS Manager
Defensive and Evasive training-Efficient & safe driving practices, including road & vehicle restrictions	Drivers	Two Trainings (monthly)	Security Supervisor & Security-in-Charge
Pollution prevention: Best practice (Actions to be taken in the event of major or minor pollution)	All construction staff	Two Trainings (monthly)	EHS Manager, Asst. EHS Manager & Supervisor
Health & Safety: Lifting and rigging	Crane operator and all riggers	Two Trainings (monthly)	Supervisor & Asst. EHS Manager
Operation Phase			
Health & Safety: Use of PPE	Identified required staff	Two Trainings (bi-annually)	EHS Manager & Asst. EHS Manager
Health & Safety: Safe way to work & hazard awareness	All staff	One Trainings (annually)	EHS Manager & Asst. EHS Manager
Health & Safety: Safe use of plant & equipment	Operators of plant & equipment	One Trainings (bi-annually)	EHS Manager & Asst. EHS Manager
Handling, use & disposal of hazardous material	Workers with authorized access to hazardous material storage areas and who uses hazardous material during their works.	One training (bi-annually)	Supervisor & Asst. EHS Manager
Waste Management	All staff (plant site and dormitory staff)	One Trainings (bi-annually)	Supervisor & Asst. EHS Manager
Defensive and Evasive training-Efficient & safe driving practices, including road & vehicle restrictions	Drivers	One Trainings (bi-annually)	Security Supervisor & Security-in-Charge
Pollution prevention: Best practice (Actions to be taken in the event of major or minor pollution)	All staff	Two Trainings (annually)	EHS Manager, Asst. EHS Manager & Supervisor
Health & Safety: Sub-Station Control Room	Designated workers	Two Trainings (annually)	EHS Manager & Asst. EHS Manager
Health and Safety: PV Panel Cleaning	Designated cleaners	Two Training (annually)	Supervisor & Asst. EHS Manager
Both Phase			
Emergency procedures and evacuation	All staff	One Training (monthly)	EHS Manager, Asst. EHS Manager and Fire Service & Civil Defense

Training Subject	Target Personnel	Duration	Instructor/Trainer
Fire Fighting Mock Drill	All staff	One Training (monthly)	EHS Manager, Asst. EHS Manager and Fire Service & Civil Defense
Earthquake Mock Drill	All staff	Four Trainings (yearly)	EHS Manager, S Asst. EHS Manager and Fire Service & Civil Defense
Heavy Flood/Typhoon Response	All staff	Four Trainings (yearly)	EHS Manager, Asst. EHS Manager and Fire Service & Civil Defense
Emergency response and management – Detailed	Rescue Team, Fire-Fighting Team and Medical Team	One Trainings (monthly)	EHS Manager and Fire Service & Civil Defense
Site Security	Security Guards	Two Training (monthly)	Security Supervisor & Security In Charge
Housekeeping, Dining & Washroom Areas - Basic	All staff	One Training (monthly)	EHS Manager& Asst. EHS Manager
Housekeeping, Kitchen, Dining & Washroom Areas - Detailed	Designated cleaners, cook and staff	One Training (monthly)	EHS Manager& Asst. EHS Manager
Culturally sensitive awareness rising on HIV/AIDS and sexually transmitted diseases. Awareness raising on Gender Based Violence (GBV) and vector-borne diseases	All staff	One Training (monthly)	EHS Manager, Supervisor and Medical Team
Cultural sensitivities of the local population	On induction of all non-local staff	One Training (monthly)	Supervisor

In case of an emergency fire breakout, the Plant Manager should be notified immediately who will delineate the information and responsibilities to other staff member. An emergency contact list should be prepared by the EHS manager consisting of Hospitals, Police, Ambulance services and other relevant contact details.

10.4.4 Emergency Recovery

After the emergency situation had passed, the EHS manager assess and categorize the damage and would provide for compensations for the injured; provide provisions for temporary services; reinstate normal environmental and working standards; initiating investigation process for the cause of disaster; evaluating response procedure and providing a recommendation to mitigate future emergencies.

10.4.5 Emergency Evacuation Plan

The EHS Manager will follow the plan for evacuation in the event of an emergency. DSEPL has prepared their evacuation maps which are given in Annexure 35. The layout plan has been prepared showing all the possible emergency fire exits and the location of the evacuation zone. An emergency contact list

should also be prepared consisting of Hospitals, Police, Ambulance services and other relevant contact details.

List of supportive resources exclusively maintained for emergency response activities are listed in **Table 10.6**.

Table 10.6: Supportive resources exclusively maintained for emergency response activities

SI No.	Particulars	Qty.	SI No.	Particulars	Qty.
1	Leather glove 16"	50	12	Artificial resuscitators	50
2	PVC Glove 16"	50	13	Helmets	50
3	Rubber Glove 16"	50	14	Rain coats	50
4	Shock proof glove 16"	50	15	Gum boots	50
5	FIRE Suite 36" 42"	50	16	Stretchers	50
6	Leather apron	50	17	Blankets	50
7	Plain glass goggles	50	18	Torch light with cells	50
8	Goggle for gas welding & cutting	50	19	Self-contained breathing apparatus (SCBA) Sets	50
9	Welding Shield	50	20	Gas mask	50
10	Spark resistant tools	50	21	Barricade tapes	50
11	Safety Belt	50			

The cost of Institutional capacity building for emergency response plan is given in **Table 10.7**.

Table 10.7: Cost of Institutional Capacity Building

SI No.	Item	Qty.	Price (BDT)
1	Fire hydrants (connected to the site reservoirs)	12	24,00,000.00
2	Fire Extinguishers	50	1,00,000.00
3	Portable foam suppression system	20	3,00,000.00
4	Supportive resources mentioned in Table 10.6	1 set	20,00,000.00
5	Emergency siren system	10	9,000.00
6	Smoke alarm	15	15,000.00
9	Hand held Wireless Communicator	15	70,000.00
10	Intercom system within the power plant	10	5,00,000.00
11	First Aid, Emergency medicine & Medical services	-	1,00,000.00
16	Emergency flash lights for Blackouts	50	5,00,000.00
	Total		59,94,000.00

10.5 Disaster Management Plan

Disaster Management is a planned and systematic approach to minimize damage to life, property and environment. It involves the systematic observation and analysis of measures relating to disaster prevention, mitigation, preparedness, emergency response, rehabilitation and reconstruction. It is imperative to display necessary documentation for ease in accessing information by EHS Manager. Some of these documents include:

- ✓ Emergency contacts;
- ✓ Emergency response procedures for fires.

The EHS Team and HR Coordinator will handle any disaster at site. During any kind of disaster all the personnel related to DSEPL will follow the communication matrix given in Table 10.1

Disaster could be of two types i.e., natural disaster (e.g., earthquake, flood, cyclone etc.) and man-made disaster (e.g., fire, terrorist attack / sabotage, bomb threat, kidnap / extortion etc.). Management plan for both types are discussed below:

10.5.1 Earthquake

Bangladesh National Building Code widely known as BNBC Code, is the ultimate code that is followed in Bangladesh to build safe houses and buildings. Earthquakes and wind effect of different building systems are incorporated in this code. Moreover, this code is almost similar to ACI code which is recognized as one of the most practiced building codes of the world. Socio-economic factors have also been taken into consideration while preparing this code. This code is very helpful to the related professionals like architects and town planners as it considers the conditions specific to Bangladesh. This code should be followed in designing the power plant structures. The below mentioned plan should be implemented during the construction and operation of this proposed plant.

- ✓ In case of earth quake, all the personnel inside the project are instructed to shut down their operations and come to open yard and assemble at the assembly points;
- ✓ If required, transportation will be arranged for sending the people to safer places;
- ✓ Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly.
- ✓ Rescue operation will be carried out by rescue officers and security personnel for any possible casualties and the same are given first aid treatment and will be sent to the nearest hospitals in case of requirement.

10.5.2 Flooding (Heavy rains)

When floods are caused due to heavy rains, those who will work in the project area should move to safer places and should stay in safe place until the water recedes. Actions to be taken:

- ✓ Monitor conditions and escape routes;
- ✓ Shut off electrical power and utilities if flooding is imminent;
- ✓ Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly.
- ✓ Call fire services, if needed.

10.5.3 Disaster Response Plan

A Disaster Response Plan (DRP) is to provide a systematic approach to the protection of employees, assets and the environment from impact of serious incidents. A well-constructed DRP will prevent a minor incident from becoming a disaster, save lives, prevent injuries and minimize damage to property and the environment. The goals of the DRP are to:

- Provide for clear lines of authority and communication during incident and crisis events;
- Provide a means by which trained people and resources are available to those managing the incident or crisis event;
- Possible disaster events that have been identified for this Project are; flooding and seismic activities.

The EHS Team and HR Coordinator will handle the emergency situation. During any kind of emergency situation all the personnel related to DSEPL will follow the communication matrix given below:

Table 10.8: Communication Matrix during Disaster

Incident	1 st Receiver	2 nd Receiver	3 rd Receiver (if needed)	4 th Receiver (if needed)
Flooding	EHS Manager/ Assistant EHS Manager	Report to Plant Manager, Inform to Medical/First Aid Team, Recue Officer and HR Coordinator	Plant Manager will report to Project Management	Ministry of Disaster Management and Relief, GoB
Earthquake	EHS Manager/ Assistant EHS Manager	Report to Plant Manager, Inform to Fire Fighting Team, Medical/First Aid Team, Firefighting team, Rescue Officer and HR Coordinator (as per requirement)	Plant Manager will report to Project Management	Fire Service & Civil Defence
Typhoon	EHS Manager/ Assistant EHS Manager	Report to Plant Manager, Inform to Medical/First Aid Team, Recue Officer and HR Coordinator	Plant Manager will report to Project Management	Ministry of Disaster Management and Relief, GoB

The emergency response plan for this project is described in the following sections.

10.5.3.1 Disaster Prevention

Project risks are prevented through implementation of risk mitigation measures to address events such as, flooding and earthquake. The potential risks and measures to reduce each type of risk are given in the **Table 10.9** below.

Table 10.9: Risk and Preventative Mitigation Measures

Risk	Preventative Mitigation Measure
Flooding	<ul style="list-style-type: none"> • Design and construct the power plant according to the Flood Study report; • Regular checking the flood forecasting news; • Regular checking and maintenance of Dyke;
Seismic Activity	<ul style="list-style-type: none"> • Proper training should be provided to workers and staffs to save themselves during any earthquake; • Emergency firefighting system should be ensured in the project site; • Rescue Team should be formed to help the injured employees or who get concealed and they will also take the injured employees in a safe place; • The project site should have adequate first aid provisions;

10.5.3.2 Disaster Preparedness

The following **Table 10.10** includes the list of preparedness measures to be included:

Table 10.10: Risk and Preparedness Measures

Risk	Preparedness Measures
Flooding	<ul style="list-style-type: none"> • Design and construct the power plant according to the Flood Study report; • Regular checking the flood forecasting news; • Regular checking and maintenance of culverts and drains; • Installation and checking of pumps for discharging water from site when the outside flood water level is higher than the inner flood water level.
Seismic Activity	<ul style="list-style-type: none"> • Proper evacuation plan should be prepared by the Project company; • Emergency transport vehicle should be available at site to transport workers after earthquake; • Emergency drills should be conducted for workers

Chapter 11

11 STAKEHOLDER CONSULTATION

11.1 Stakeholder Consultation

Stakeholder consultation forms an important part of the IEE study. The main objective of the consultation process is to apprise the local inhabitants about the proposed project and to seek their opinions regarding the possible impacts and discuss their mitigation measures of the project. It was recognized that their opinions would be more useful as they are accustomed to construction and operation of a number of power plant units in the locality in last few years.

Community input (both of knowledge and values) on socioeconomic and environmental issues can greatly enhance the quality of decision-making. Stakeholder consultation was therefore conducted in the project area not only to satisfy the legal requirements of the IEE process in Bangladesh but also to improve and enhance the social and environmental design of the project.

11.2 Objectives of Stakeholders Consultation

Through the public consultation process, the project proponent hopes to:

- Promote better understanding of the project, its objective, and its likely impact;
- Identify and address concerns of all interested and affected parties of project area;
- Provide a means to identify and resolve issues before plans are finalized and development commences, thus avoiding public anger and resentment and potentially costly delays;
- Encourage transparency and inculcate trust among various stakeholders to promote cooperation and partnership with the communities and local leadership.
- Gather comments and opinions from the affected communities on the impact mitigation and environmental and social management plans.

11.3 Consultation Process

- ✓ Primary stakeholders were consulted during informal and formal meetings;
- ✓ The consultation process was carried out in the Bangla language. During these meetings a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition to providing communities with information on the proposed project, their feedback was documented during the primary stakeholder consultation;
- ✓ The issues and suggestions raised were recorded in field notes for analysis and interpretation;
- ✓ By reaching out to a wider segment of the population and using various communication tools—such as participatory needs assessment, community consultation meetings, focused group discussions, in-depth interviews, and participatory rural appraisal—IEE involved the community in active decision-making;

- ✓ This process will continue even during construction and operation phase of the project to create consensus among stakeholders on specific environmental and social issues raised in the context of proposed project;
- ✓ Secondary stakeholder consultations were more formal as they involved government representatives and local welfare organizations consulted during face-to-face meetings and through telephonic conversations. They were briefed on the IEE process, the project design, and the potential negative and positive impact of the project on the area's environment and communities.

It was important not to raise community expectations unnecessarily or unrealistically during the stakeholder consultation meetings in order to avoid undue conflict with local leaders or local administrators. The issues recorded in the consultation process were examined, validated and addressed in the IEE report.

11.4 Stakeholders Consulted & Consultation Technique

In recognition of the diversity of views within any community, it is very important to obtain a clear understanding of the different stakeholders and to analyze their capacity and willingness to be involved in some or all of the project and its planning process. It is important to be aware of how different power relations can distort participation. It is also important to examine how community skills, resources, and 'local knowledge' can be applied to improve project design and implementation. All of this can be achieved by careful use of the various tools of Stakeholder Consultation. Therefore, the following participatory technique and key stakeholders were employed during stakeholder consultation:

- Focus Group Discussion (FGD) with several groups of people i.e.; women, fisherman, farmer, laborer etc.
- Key Informant Interview (KII) with relevant Government & Non-government officials;
- Formal Public Consultation meetings with relevant Government & Non-government officials and communities in surrounding areas. Men, women and local elders attended these meeting.

11.5 Stakeholder Concerns and Recommendations

The findings of FGD and KII are given in **Table 11.1** and **Table 11.2** respectively. All these have been addressed in various sections of the IEE, and the mitigation plans have been incorporated in the ESMP. The summary of the various stakeholder consultations is given below. Participants list of Public Consultation is attached as **Annexure 18**.

Table 11.1: Summary of Focus Group Discussion (FGD)

Stakeholder Category	Key Points Discussed	Outcomes in brief	Comments/Feedback Compliance
Local Community		<ul style="list-style-type: none"> ✓ People are in favor of the project and they ask to prioritize local people and employ them during different phases of the project. ✓ They wanted the Project company to finish the land acquisition process as early as possible providing the exact amount of compensation to the affected people. Moreover, it was emphasized that the Project company to give prioritize local people to engage in the project during and after construction phase. 	<ul style="list-style-type: none"> ✓ Section 6.3.17 & 6.4.16 ✓ Section 6.2.1, 6.3.17 & 6.4.16
Local Fisherman	<ul style="list-style-type: none"> ✓ Details regarding project activities; ✓ Environmental Protection Activity; 	<ul style="list-style-type: none"> ✓ They request the authority not to discharge any construction materials, soil, and solid waste directly into the nearest canal as it is harmful for fish; ✓ They also suggested that the authority should not dump any kind of waste at local canal's water; ✓ Fisherman has high expectation on getting employment opportunity for the younger generation as they are mostly not interested in pursuing fishing activities; 	<ul style="list-style-type: none"> ✓ Section 6.3.10 & 6.4.14 ✓ Section 6.3.5 & 6.4.4 ✓ Section 6.3.17 & 6.4.16
Local Farmers	<ul style="list-style-type: none"> ✓ Concern about this project; ✓ Benefit from this Project; ✓ Suggestion regarding this project; 	<ul style="list-style-type: none"> ✓ People generally grow various kinds of local vegetables at the surrounding area. For their irrigation purpose they use the water of nearest river & canal, so they want the river & canal's water free from pollution; ✓ They requested not to dump any kinds of waste and loose soil in the nearest agricultural land and crops. ✓ They also suggested the authority not to dump any oil or solid waste into the local canal & river; 	<ul style="list-style-type: none"> ✓ Section 6.3.5 & 6.4.4 ✓ Section 6.3.4, 6.3.7, 6.4.3, & 6.4.6 ✓ Section 6.3.7 & 6.4.6
Vulnerable Group (Old people, women and children)	<ul style="list-style-type: none"> ✓ Expectation from the project. 	<ul style="list-style-type: none"> ✓ They are in favor of this project but they requested the authority take proper steps to minimize air and noise emission and manage all waste properly. ✓ They ask to prioritize local people and employ them during different phases of the project; ✓ People urge to employ local women during different phases of the project to overcome their poverty. 	<ul style="list-style-type: none"> ✓ Section 6.3.1, 6.3.2, 6.3.7, 6.3.13, 6.4.1, 6.4.2, 6.4.6 & 6.4.8. ✓ Section 6.3.17 & 6.4.16
Local workers & laborers		<ul style="list-style-type: none"> ✓ Group of working people requested to engage the neighboring workers according to their skill during construction/operation phase of the project; ✓ They requested the authority to give them opportunity to work in this project as day Laborer; ✓ They said that the authority should take proper management plan on health & safety of the workers. 	<ul style="list-style-type: none"> ✓ Section 6.3.17 & 6.4.16 ✓ Section 6.3.17 & 6.4.16 ✓ Section 6.3.12 & 6.4.11.

Table 11.2: Summary of Key Informant Interviews (KII)

Authority	Name	Occupation	Age	Comments
Government Officials (Pabna Sadar Upazila)				
UNO Office	Tahmida Akhter	UNO	--	<ul style="list-style-type: none"> This project may bring a lot of positive change in commercial & industrial sector; The authority should use high technology so that it does not harm the elements of Environment.
Upazila Parishad ⁷	Md. Mosarrof Hossain	Chairman	50	<ul style="list-style-type: none"> Environmental Laws and Regulation should be strictly followed at different phases of the project; All the emission (air, noise, water etc.) level should meet the DoE guidelines; I hope that the project activity will not hamper the regular movement of the community people and will bring betterment to their lives.
Hemayetpur Union Parishad ⁸	Md. Mizanur Rahman	Union Secretary	45	<ul style="list-style-type: none"> We support this project but the authority must give high priority on Environment; Compensation should be given properly according to the market price; Local people should be given priority for employment.
Govt. Officials, Pabna				
Department of Fisheries	Md. Abul Kalam Azad	District Fisheries Officer	52	<ul style="list-style-type: none"> Solid and liquid waste should not be discharged into river or nearest khal without proper treatment; Authority should closely monitor so that any kinds of hazardous materials do not mix with water.

⁷ Upazila Parishad is one of the administrative units of Bangladesh, works as the sub-unit of district. There are several Union Parishads under one Upazila Parishad

⁸ Union Parishad is the smallest rural administrative and local government unit in Bangladesh.

Authority	Name	Occupation	Age	Comments
Department of Agricultural Extension	Dr. Md. Jamal Uddin	Deputy Director	54	<ul style="list-style-type: none"> The project proponent may use the lands under solar panel for cultivating low rising crops. This project may contribute in improving the socio-economic condition of that char land. Due to the project intervention lots of local people will get chance to work in the project at different phases, there may be increase in local business and shops as the project activity may involve sourcing of different materials and services from local suppliers. As a result, the economic condition of that area will improve.
Department of Environment (DOE)	Md. Nazmul Hossain	Assistant Director	30	<ul style="list-style-type: none"> Must maintain all the environmental laws and code as per the DoE guideline; Should use high technology so that it does not harm environment; Should prepare a project specific environmental management plan;
Bangladesh Water Development Board (BWDB)	Md. Abdul Mazed	Sub-Assistant Engineer	47	<ul style="list-style-type: none"> Proper mitigation and management plan should be adopted so that aquatic ecosystem is not disturbed; Care must be taken to ensure that any leakage of oil or other waste does not happen.



Local Community



Local Farmers and Fishermen



Labors and Workers



Local women



Local women and children



Vulnerable group

Figure 11.1: Focus Group Discussion



District Fisheries Officer's Office



Department of Agricultural Extension



DoE, Pabna District Office



BWDB

Government Officials, Pabna



UNO Office



Hemayetpur Union Office



Upazila Parishad Office

Government Officials, Pabna Sadar Upazila

Figure 11.2: Photographs of Public Consultation at different Government Offices

11.6 First Formal Public Consultation Meeting

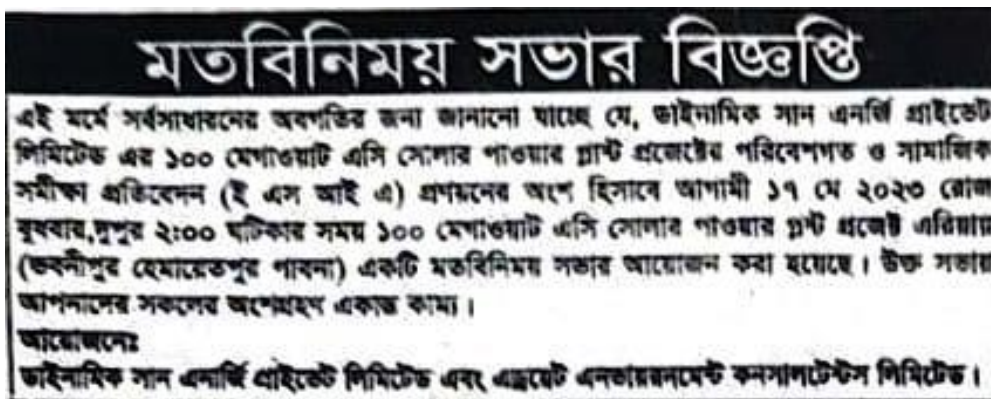
A Formal Public consultation was carried out on 17th May, 2023 with a vision to engage with the community a lot better than the informal ones. The meeting was held on the Project site, Bhabanipur, Hemayetpur Union, Pabna Sadar Upazila. The meeting started at 1:45 p.m.

Dr. Nasir Uddin Khan, Environmental Consultant of AECL explained the environmental issues regarding this project. He discussed with the participants about the proposed Project interventions and importance of electricity in our day to day life. Mamun-Ar-Rashid, Social and Resettlement Consultant of AECL explained the land acquisition process and resettlement plan to the local people. The

consultation meetings were intended to capture the main views of the participants from the surrounding areas. The information about public consultation meeting was published in The Daily Asia Bani and The Muslim Times newspaper shown in Figure below.

Table 11.3: Project attendees of Formal Public Consultation

Representing Organization	Name and Designation
DSEPL	Md. Robiul Islam (Company Secretary)
AECL	Dr. Nasir Uddin Khan (Environmental Consultant, Team Leader); Mamun-Ar-Rashid (Social and Resettlement Consultant); Shanjana Haider (Environmental Consultant); Md Golam Rasul (Consultant); Shahriar Ebn Bashar (Consultant); Sabrina Islam Labonno (Consultant); Raktim Banik (Consultant)



The Daily Asia Bani



The Muslim Times

Figure 11.3: Circular in the Newspaper

Findings of the public consultations are given in **Table 11.4**. The photographs are shown in **Figure 11.4**. List of Participants in Public consultation meeting and meeting minutes are given in **Annexure 18** and **Annexure 19** respectively.

Table 11.4: Summary of First Public Consultation Meeting

Key Points Discussed	Outcomes in brief	Feedback addressed in IEE
<p>Alhaj Mosarof Hossain (Upazila Chairman, Pabna Sadar Upazila) mentioned:</p> <ul style="list-style-type: none"> the consultant should conduct detail study on the impact and consequence of this project especially on environmental and socio-economic condition. He also requested to give priority to local people in providing jobs at the plant 	<ul style="list-style-type: none"> The consultant team replied that they have already undertaken relevant necessary studies for this project. Company Secretary appreciated his advice and assure that they may consider local people as the first priority on the basis of their ability to work. 	<ul style="list-style-type: none"> Chapter 5, Table 5.1. Section 3.8.4, 6.3.17 and 6.4.16
<p>Inspector, DoE, Pabna:</p> <ul style="list-style-type: none"> He mentioned to follow the Bangladesh Environment Conservation Rules, 2023 and all the relevant guidelines during construction and operation stages. 	<ul style="list-style-type: none"> The consultant team replied that they have already suggested the Project company to perform all their duties according to relevant law and legislations. Besides that, they are thoroughly monitoring all the activities. The Company Secretary informed that DSEPL is currently following DoE guidelines along with ADB SPS. They will continue following for the betterment of the environment. 	<ul style="list-style-type: none"> Chapter 2, Table 2.1, Section 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 4.10.1, 4.10.2, 4.11, 4.12, 4.14.3, 6.1, 6.2, 6.3, and 7.2, Table 7.1, Section 7.4, 7.5, 7.6, 7.7, 8.2, 8.3, 8.4, 10.5.
<p>Md. Jahangir Alam (Hemayetpur Union Parishad Chairman) requested:</p> <ul style="list-style-type: none"> The Project company should compensate all the land and crops owner according to the price set by GoB. 	<ul style="list-style-type: none"> Company Secretary thanked him for sharing his thoughts. He assured that already a good number of people have received their compensation and rest are on the process. All the deals will be completed according to ARIMA, 2017 and Electricity Rules, 2020. 	<ul style="list-style-type: none"> Section 6.2.1 and Annexure 6 (Land Acquisition Information of Power Plant and Tower Footing areas)

Key Points Discussed	Outcomes in brief	Feedback addressed in IEE
<p>Md. Abdullah Mondal, (Local Representative) mentioned:</p> <ul style="list-style-type: none"> • After the starting of this project they got a new kacha road, if the company developed the road connection from Bhabanipur to Pabna Sadar, their children can get chance to educate themselves more. 	<ul style="list-style-type: none"> • Company Secretary said due to the betterment of the project we need a well-paved road. We are discussing this matter with local authority. Hope to work coordinating with them to have a developed road for all. 	<ul style="list-style-type: none"> • Section 3.7.4 and 7.11



Figure 11.4: Photographs of Public Consultation

11.7 Second Formal Public Consultation Meeting

Second Formal Public Consultation Meeting was conducted on August 17, 2023 at the project site. This consultation was mainly with the direct impact communities and relevant stakeholders where the identified impacts and the ESMPs were presented, highlighting how the concerns of the communities and stakeholders from previous consultations were addressed in the IEE and ESMP. The meeting started at 11:30 a.m.

Shanjana Haider, Environmental Consultant of AECL discussed about the current status and detail of the project, identified impacts and the environmental & socio-economic management plans (local employment opportunities, resettlement issues, overall economic development) that will be undertaken by the proponent during construction and operation phase according to their concern shared during the last public consultation meeting. The information about public consultation meeting was published in The Daily Asia Bani and The Muslim Times newspaper shown in Figure below.

Table 11.5: Project attendees of Formal Public Consultation

Representing Organization	Name and Designation
DSEPL	Md. Robiul Islam (Company Secretary)
AECL	Shanjana Haider (Environmental Consultant); Burhan Uddin (Social and Resettlement Consultant); Md Golam Rasul (Consultant); Shahriar Ebn Bashir (Consultant); Sabrina Islam Labonno (Consultant); Md. Mosaddaqr Rahman (Consultant)



The Daily Asia Bani



The Muslim Times

Figure 11.5: Circular in the Newspaper

Findings of the public consultations are given in **Table 11.6**. The photographs are shown in **Figure 11.6**. List of Participants in Public consultation meeting and meeting minutes are given in **Annexure 18** and **Annexure 19** respectively.

Table 11.6: Summary of Second Public Consultation Meeting

Key Points Discussed	Outcomes in brief	Feedback addressed in IEE
<p>Md. Nazmul Hossain (Assistant Director, DoE, Pabna District Office) mentioned:</p> <ul style="list-style-type: none"> DSEPL has followed the latest DoE Rules and Regulations in the implementation of the project He highlighted the benefits of solar power plant as it didn't use any raw materials which have negative impacts on environment like coal or gas power plants and this type of power plant. 	<ul style="list-style-type: none"> The consultant team appreciated his compliments. Company Secretary appreciated his advice and assure that they will take actions to mitigate any negative impacts on local environment. 	<ul style="list-style-type: none"> Chapter 2, Table 2.1, Section 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 4.10.1, 4.10.2, 4.11, 4.12, 4.14.3, 6.1, 6.2, 6.3, and 7.2, Table 7.1, Section 7.4, 7.5, 7.6, 7.7, 8.2, 8.3, 8.4, 10.5. Section 9.3.2
<p>Md. Musharraf Hussain (Assistant Director, BWDB, Pabna District):</p>	<ul style="list-style-type: none"> The consultant team replied that they have already suggested the Project 	<ul style="list-style-type: none"> Section 6.3.5, 6.3.6, 6.3.10, 6.3.13, 6.4.4,

Key Points Discussed	Outcomes in brief	Feedback addressed in IEE
<ul style="list-style-type: none"> • He ensured that this project have no negative impact on surface and ground water. • He also requested the local people to support this project as it will improve the socio-economic condition of Pabna Upazila 	<ul style="list-style-type: none"> • company to perform all their duties according to relevant law and legislations so that ground water will remain uncontaminated. • The Company Secretary thanked him and informed that DSEPL is currently following DoE guidelines along with ADB SPS. They will continue following for the betterment of the environment. 	<ul style="list-style-type: none"> • 6.4.5, 6.4.8, and 6.4.14 • Section 6.3.17, 6.3.18, 6.4.16 and 6.4.17
<p>Amena Khatun (Housewife, Bhabanipur):</p> <ul style="list-style-type: none"> • She requested that other interested women should also be given suitable job opportunities so that they can also earn money for their family and can improve their living standard. • She requested the project company to arrange some trainings which are related to project activities so that their children can work here too after they complete their education. 	<ul style="list-style-type: none"> • Company Secretary thanked her for sharing her thoughts. He informed that already a good number of women have been appointed here and they are willing to appoint more people as per requirement of the project. He also described their CSR policy. 	<ul style="list-style-type: none"> • Section 3.8.4, 6.3.17, and 6.4.16 • Section 7.11
<p>Atahur Member (Local Representatives, Char Bhabanipur):</p> <ul style="list-style-type: none"> • He thanked DSEPL as due to this project road connectivity has improved in their area. • He also mentioned that this project has enhanced the socio-economic condition in their area as the project authority recruit local people in project activity. 	<ul style="list-style-type: none"> • Company Secretary said due to the betterment of the project we need a well-paved road. We are discussing this matter with local authority. Hope to work coordinating with them to have a developed road for all. 	<ul style="list-style-type: none"> • Section 3.7.4 • Section 6.3.17, 6.3.18 6.4.16 and 6.4.17.

Key Points Discussed	Outcomes in brief	Feedback addressed in IEE
<p>Saiful Islam (Businessman, Bhabanipur):</p> <ul style="list-style-type: none"> • He requested the project company to buy construction materials, daily necessities from local people to improve their economic condition. • He requested project authority for construct a mosque within the project area for local people religious activity. 	<ul style="list-style-type: none"> • Company Secretary said that they are already procuring construction materials and daily necessities from local dealers, which are available here. In some cases, they need to communicate foreign dealers too. He also ensured that they have a plan to construct a mosque within the project area. 	<ul style="list-style-type: none"> • Section 6.3.18 and 6.4.17 • Section 3.4.1



Figure 11.6: Photographs of Second Formal Public Consultation Meeting

11.8 Stakeholder Engagement Plan

The stakeholders must be engaged for smooth continuation of the Project in all the phases of the project i.e., pre-construction, construction and operation stages. EHS manager will conduct meeting in every six months with stakeholders who are directly and indirectly impacted and relevant with the project related activities. Issues of affected people, land related issues, community health and safety measures and any other issues related to land will be discussed in the meeting. EHS Manager should explain the procedure regarding Grievance Redress Mechanism (GRM), so that stakeholders can access the GRM and get solution. Besides that, EHS Manager will disclose the relevant project information and securing their opinions to overcome the adverse situation for project implementation. Assistant EHS Manager will note down all the queries, issues and problems of the stakeholders and report to project management. Project management should take necessary steps to sought out the matters. The stakeholders should be engaged at every step of the project development in an integrated way.

In the early stages of the development of the project, the initial identification of stakeholders was conducted, and these stakeholders were further grouped into government, non-government organizations, civil society group, businesses, institutions, indigenous people, and local communities and individuals. Analysing the stakeholders identity, roles, interest, and influence on the project we can further categorize the stakeholders into the following groups:

Table 11.7: Stakeholder Groups

Stakeholder Category	Brief Description
Direct Stakeholder	These are the stakeholders identified as the most vulnerable to the possible impacts and changes to be brought by the project.
Indirect Stakeholder	These are stakeholders that may be indirectly affected by the project wherein consequences although indirect, may still be felt due to changes and impacts brought by the project.
Other Relevant Stakeholders	These are stakeholders that may have interest in the project and influence its development and operations.

During each stakeholder consultation meeting, stakeholders should be aware of the ongoing progress/condition of the project. Any kind of constraints, incidents, accidents and GRM should be informed to the stakeholders. The concerns and overviews of stakeholders should be evaluated during the meeting and shared with top management of the proponent to make necessary steps to solve any issue that may arise adversely in near future. Stakeholders should be aware of their rights and privileges according to national and international regulatory guidelines. Effectiveness of GRM, possibility of job placement, community health issues, performed and future CSR activities should be discussed in the meeting. Stakeholders should consider the project as one of their own things to explore the opportunities they might get. This section includes the summary of these guidelines so that SEP can be developed as part of the operations ESMP.

11.9 Disclosure

The draft IEE report will be available for the public review Dynamic Sun Energy Private Limited website. Once the final version is ready, it will replace the draft version on the Dynamic Sun Energy Private

Limited website. The executive summary will be translated into Bangla and will be made available to the public.

Chapter 12

12 GRIEVANCE REDRESS MECHANISM AND DISCLOSURE

12.1 Grievance Redress Mechanism

Public participation, consultation and information disclosure undertaken as part of the local IEE process have discussed and addressed major community environmental concerns. Continued public participation and consultation has been emphasized as a key component of successful project implementation. As a result of this public participation during the initial stages of the project, major issues of grievance are not expected. During the construction and operational phase of the project, the complaints that may be anticipated are mostly related to dust, noise & vibration of the engines, unexpected accidents and some other social and environmental issues. To settle such issues effectively, an effective and transparent channel for lodging complaints and grievances will be established. The grievance redress mechanism should be scaled to the risks and adverse impacts of the project. It should address affected people's concerns and complaints promptly, using an understandable process. It should also be readily accessible to all sections of the community at no cost and without retribution.

The Grievance Mechanism will be implemented during both the construction and operational period of the project to ensure that all complaints from local communities are dealt with appropriately, with corrective actions being implemented, and the complainant being informed of the outcome. The GRM should accept complaints from Project affected people and anonymous source.

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

A grievance redress mechanism and procedures is setup to provide opportunity for project affected persons (PAPs) to settle their complaints and grievances amicably. The established grievances redress procedures and mechanism ensures that project affected persons are provided with the appropriate resolution and that all administrative measures are in line with the law. It also allows project affected persons not to lose time and resources from going through lengthy administrative and legal procedures. Grievances are first preferred to be settled amicably.

100 MW ac Solar Power Plant has already set-up a grievance redress committee that addresses any complaints during the construction period of the project but the team formation needs some enhancement

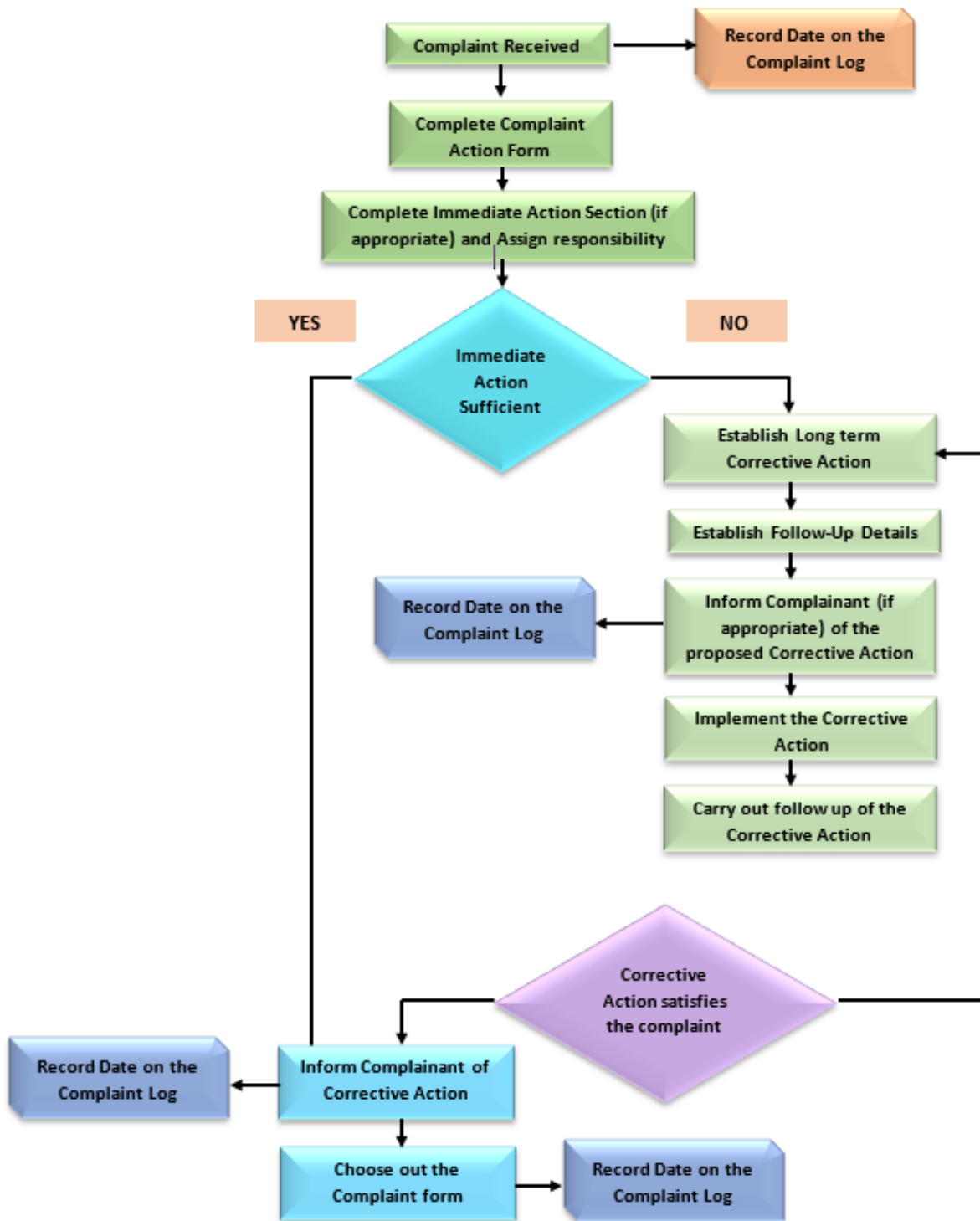


Figure 12.1: Flowchart of Complaints/Grievance procedure

The company has formulated a Grievance mechanism to reduce/redress grievance related to environmental and OHS issues, community issues, land acquisition related issues at various level for effective & smooth operation of the project during both construction and operation phases and for both TL and main power plant site. To mitigate/redress the grievance the company has been working in three step layers to solve the complaints and concerns more effectively and efficiently within sort period which is as below:

1. PAPs Representative Committee:

Name	Position	Contact No.
Mr. Md. Atahar Mondol	Local Representative	+880-1718-964871
Mr. Md. Shahid Bissas	Local Representative	+880-1745-521461
Mr. Md. Bondar Ali Haji	Local Representative	+880-1711-301866

2. Project Management Committee:

Name	Position	Contact No.
Mr. Md Jahurul Islam	DGM (HR & Admin)	+880-1324-724855
Mr. Md Omar Faruk	AGM (Operation)	+880-1725-538929
Mr. Md. Aktaruzzaman	AGM	+880-1324-437720

3. Executive Committee:

Name	Position	Contact No.
Mr. AHM Abdur Rahman	Director (Operation & Administration)	+880-1755-524278
Mr. Md. Robiul Islam	GM & Company Secretary	+880-1713-236107
Mr. Md. Shamim Hossain	Head of Audit	+880-1777-709448

Framework of Grievance



Procedure of Grievance Redressal & its Mitigation:

1. PAPs should be encouraged to raise their issue in written or oral to PAPs Representative Committee informally in the first instance;
2. Upon getting the query from PAPs, the PAPs Representative Committee attend the issue and will conduct the necessary investigations whether the issue related with the project activity and measure the depth of the issue;
3. Then the committee give a date and sit together with the aggrieved PAP to resolve;
4. Generally, any issue raised by PAPs, it should be resolve within 7 days from the date of cognizance of the committee;
5. If the matter is not resolved, the PAPs Representative Committee submit a letter to Project Management Committee in detail and outline what steps they would like to be taken to redress the issue with their investigation report;

6. Project Management Committee will conduct the necessary investigations then a grievance hearing will be held and mitigate the issue within next 7 days.
7. If they fail to mitigate, they forward it to the Executive Committee of the company with their investigation report;
8. Executive Committee will take the decision regarding on the complaints or concern issues within 14 days;
9. PAPs have the right to appeal against the Grievance Management decision. In some cases, if the PAPs and Company decide that it would be advantageous to enlist a third party in the dispute resolution process, such mediation to help the parties arrive to a mutually agreeable solution. The grievance process may be temporarily halted in such cases.

For any kind of grievance any members of the PAPs representative committee should be contacted. During operations, the GRM will be open for Operations and Maintenance related complaints and that this will be contained in the main project GRM. The RP will be available in English on adb.org for access to the affected people.

DSEPL should recruit one dedicated officer as Community Relations Officer (CRO) to maintain a Complaints Database, which will contain all the information on complaints or grievances received from the communities or other stakeholders and manage record keeping. This would include: the type of complaint, location, time, actions to address these complaints, and final outcome. CRO will undertake engagement with PAHs to determine if there are any grievances or issues that require resolution.

The GRM in place is being used by the community to raise complaints. But no complaint has been raised by the community till now. Right now, the Site supervisors manage GRM at site. Till now only one complaint was raised and it was related to an office staff who was not listening to his superiors, the staff was alerted about that and now he is following the rules. The complaint is resolved now. No grievance has escalated to legal claims till date. The GRM is gender responsive. Community people and workers are aware of the GRM. The TOR of GRM has been added in Annexure 20.

As a general policy, project proponent will work proactively towards preventing grievances through implementation of impact mitigation and community liaison activities that anticipate and address potential issues before they become grievances. Minor issues will be solved by the contractor in consultation with the aggrieved party and the local Union parishad representatives (local authority representative).

In case a dispute is not resolved by arbitrational tribunal, then if any of the Party disagrees, the aggrieved party has the right to appeal to the ordinary courts of law. However, the preferred option of dispute settlement ought to be the option of settling the dispute amicably because recourse to courts may take a very long-time even year before a final decision is made and therefore, should not be the preferred option for both parties concerned

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

Table 12.1: Sample Grievance Reporting Form

Contact Details	Name:	
	Address:	
	Telephone Number/ Cell Phone Number:	
	Email:	
How would you prefer to be contacted? (please tick box)	<input type="checkbox"/> By Phone <input type="checkbox"/> By Email	
Details of your Grievance (Please describe the problems, how it happened, when, where, and how many times, as relevant)		
What is your suggested resolution for the grievance?		
Signature:		Date:

13 CONCLUSION AND RECOMMENDATIONS

13.1 Conclusions

Dynamic Sun Private Ltd. is going to set up the 100 MW ac Solar Power which will generate and supply electricity to Bangladesh Power Development Board (“BPDB”) for a period of 20 years on an off-take basis. The proposed project is located at Bhabanipur and Ratanpur Mauza, Hemayetpur Union, Pabna Sadar Upazila at Pabna District. The proposed power plant will use renewable energy which reduces greenhouse gas emissions by providing carbon-free electricity generation, contributing to cleaner air and a healthier planet. The abundance and renewable nature of solar energy ensures its availability for generations to come, promoting long-term sustainability. The integration of solar power plants into existing electricity grids enhances grid stability and resilience.

The present IEE report finds that though there are certain adverse environmental impacts associated with the project under consideration, these are manageable provided recommendations in the ESMP are followed with due diligence.

If the management plans suggested are followed properly i.e. Regular water sprinkling to minimize fugitive dust emission; Noisy construction works to be limited to daytime hours and all employees likely to be exposed to ear noise to be provide with ear protectors; Collection and segregation of wastes and safe storage should be done; Supply good quality drinking water and adequate standard toilet facilities must be available at the construction site to the workers; The quality of drinking water should be checked periodically; Septic tank of adequate capacity should be installed at site; Access to workplace must be restricted for community people to provide higher degree of safety and people working in the site workers must wear appropriate PPEs; Standard wage, wage deductions, hours of work, overtime arrangements, overtime compensation, leave for illness, maternity, vacation or holiday should also be maintained by the contractor; Child labor and forced labor should strictly be avoided; Speed limit and proper sign board should be provided along the connecting roads to the project site etc. then it is expected to mitigate the negative impacts due to the construction of this proposed power plant. In addition to that, handling, installation of PV modules should be undertaken carefully by experienced workers. Suggested EMP Implementation Unit for construction phase should be implemented properly for the smooth operation of the construction phase and ensure environmental safeguard.

During operation phase the proposed project will not create much environmental negative impact. There will be no air or liquid emission from the project operation. Only the sewage and solid waste should be handled according to the mitigation measure suggested to avoid the negative impact. Collection and segregation of wastes and safe storage should be done. STP of adequate capacity should be installed at the project site. Supply good quality drinking water and adequate standard toilet facilities must be available at the project

area. Solid and hazardous materials will have to be stored at site at designated area and disposed at a regular interval in municipal solid waste disposal area while others which has demand in market will be sold in to the authorized dealer. All PV panels should be checked at a regular interval for leaching and electrical leakage. Damaged or old panels should be temporarily stored in the hazardous waste and give them to licensed waste treatment agencies to treat the panels as well as hazardous solid waste storage area and sold them to secondary dealer. There won't be any significant impact from the transmission line during operation phase. Suggested EMP Implementation Unit for operation phase should be implemented to ensure environmental safeguard.

The benefits of solar power plants, extend beyond environmental considerations. They encompass economic growth, job creation, energy security, and a cleaner, healthier future for all. Bhabanipur and Ratanpur Mauza are two remote places of Pabna Sadar Upazila with undeveloped roads and socio-economic facilities. After the implementation of the project, it will create employment opportunity to the local people and improve transportation system in the project area, which will ultimately play an important role in poverty reduction and develop social safety condition.

It is expected that the project will be an ideal for the nation. The project operator will use modern technology and follow all necessary measures to make it successful. Minimum impacts shall be produced on the surrounding environment on the condition that the mentioned mitigation measures are taken. The project site is reasonably selected and the project construction is feasible from the perspective of environmental protection.

Having reviewed all the potential environmental impacts and if followed by our proposed mitigation measures, the project is expected to proceed without having unacceptable environment.

13.2 Recommendations

- A greenbelt area should be developed along the project boundary. However, plantation of trees shall be provided by planting trees of local species around the power plant boundary.
- Internal environmental management in the company shall be reinforced to make sure that the environmental protection actions are implemented, the facilities are in normal operation and assistances are provided to enable the local environmental protection authorities to carry out the monitoring activities;
- Solid and Hazardous waste management is an important issue in this project. Some raw materials have secondary demand can be sold but other wastes must be disposed properly;
- All activities (pre-construction, construction and operation stage) should be implemented according to ESMP and regular monitoring of the project activities as mentioned in the environment monitoring plan during different phases of the project should be done;
- Public consultation/stakeholder consultation should be conducted regularly in every stage of the project to know the problems of local people and stakeholders related to the project activities.

However, no development can be expected without any adverse impact on the environment. The beneficial impacts on the nation as well as human beings would only be meaningful and sustainable development would only be possible if adverse impacts are minimized through strict maintenance and control measures as mentioned for this project. All this would need vigilant care and money and the Project company should take these into consideration.

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