Draft Report

Environmental Impact Assessment (EIA)

for

Unitex Steel Mills Ltd.

at

Daulatpur, Muhuriganj, Chhagalnaiya, Feni

Proponent:

Unitex Steel Mills Limited (USML)

Factory address: Gopal, Chhagalnaiya, Feni.

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UNITEX

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ABBREVIATION

AECL	Adroit Environment Consultants Limited
AoI	Area of Influence
ASP	Air Separation Plant
BBS	Bangladesh Bureau of Statistics
BMD	Bangladesh Meteorological Department
BWBD	Bangladesh Water Development Board
BOD	Biochemical Oxygen Demand
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
DO	Dissolve Oxygen
DOE	Department of Environment
DRI	Direct Reduced Iron
ECA	Environment Conservation Act 1995
ECC	Environmental Clearance Certificate
ECR	Environment Conservation Rules 2023
EP	Equator Principles
EIA	Environmental and Social Impact Assessment
ERG	Emergency Response Group
ERP	Emergency Response Plan
ERT	Emergency Response Team
EMP	Environmental Management Plan
FGD	Focus Group Discussion
FTP	Fume Treatment Plant
GOB	Government of Bangladesh
HBI	Hot Briquetted Iron
IUCN	International Union for Conservation of Nature
KII	Key Informative Interview
MTPA	Metric Tons Per Anum
MVA	Mega Volt Ampere
NEMAP	National Environmental Management Action Plan
NGO	Non-Government Organization
NOx	Oxides of Nitrogen
PAPs	Project Affected Persons
PGCB	Power Grid Company of Bangladesh
$PM_{2.5}$	Particulate Matter < 2.5µm
PM_{10}	Particulate Matter < 10µm
PPM	Parts Per Million
PPE	Personal Protective Equipment
RIC	Resource Integration Center
SESIs	Significant Environmental and Social Impacts

SO_2	Oxides of Sulfur
SPARRSO	Bangladesh Space Research and Remote Sensing Organization
SPM	Suspended Particulate Matter
T/L	Transmission Line
TOR	Terms of Reference
TDS	Total Dissolve Solid
TPD	Tonnes Per Day
TSS	Total Suspended Solids
USML	Unitex Steel Mills Limited

EXECUTIVE SUMMARY

1. INTRODUCTION

Steel industry played an important role in the development of modern civilization. Without steel, we wouldn't have the infrastructure to support today's population of Bangladesh. It has a major role in our nation's economy. It provides the raw materials needed to make cars or planes or trains, household appliances, engineering infrastructures, buildings and other essential things people need in their daily lives. Steel is the backbone of our civilization and its importance will only continue to grow as our civilization continues to grow and expand and develop new technologies.

To cope up with the increasing demand of steel production in Bangladesh and worldwide, Unitex Steel Mills Limited is planning to establish a steel manufacturing mini mill with an aim to increase the steel production 1,00,000 metric tons per annum. Unitex Steel Mills Limited (USML) will be the most automated advanced merchant mill which will have the electric steel making manufacturing facility and long product rolling mill once established. USML also have the fume separation plant, water treatment plant for this proposed project

Adroit Environment Consultants Ltd (AECL) has been engaged by Unitex Steel Mills Limited (USML) to conduct the EIA for the project titled " Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni". This EIA report has been prepared in order to obtain the environmental clearance certificate (ECC) from the Department of Environment (DoE) by following all the legal guideline of the Government of Bangladesh (Gob).

2. LEGISLATIVE REQUIREMENTS

As per the Schedule-1 of the ECR 2023, the proposed project falls under "Red Category" which requires Environmental and Social Impact Assessment (EIA) Study to assess the impacts of the project in the surrounding area and suggest the Mitigation measures, Environmental Management plan etc. The EIA study for this project has been undertaken to obtaining the Environmental Clearance Certificate (ECC) from DoE. The prevailing national policies, strategies, laws, rules, action plans along with IFC EHS Guideline, ADB, AIIB, EP and WB Performance Standards are also briefly discussed in chapter 2.

3. DESCRIPTIONS OF THE PROJECT

USML proposed a steel manufacturing mini mill project with a purpose to produce 1,00,000 MTPA steel products. This project is located at the Chhagalnaiya Upazila of Feni district. The total project land area is 60 acres. The project land is a vacant land and the land is owned by Unitex Steel Mills Limited. Construction of temporary boundary wall is ongoing at the present site area. The project area has a temporary office shed for project staffs. Muhuri and Feni River is 1.0 km and 1.78 km respectively away from the project area and 144.41 meters away from the Dhaka – Chattogram highway. Rahmat kha dighi is present at the

east side, Muhuriganj community center at the north side, Old Muhuriganj bazar at the west side and Golsan market at the south side of the proposed project area. Detail of the project is described in **Table 1.**

Table 1: The Basic Data of proposed project

Project Main Components	
1. Name of the Project	Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni
2. Project Proponent	Unitex Steel Mills Limited
3. Project Location	Thana: Chhagalnaiya, Gopal Union Parishad, Muhuriganj, Feni District, Bangladesh
4. Project area	60 Acre
5. Project cost	2,000 Crore BDT
6. Project starting date	01 November, 2023
7. Project duration	Project Preparation: 15-16 Months; Project Implementation: 2years (Tentative)
8. Land type	Own land of Unitex Steel Mills Limited
9. Present condition	Temporary construction of boundary wall is on-going
10. Fuel Type	Diesel oil for backup generator support
11. Net Production Capacity	1,000,000 MT/Y
12. Raw material Storage Capacity	50,000 MT/Y
13. End product Storage Capacity	65,000 MT/Y
14. Raw material Source	Imported from USA, UK, Europe, Japan, South Korea, Singapore, Hong-Kong, Australia, Brazil, UAE, Algeria
15. Raw material Type	Scrap, HBI/DRI
16. End product type	Rebars, angles, bars and rods
17. Total Manpower	Construction phase: 150 Operation phase: 516
18. Water Requirement	**Construction phase:** 6.75 m^3/day for sanitation and drinking purposes **Operation Phase:** 2400 m^3 (one time intake for entire project life), 150 m^3 /hr for make-up water and 24 m^3/day for sanitation and drinking purposes. Total requirement will be 174 m^3/day
19. Electricity Connection	Electricity will be supplied from National Grid. The Steel Mill will be connected to Korerhat 400/230/132/33 kV Substation of PGCB through a new 230/33 kV Grid Substation of Unitex.
20. Sub-component	i. 230/33 kV Grid Substation area (East side within the project boundary) ii. 3.785 km Transmission Line with 11 towers (from proposed Unitex substation to korerhat 400/230/132/33 kV Substation)

The steel production in the proposed project will be done in 5 stages such as 1) Melting of raw material 2) Ladle furnace casting 3) Continuous Casting 4) Rolling Mill and Cooling Tower 5) Inspection and Dispatched. First, the raw material (scrap) will be transported in an Electric Arc Furnace at a temperature of 1500^0C for 55 minutes, then the molten iron will be shaped into a billet or bar through a continuous casting machine and a rolling mill. At the final step, the hot iron will be cooled through the cooling tower and the end product is ready for dispatched. The proposed project area will have 2400 m^3/hr, 20MT/hr slag treatment palnt 2.4 million m^3/hr Fume treatment plant and a 200 TPD capacity Air separation plant. Moreover, the project will also have 3 rainwater harvesting tank with total capacity of 1250 m^3/day to reduce consumption load on ground water.

4. ENVIRONMENTAL AND SOCIAL BASELINE STUDY

Baseline environment is concerned with existing physical, chemical and biological conditions of the area where the project is going to be set up. The ambient air quality, noise level and water quality have been analyzed to evaluate the primary baseline of the area.

According to Bangladesh Meteorological Department, the monthly average Dry Bulb Temperature (maximum) is 29.5°C in May, 2019. Average Monthly Relative Humidity (maximum) for an average year is recorded as 90 % in July, 2015. The maximum Monthly Average Rainfall is recorded as 1128 mm in July, 2015. According to the Climate map of Bangladesh, the project area falls in South-eastern zone (A).

Air monitoring has been conducted at eight different locations. Among the locations, the maximum values of PM2.5, PM10, SPM, SO2, NOx, CO were found to be 35.7 µg/m^3 (location 3), 46.2 µg/m^3 (location 1), 88.1 µg/m^3 (location 3), 6.2 µg/m^3 (location 3), 11.1 µg/m^3 (location 3) and 1.1 ppm (location 3) respectively. These maximum values are well within the permissible limits of the DOE and IFC standards.

The ambient noise level data were collected from different sides (eight locations) of the project. The highest noise level was found at the 8th location (near the access road) during day time and the value was 48.8 (LAeq) dBA which is within the permissible limits of the DOE and IFC standards.

The sample for surface water quality was collected from 8 location on 12th September,2023 and different parameters were analyzed in the Laboratory. The test results are presented in **Table 4.11**. To determine quality of surface water. Ground water samples from 1 location was collected from nearest tube well and different parameters were analyzed. The result is presented in **Table 4.13.** Both surface and ground water quality test results show that all the parameters remain well within the allowable limit as per as DOE standards.

On the basis of distribution of earthquake epicenters and morpho-tectonic behavior of different tectonic blocks Bangladesh has been divided into four seismic zones with different expected levels of intensity of ground motion. According to the Earthquake Zoning Map of Bangladesh (2017), the project area falls in seismic **Zone II**, ***moderate*** and where seismic zone coefficient (Z) is 0.20.

During the field visit, different kinds of flora such as Aam (*Mangifera indica),* Kathal (*Artocarpus heterophyllus),* Jam (*Syzygium cumini)*, Pepe (*Carica papaya),* Kala (*Musa Sepientum),* Narikel (*Cocos nucifera*), Kachuripana (*Eichhornia crassipes*), Helencha (*Enhydra fluctuans*) etc. were found during the AECL field visit. Common Toad (Bufo melanostictus), House Lizard (Hemidactylus brookii), Common Kingfisher (*Alcedo atthis*), Common Myna (*Acridotheres tristis*), House Sparrow (*Passer domesticus*), House mouse (*Mus musculus*), Boal (*Wallago attu*), Shing (*Heteropneustes fossilis*), Kalibaush (*Labeo calbasu*), Punti (*Puntius chola*) etc. faunal species were found during AECL field survey. Details provided in **Section 4.12**. Any endangered, vulnerable or threatened faunal species were not found during the field visit around the project area.

- **SOCIO- ECONOMIC ENVIRONMENT**

The following sections present socio-economic profile of Chhagalnaiya Upazila (Table 2) and also for the project area of influence (AOI). The socio-economic baseline environment of the project area was captured to have a picture of the socio-economic scenario to allow comparison with that of any potential impact associated with the proposed project.it includes the demographic profile, employment status, sanitation facilities, pure drinking water supply, economic status, fishing activities, public utilities, etc. (brief discussed **in section 4.13**).

Table 2: Demographic Characteristics of Chhagalnaiya Upazila

Characteristics	Chhagalnaiya
Total Area (Sq. km)	139.6
Total Household	36,744
Total population	187,156
Male	89,494
Female	97,662
Average Household	5.04
Literacy rate (%)	63.38
Sex ratio (M/F)	92
Population Density (Per Sq. km)	1341
Ward	9
Union	5
Mouza	46
Village	58
Mahalla	11

During the household survey by AECL team, a total 43HHs comprises 165 people have been surveyed. Male population is higher compare to female population in the study area and Islam is the predominant religion in that area. A variety of occupational choices have been found in the project location, and majority are farmers. Female population of the study area are mostly housewife.

5. ENVIRONMENTAL & SOCIAL IMPACTS OF THE PROJECT

Major impact during pre-construction phase is disruption of earth surface and disturbance to the local ecology due to land development work in the main mill area and acquisition of land for proposed transmission line area.

Major impact during construction phase may include air pollution due to constructional activity and movement of vehicles. Noise generated from moving and idling vehicles, construction activity and movement of heavy machinery may cause hearing problem and create sudden panic to the adjacent people. Surface water quality deterioration due to dumping of solid waste may occur if not managed properly. Soil and ground water may be polluted by accidental spillage of waste lubricants from machineries. Possibility of occurring accidents due to lack of safety and security, not using proper PPE, spread of several contagious and infectious diseases. Susceptibility of unconventional relations between the migrant laborers and local vulnerable women may lead to the risk of gender oriented/sexually transmitted diseases like HIV/ AIDS and STI and gender-based violence (GBV). Spread of contagious diseases due to unhygienic condition in labor shed. Beneficial impact is employment opportunity will be generated during construction.

The major impacts during operation phase may include air pollution from stack emission and raw material handling, noise emission from mill operation and substation. Surface water quality may degrade if the waste water from the cooling process discharged in adjacent water body without treated. Lack of proper handling of slag waste and its disposal, solid waste from filter bags. Spillage of chemicals may degrade the soil and ground water quality. In addition to that due to influx of residential officials and workers significant amount of solid waste and sewage waste will be generated. There is possibility of occurring accidents and spread of several transmittable and infectious diseases among community people. Transmission line may pose potential hazards such as electrocution, lightning strike, bird electrocution etc. during operation time. Impact evaluation and identification has been presented in **Table 5.2**

6. PREDICTION, EVALUATION AND MITIGATION MEASURES OF IMPACTS

After evaluating the impacts and their effects on the surroundings, mitigation measures should be taken thoroughly to keep the environment less harmful and hazard free.

As mitigation measures during construction phase, it is suggested to do 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 of good quality drinking water and standard toilet facilities must be provided to the workers at the construction site. The quality of drinking water should be checked periodically. Access to workplace must be restricted for community people to provide higher degree of safety and people working in the site must wear 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. Proper handling of hazardous (E-waste) material and regular inspection of occupational health and safety should be maintained.

During operation phase, the project authority will install fume treatment plant of latest technology for treating emission so that the parameters remain well within the standards provided By Air Pollution Control Rules, 2022. Proponent should install STP for proper treatment of sewage waste. Liquid waste from the cooling tower (blowdown water) will be treated in the WWTP for reusing them in slag cooling. There is no other source of liquid waste generation from the plant. No waste water from the plant will be discharged to the surface waterbody. Slag waste from the EAF should be treated before reusing them. Because of its chemical composition and technical properties, it can be reused as raw material in substitute for aggregates in civil engineering. Proposed project planned to implement a slag treatment plant with a capacity of 20 MT/hr in the project boundary area. Hazardous waste (fuels, oils, lubricants) should be segregated separately and safe disposal should undertake. Solid wastes should be segregated and properly dispatched to the designates waste site or handover it to the waste collection authority. Identifying the possible risk during project operation and provide PPEs and other safety facilities to the mill workers. Local people should be given priority in case of employment. Safe drinking water and proper sanitation system should be present at project site.

a. Air Modeling

An advanced air emission dispersion modeling has been conducted for determining the ground concentration of pollutants from the stack of proposed FTP. USEPA approved AERMOD view version 10.0.1 model was used to estimate emission concentration from the plant. The NOx, SOx and SPM concentration contour has been analyzed with 1000 m interval with a radius of 10000m from the point source. Emission contour map showing the concentration for 24-hour average and Annual average at 10km radius of the project location are shown in Figure 6.3- 6.8, in section 6.4.1.

Table 3: Summary of the exhaust specifications and model input data

Parameters	Values
Stack height	30 m
Stack inside diameter	4.5 m (Exhaust pipe diameter)
Stack Location	22°56'46.03"N, 91°30'56.06"E
Number of stacks	1
Stack exit velocity	10 m/s
Exhaust temperature	20^0C
Emission rate of Dust	3.06 m^3/s
NOx emission rate as NO_2	6.64 m^3/s
SO_x emission rate as SO_2	5.11 m^3/s
Ambient Temperature	30 ^{0}C

Table 4: NOx, SOx and SPM concentration at various distances from the stack from Modelling

Direction	Distance	Value concentration (24-hour average)			Direction	Distance	Value concentration (Annual average)		
		NOx	SOx	SPM			NOx	SOx	SPM
North	1-2 km	0.6-1.0 µg/m^3	0.5-1.0 µg/m^3	0.3-0.8 µg/m^3	North	1-2 km	0.05-0.1 µg/m^3	0.03-0.1µg/m^3	0.02 µg/m^3
	3-4 km	0.4-0.6 µg/m^3	0.3-0.4 µg/m^3	0.1-0.3 µg/m^3		3-4 km	0.02-0.05 µg/m^3	0.01-0.03 µg/m^3	0.01 µg/m^3
	> 5 km	0.16-0.4 µg/m^3	0.12-0.3 µg/m^3	0.1 µg/m^3		> 5 km	0.01-0.02 µg/m^3	0.010 µg/m^3	0.006-0.01 µg/m^3
South	1-2 km	0.8-1.0 µg/m^3	0.8-1.0 µg/m^3	0.3-0.8 µg/m^3	South	1-2 km	0.08-0.1 µg/m^3	0.07-0.1 µg/m^3	0.02-0.06 µg/m^3
	3-4 km	0.5- 0.8 µg/m^3	0.4-0.8 µg/m^3	0.1-0.3 µg/m^3		3-4 km	0.02-0.08 µg/m^3	0.01-0.07 µg/m^3	0.01-0.02 µg/m^3
	> 5 km	0.16-0.5 µg/m^3	0.12-0.4 µg/m^3	0.1 µg/m^3		> 5 km	0.02 µg/m^3	0.010 µg/m^3	0.01 µg/m^3
East	1-2 km	0.6-1.0 µg/m^3	0.5-1.0 µg/m^3	0.3-0.8 µg/m^3	East	1-2 km	0.06-0.1 µg/m^3	0.05-0.1 µg/m^3	0.02-0.06 µg/m^3
	3-4 km	0.16-0.6µg/m^3	0.12-0.5 µg/m^3	0.1 µg/m^3		3-4 km	0.02-0.06 µg/m^3	0.01-0.05 µg/m^3	0.01.02- µg/m^3
	> 5 km	0.16 µg/m^3	0.12 µg/m^3	0.1 µg/m^3		> 5 km	0.02 µg/m^3	0.01 µg/m^3	0.006-0.01 µg/m^3
West	1-2 km	2.0- 4.0 µg/m^3	2.0-3.0 µg/m^3	1.0-2.0 µg/m^3	West	1-2 km	0.2-0.4 µg/m^3	0.1- 0.3 µg/m^3	0.1- 0.3 µg/m^3
	3-4 km	1.0-2.0 µg/m^3	1.0 µg/m^3	0.6-1.0 µg/m^3		3-4 km	0.1-0.2 µg/m^3	0.1 µg/m^3	0.1 µg/m^3
	> 5 km	0.5- 1.0 µg/m^3	0.3- 0.8 µg/m^3	0.3- 0.6 µg/m^3		> 5 km	0.06-0.1 µg/m^3	0.03- 0.1 µg/m^3	0.05-0.1 µg/m^3
Bangladesh standard for 24 hours concentration		80 µg/m^3	80 µg/m^3	65 µg/m^3	Bangladesh standard for annual concentration for		40 µg/m^3	NF	35 µg/m^3
IFC/WHO standard for 24hours concentration		NF	20 µg/m^3	75 µg/m^3	IFC/WHO standard for annual concentration		40 µg/m^3	NF	50 µg/m^3

In table 4, the highest 24hours and annual emission of NOx, SOx and SPM is found to be at the west side of the project which is below the IFC/WHO and Bangladesh standards.

In table 5, Primary data used to compare the total pollution in the proposed project area with the Bangladesh standards and all the value is below the maximum standards. The maximum 24 hours concentration of NOx, Sox and SPM has been detected as 4.0 µg/m^3, 3.0 µg/m^3 and 2.0 µg/m^3 respectively in a pocket at a radius up to 1-2 km north to the project.

Table 5: Comparison Ambient air quality guideline for NOx, SOx and SPM

Pollutants	Average Period	Ambient concentration	Maximum Concentration from steel mill	Total	BNAAQS* (µg/m3)
NOx	24-hours	11.1**	4.0	15.1	80
SOx	24-hours	6.2**	3.0	9.2	80
SPM	24-hours	88.1 **	2.0	90.1	150

**Bangladesh National Ambient Air Quality Standard for 24 Hours*

***Maximum 24 Hours average of NO_x, Sox and SPM concentration during primary data collection (table 4.15)*

b. Operational Waste Water

This project will install an WWTP to purify the Waste water release from the blowdown process. The proposed WWTP will reduce suspended solids, oil and heavy metal from the waste water through a physical and chemical treatment and the sludge from the WWTP will be thickened and dried in the sludge treatment process before disposed off. The treated waste water will be used in slag treatment process, where all the water will be evaporated. So, no waste water from the mill operation will be released in the nearest surface water body. Details of WWTP is provided in Section 3.8.4. There will be a WTP to treat the rain water/ surface water before using in the cooling tower. The water will pass through a surge tank for sedimentation and an additive will be used before entering in the cooling tower. Details shown is figure 3.8, section 3.7.2.

7. ENVIRONMENTAL MANAGEMENT PLAN (ESMP)

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. The Environmental Management Plan (EMP) includes several plans for implementing mitigation and enhancement measures, waste management plan, occupational health and safety plan, green belt development, EMP implementation team, Cost of EMP implementation, Contingency plan, EMP monitoring and review has been discussed in detail in **Chapter 7**. Summary of recommended management plan and benefit enhancement measures are presented in **Table 7.1 of Chapter 7**. The total EMP implementation cost will be BDT 1,26,65,400.00.

8. MONITORING, EVALUATION AND REPORTING

Monitoring programs have been proposed for this project, during both construction and operation phase. The objective of this monitoring program is to ensure that the various tasks detailed in the environmental and social management plan, particularly the mitigation measures are implemented in an effective manner, and also to evaluate project's impacts on the key environmental and social parameters.

Suggested analytical monitoring during construction phase are monitoring of ambient air, noise, surface water and ground water parameter. Suggested analytical monitoring during operation phase includes stack emission, STP, WWTP, ambient air, noise, surface water and ground water parameter parameters. Some visual monitoring has also been suggested. Detail Monitoring plans are described below in **Chapter 8** in detail**.** A management set up has to be created for the environmental monitoring program which can ensure compliance with national environmental standards. The total estimated cost of monitoring would be around BDT 17,05,000.00 yearly during construction and BDT 11,77,000.00 yearly during operation respectively.

9. ALTERNATIVE ANALYSIS

Modern world is facing the demand of steel to support the Modern civilization, Infrastructure engineering, economic growth. The aim of this project is to manufactured 1,000,000 MT steel products per year and supply the products to the national and international market. Choosing this project can provide employment opportunity, supply of infrastructure materials and could support national economic development. If chose no build scenario instead of steel mill establishment then there will be no environmental impact as well as no development and economic growth will be possible. So, choosing 'No Build Scenario' alternative is unacceptable.

The Steel mill is planning to be developed in an area of 60 Acres. The project land is owned by Unitex Steel Mills Limited and enough to set new industry with all equipment and machineries. This proposed Steel mill will be connected with Korerhat 400/230/132/33 KV Substation of PGCB by a new 230/33 KV Grid Substation of Unitex, where electricity will be supplied from National Grid. Load sanction has already been approved from regulatory body. There is also no alternative land for the proposed project right now. If the project chooses to relocate then it will be too expensive for the proponent to buy another land and develop the overall project. So, the selected location of steel manufacturing mini mill is quite expectable for the proposed project from environmental point of view.

Moreover, the proposed project involves the introduction of best technologies which is energy and time efficient. Technologies such as Electric Arc Furnace, Ladle Refining Furnace, Continuous Casting Machine, Rolling Mill, Air Separation Plant, etc. for steel manufacturing process. Even this proposed project also suggest the best method and technologies, which will generate less pollution in the environment such as Fume Treatment Plant, Waste Water Treatment Plant, Slag Treatment plant and rain harvesting tank etc. So, alternative of project technology is not required as the proposed project technology is quite efficient.

10. EMERGENCY RESPONSE AND DISASTER MANAGEMENT PLAN

- **Emergency response plan**

Under the supervision of the 'Environment Management and EHS team, all project personnel will have responsibilities assigned to them during emergency. There should be trained emergency response teams, specific contingency plans and specific equipment packages in place to cope with these types of emergencies. The proposed project should have an emergency evacuation plan with supportive emergency resource and cost of institutional capacity building. In case of an emergency incident occur, immediate action must be taken to mitigate the impacts. Details discussed in **Chapter 10**

- **Disaster management plan**

Appropriate management plan should have to be taken by the project operator to prevent any unwanted disasters (earthquake, fire accident, flooding, terrorist attack, etc.) in the project area as per the suggestion made in **chapter 10**.

11. STAKEHOLDER CONSULTATION

Stakeholder consultations are very important and sensitive issues for setting up a new steel mill in any area of Bangladesh. Two types of consultation were carried out which are Focus Group Discussion and Key Informant Interviews during 13th September, 2023 to 8th October, 2023 respectively. Local people, fishermen, farmers, women, children and vulnerable groups were communicated during the focus group discussion and they request the project proponent to not dump any waste in the nearest water body, not deteriorate the air quality and asked for compensations if any unanticipated situation occur due to the project implementation. Govt. offices of Chhagalnaiya Upazila and Feni District, such as, DoE, Bangladesh Water Development Board (BWDB), Department of Fisheries, Department of Agricultural Extension, UNO Office and Upazila Parishad of Chhagalnaiya Upazila, Gopal Union Parishad, Feni district was reached during the key informant interviews. The KII participants are in support with this project If all the environmental rules and regulation regarding this project followed properly. Throughout these meetings a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact.

12. GRIEVANCE REDRESS MECHANISM

The Project Management will establish a procedure to answer to project-related queries and address complaints and grievances. The complaints related to project operation that may create inconveniences to agency/individual should be addressed based on consensus, the procedure will help to resolve issues/conflicts amicably and quickly without resorting to expensive, time-consuming legal actions. To ensure impartiality and transparency, hearings on complaints will remain open to the public. A Grievance Redress Committee (GRC) will be created and the GRC will record the details of the complaints and the reasons that led to acceptance or rejection of the particular cases. The GRC will keep records of all resolved and unresolved complaints and grievances and make them available for review as and when asked for by appropriate authority and any organizations known to be working with urban development

issues. However, it should be noted that the GRC process will not pre-empt and aggrieved person's right to seek redress in the courts of law. The GRC team is described in **Chapter 12**.

14. CONCLUSION

The proposed project is a nationally important project to ensure economic growth and secure the future development of modern civilization. The present EIA report finds that; though there are certain adverse environmental impacts associated with the project construction and operation phase, but these are manageable if provided recommendations in the mitigation plan are followed with due diligence.

Steel industry has a major role in our nation's economy. It provides the raw materials needed to make cars or planes or trains, household appliances, engineering infrastructures, buildings and other essential things people need in their daily lives. Without steel, we wouldn't have the infrastructure to support today's population of Bangladesh. Unitex Steel Mills Limited (USML) will be the most automated advanced merchant mill along with the electric steel making manufacturing facility and long product rolling mill. USML also have the fume separation plant, water treatment plant for this proposed project.

Moreover, this project has been designed to comply with the country's environmental laws and regulations especially on, air emissions, ambient air quality, waste water effluent, and noise. The present EIA report finds that though there are certain adverse environmental impacts associated with the industrial unit under consideration, these are manageable provided recommendations in the EMP are followed with due diligence.

GENERAL INFORMATION

The list of authorities for the proposed project "Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni" is shown in Table 3;

Table 3: Involved Proponent in The Proposed Project

SL No.	Involved Proponent Type	Proponent Details
1.	Proponent From Unitex Steel Mill Limited	▪ Mrs. Maimuna Khanam, Managing Director ▪ Mr. Mohammad Shahidullah Kaisar, Director ▪ Mr. Belal Ahmed, CEO
2.	Assigned Person for This Proposed Project	**Name:** Engr. Pranoy Barua **Designation**: Project Head **Phone:** +8801818132180 **E-mail:** pranoy.barua@unitexbd.com
3.	Environmental Consultant	**Consultancy Name:** Adroit Environment Consultants Ltd. (AECL) **Address:** HOUSE 01, ROAD 16, SECTOR 7. UTTARA, DHAKA-12309 **E-MAIL**: aecldhaka@gmail.com, eia.aecl@gmail.com, **WEB:** www.aecl-bd.org

Declaration Letter

We do here by declare that the entire EIA study titled "Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni" will be conducted by the below mentioned consultants of Adroit Environment Consultants Ltd. (AECL) appointed by Unitex Steel Mills Limited (USML) and the EIA report will be prepared and submitted to the Department of Environment (DoE) with our full concern.

Dr. Nasir Uddin Khan
B.Sc. Eng. (Civil),
M.Sc. Eng. (Environment),
PhD (USA)

Senior Environmental Expert (Team Leader)

Md. Saiful Islam
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Environmental Expert

Shanjana Haider
B. Sc. Engineering (Civil, BUET),
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Environmental Expert

Mamun Ar Rashid
MSS (Political Science, National University),
Post Graduate Diploma in
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Socio-Economist

Fazilatun Nessa
Masters in Social Science

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Dr. Abdul Jabber Howlader
M.Sc. (Zoology) Entomology,
Ph.D (Zoology),

Ecologist

Commonwealth Post-Doctoral Fellow

Dr. Md. Baki Billah
M.Sc. Zoology (Fisheries), JnU
Ph.D. in Biology

Fisheries Expert

Md. Faisal Bin Mahmud

Chemist/Baseline Survey Co-ordinator

Md. Golam Rasul
(BURP, RUET)

GIS Analyst

Raktim Banik

Field Investigator/Social

Md. Kamal Uddin

Field Investigator/Social

Md. Rubel Miah

Field Investigator/ Environment

Chapter 1

1 INTRODUCTION

1.1 Background

Steel industry played an important role in the development of modern civilization. Without steel, we wouldn't have the infrastructure to support today's population of Bangladesh. It has a major role in our nation's economy. It provides the raw materials needed to make cars or planes or trains, household appliances, engineering infrastructures, buildings and other essential things people need in their daily lives. Steel is the backbone of our civilization and its importance will only continue to grow as our civilization continues to grow and expand and develop new technologies.

Bangladesh's steel industry is growing at a rapid pace as the steel demand for the mega infrastructure projects has increased in this decade. Demand for steel has increased sharply in recent years – currently 7.5 million MT which was merely 2.5 million MT in a decade ago.

To cope up with the increasing demand of steel production in Bangladesh and worldwide, Unitex Steel Mills Limited is planning to establish a steel manufacturing mill with an aim to increase the steel production 1,00,000 metric tons per annum. Unitex Steel Mills Limited (USML) will be the most automated advanced merchant mill along with the electric steel making manufacturing facility and long product rolling mill once established. USML also plans to have the fume separation plant, water treatment plant for this proposed project

Adroit Environment Consultants Ltd (AECL) has been engaged by Unitex Steel Mills Limited (USML) to conduct the EIA for the project titled " Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni". This EIA report has been prepared in order to obtain the environmental clearance certificate (ECC) from the Department of Environment (DoE) by following all the legal guideline of the Government of Bangladesh (Gob).

1.2 Objective of the Study

The specific objectives of EIA study are as follows:

- To identify the potential environmental and socio-economic impact of the proposed project and their possible mitigation measure during its construction and operation phase.
- To prepare EIA report according to the approved ToR by DoE and following all the legal guidelines.
- To obtain an Environmental Clearance Certificate (ECC) from DoE.

1.3 Scope of Study

As per the Schedule-1 of the ECR 2023, the proposed project falls under **"Red Category**" which requires Environmental Impact Assessment (EIA) Study to assess the impacts of the project in the surrounding area and suggest the Mitigation measures, Environmental Management plan etc. So, the scopes of this study include but not limited to the following:

- Study of the relevant documents on Policy, Legal and Administrative framework and their review, particularly on environmental aspects and effluent discharge limits, health and safety requirements, identification of sensitive areas and endangered species, land use etc.;
- Identification of project details and major project activities, both during construction and operational phases of the project;
- Carrying out an Environmental baseline survey (Meteorology, Climate, Geology, Hydrology, Ambient air, Noise, Ecology, Land use pattern, Natural disasters, Socio-economic condition etc.) covering the project site i.e., study areas;
- Identification of the Important Environmental and Social Components (IESC);
- Identification of environmental impacts of project activities on the surrounding environment, including cumulative impacts of the proposed project;
- Identification of the most significant Environmental and Social impacts and suggestions for mitigation measures in order to eliminate negative impacts and to enhance positive impacts;
- Development of Environmental Management Plan (EMP) for both construction as well as operational phases of the project;
- Preparation of Environmental monitoring and implementation arrangement for preconstruction, construction and operation stage of the project;
- Present justification for the project, and to investigate alternatives to reduce potential environmental impacts and increase potential benefits;
- Prepare Emergency response plan and Disaster Management Plan;
- Arrangement of consultation meetings to consult with potentially affected people.

1.4 EIA Methodology

The focus of the EIA will be to collect baseline data and to identify anticipated environmental and social effects, both positive and negative that may result from the project. Predictions will consider all aspects and phases of the project. The methodology followed to undertake the EIA study is divided into several tasks elaborated below:

- **Project Data Compilation:** A generic description of the proposed activities relevant to environmental assessment has been compiled with the help of the proponent.
- **Legislative Review:** Information on relevant & prevailing national legislation, regulations, guidelines, and standards was reviewed and compiled.

- **Baseline Data Collection:** Extensive field visits have been conducted to collect primary and secondary data to ensure establishment of proper baseline information. Secondary data on weather, soil, water resources, wildlife and vegetation were reviewed and compiled. Terrestrial ecological and fisheries baseline has also been prepared. This section covers the following aspects comprehensively in addition:
    - Relevant physical, biological, and socioeconomic conditions within the study area;
    - Detail description of local geology, topography, Local climatic condition, hydrological (Surface and ground) condition, geography, extreme environment, wind pattern and soil condition;
    - Traffic volume study at the project site access road and near the project site highway.
    - Description of land use/ land cover has been provided including ecologically critical area, national parks, forest, orchard, cultural heritage site etc. (if any), in the selected project site. Landsat 8 image (Spatial Resolution: 30m*30m and color composite band: 1-7) has been used for Land use and land cover analysis.
    - While describing the meteorological condition, mean, minimum & maximum temperature, monthly & yearly total rainfall, humidity, wind speed & wind direction of last 5 years including several relevant distribution maps of Bangladesh have been collected from Bangladesh Meteorological department (BMD) and provided in the relevant section;
    - Baseline primary data has been collected (air, noise, surface & ground water) and their test results have been presented.
    - In describing ecology, geology, soil, aquatic flora, aquatic fauna, terrestrial flora, terrestrial fauna and forest as are available in the site and site area have been described with photographs;
    - Cyclones and alignment of cyclones has been provided with maps, figures, data and information;
    - Similarly, seismicity risk and flood risk have been described with relevant maps, figures, data and information;
    - Latest Primary Socio-economic information has been collected through household survey and Secondary Socio-economic information have been collected from latest Bangladesh Bureau of Statistics (BBS);
    - Description of map of unique sites or special features such as parks and protected areas, Heritage Rivers, historic sites, environmentally and culturally significant sites;
    - Physical or cultural heritage (if any);
- **Identification of potential impacts:** The information collected in the previous steps were reviewed and potential environmental issues were identified.
- **Impact Assessment:** The environmental, socioeconomic, and project information was collected to assess the potential impacts of the proposed activities. The impact assessment was considered for the project during pre-construction, Construction and Operation stage of the project.

- **Suggestion of Mitigation Measures for Adverse Impacts:** After identifying all negative impacts at all stages i. e. pre-construction, Construction and Operation stage of the project, suggestions for mitigation measures have been outlined as per the prevailing national guideline.
- **Analysis of Alternatives:** Analysis of alternative options was considered to minimize impacts of the Project while undertaking this EIA study. Analysis of Alternatives chapter includes Site and Technology alternative. The "No Build" scenario is also discussed in this chapter.
- **Stakeholder Consultation:** Extensive consultation has been conducted with key stakeholders' including the local population, vulnerable groups including women, government departments/agencies, and NGOs.
- **Grievance Redress Mechanisms:** Brief Description has been given of the grievance redress framework/mechanisms (both informal and formal channels), setting out the time frame and mechanisms for i) resolving complaints about environmental and social performance; and ii) worker / contractor related grievances.
- **Suggestion of Environmental Management and Monitoring Plan:** A structured Environment management, institutional or organizational arrangements and monitoring plan has been suggested to mitigate all adverse impacts with appropriate monitoring suggestions to ensure the compliance of the local and international lender legislations.
- **Conclusion and Recommendations:** Presented the conclusions drawn from the assessment and provide recommendations.

1.5 The EIA Team

Adroit Environment Consultants Ltd. (AECL) has prepared this report under the guidance and supervision of Dr. Nasir Uddin Khan. The total team composition and their expertise have been given in the table below:

Table 1.1: The EIA Team

Professional	Name	Expected Expertise
Team Leader/ Senior Environmental Expert	Dr. Nasir Uddin Khan B. Sc. Engineering (Civil) M. Sc. Eng. (Environment) Ph.D. (Climate Change, Environmental Management & Sustainable Development)	Environmental & Social Impact Assessment (EIA, EMP/EIA), Industrial Wastewater Treatment, Environment monitoring, Solid waste management, Climate Change, Environmental Management System, Occupational Health & safety, Cleaner Production and Energy efficiency, Air & Noise modeling, environmental education & awareness.
Environmental Expert	Md. Saiful Islam B.Sc. Engg. (Civil, RUET), M.Sc. Engg. (Civil & Environment)	Engineering survey, site plan, Preparation of EIA, EMP & EIA. Environmental Monitoring

Professional	Name	Expected Expertise
Environmental Expert	Shanjana Haider B.Sc. Engg. (Civil, BUET), M.Sc. Engg. (Civil & Environment, IUT)	Engineering survey, site plan, Preparation of EIA, EMP & EIA, Environmental Monitoring and report preperation
Ecologist	Dr. Abdul Jabber Howlader M. Sc. (Zoology) Entomology, Ph.D (Zoology), Commonwealth Post-Doctoral Fellow	Ecological survey on the fauna (macro and micro invertebrates, fishes, birds) of the project area, Primary Aquatic and Ecological survey details analysis, Establishing baseline condition fisheries and aquatic resources.
Fisheries Expert	Dr. Md. Baki Billah M.Sc. Zoology (Fisheries), JnU Ph.D. in Biology	Ecological survey on the Aquatic fauna (macro and micro invertebrates, fishes, birds) of the project area, Primary Aquatic and Ecological survey details analysis, Establishing baseline condition fisheries and aquatic resources.
Sociologist	Mamun Ar Rashid Masters in Social Science Post Graduate Diploma in Disaster Management from Dhaka University.	Social Survey on project affected person, vulnerable group, economic condition and livelihood pattern around the project area.
Socio- Economist	Fazilatun Nessa Masters in Social Science	Socio economical Survey on project affected person, vulnerable group, economic condition and livelihood pattern around the project area.
Chemist	Md. Faisal Bin Mahmud	Environmental Monitoring, Laboratory analysis for different environmental parameters.
GIS Analyst	Md. Golam Rasul (BURP, RUET)	Analyzing spatial data through mapping software and preparing digital maps with geographic data and various other data sets.
Field Investigator	Raktim Banik	Base line data collection, secondary data collection, monitor, record, and assess individuals, places, and events.
Field Investigator	Md. Kamal Uddin	Base line data collection, secondary data collection, monitor, record, and assess individuals, places, and events.
Field Investigator	Md. Rubel Miah	Base line data collection, sample collection from site, sample preservation and laboratory analysis.

1.6 Limitations of the Study

Services performed by the consultant are conducted in a manner consistent with level of care and skill generally exercised by members of the engineering and consulting profession. The report may not exhaustively cover an investigation of all possible aspects and circumstances that may exist. However, an effort is made to discover all meaningful areas under the stipulated time available.

In evaluating subject site, consultant relies in good faith on information provided by client's management or Employees. The Consultant assume that the information provided is factual, accurate. However, the consultant notifies the contradictions and errors in the data, where it seems appropriate.

In some cases, secondary data was used in this study to overcome this issue. It should be recognized that the information given in the report is time specific and with the passage of time the relevancy of data and analysis may suffer. Specific circumstances and condition of site can change due to which conclusion and opinions may also change.

1.7 Acknowledgement

The EIA Report has been prepared basically with the support from Unitex Steel Mills Limited and also from various government agencies and NGOs including Department of Environment (DOE), Bangladesh Meteorological Department (BMD), Bangladesh Bureau of Statistics (BBS), Bangladesh Water Development Board (BWDB), Department of Fisheries, Department of Agricultural Extension, UNO Office and Upazila Parishad of Chhagalnaiya Upazila, Gopal Union Parishad, Feni district Local Representatives etc. We would like to express our gratitude to each organization and its employees for their contribution and kind co-operation in conducting the study.

Chapter 2

2 LAW AND LEGISLATION

2.1 Introduction

As an institutional arrangement, Government of Bangladesh has designated the “Department of Environment" (DOE) with the responsibility for the regulatory functions to enforce the environmental laws, rules and regulations to prevent environmental degradation in the country. Under these legal provisions, the industrial entrepreneurs/ project owner must undertake environmental study and take mitigation measures to protect the environment from pollution and adverse impacts and must get “Environmental Clearance” from DOE before setting up and running their industries/project.

The environmental classifications for industrial projects in Bangladesh are based on "inclusion lists" given in the ECR 2023 with ‘**RED**’ being the highest. Based on project categorization under the ECR, the proposed steel manufacturing mill falls under the **“Red category”** (i.e., serial no. 21 of Red Category list in Schedule-1 in the ECR 2023).

The prevailing national policies, strategies, laws, rules, action plans along with IFC EHS Guideline, ADB, AIIB, EP and WB Performance Standards are also briefly discussed in the following sections.

2.2 Implications of Policies and Regulations on The Proposed Project

Table 2.1 below presents an outline of other National legal instruments that will have relevance to the proposed Project with respect to the social and environmental considerations.

Table 2.1: National Legal Instruments relevant to the Project

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
National Environmental Policy, 2018	Department of Environment Ministry of Environment, Forest and Climate Change (MOEFCC)	• To identify and control all types of environmental pollution and degradation activities; • To ensure environmental development in all fields; • To ensure sustainable, long-term and environmentally friendly use of all natural resources; • To explore and expand the areas of mutual cooperation in regional and international arenas for the development of global environment; • To maintain and streamline the environmental policies and strategies among other policy strategies in the interest of sustainable development.	Applicable as the project activity associated with environmental issues.
National Conservation Strategy, 1992	Ministry of Environment, Forest and Climate Change (MOEFCC)	• All project will be subject to an EIA/EIA and the adoption of pollution prevention/ control technologies will be enforced; • Hazardous or toxic materials/wastes will not be imported as raw materials for project; • Import of appropriate and environmentally-sound technology will be ensured; • Dependence on imported technology and machinery should gradually be reduced in favor of sustainable local skills and resources.	Applicable as the project proponent needs to meet all the requirements effectively.
National Environmental Management Action Plan (NEMAP), 1995	Department of Environment Ministry of Environment, Forest and Climate Change (MOEFCC)	• To identify the key environmental issues affecting Bangladesh; • To identify the actions necessary to halt or reduce the rate of environmental degradation; • To improve the natural and built environment; • To conserve the habitats and biodiversity; • To promote the sustainable development; • To improve the quality of life of the people.	Applicable as the project activity associated with environmental issues.

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
The Environment Conservation Act, 1995 and subsequent amendments in 2000 2002 and 2010	Department of Environment Ministry of Environment, Forest and Climate Change (MOEFCC)	• Define Applicability of environmental clearance; • Regulation of development activities from environmental perspective; • Framing applicable limits for emissions and effluents; • Framing of standards for air, water, and noise quality; • Formulation of guidelines relating to control and mitigation of environmental pollution, conservation, and improvement of environment; • Declaration of Ecologically critical areas.	Applicable as the proposed project falls under "Red" Category and requires Environmental Clearance Certificate for operation.
Environmental conservation Rules, 1997 and subsequent amendments in 2002, 2003, 2017, and 2023	Department of Environment Ministry of Environment, Forest and Climate Change (MOEFCC)	• Declaration of Ecologically critical areas; • Requirement of environmental clearance certificate for various categories of projects; • Requirement of EIA/EIA as per category; • Provides standards for quality of air, water and sound and acceptable limits for emissions/discharges from industries, vehicles and other sources.	Applicable as the Project falls under "Red" Category and requires Environmental Clearance Certificate for operation.
Noise Pollution (Control) Rules 2006	Ministry of Environment, Forest and Climate Change (MOEFCC)	• Prevention of Noise pollution; • Standards for noise level.	Applicable as noise will be generated due to the project activity.
Air Pollution (Control) Rules 2022	Ministry of Environment, Forest and Climate Change (MOEFCC)	• Prevention of Air pollution; • Standards for Ambient Air Quality.	Applicable as ambient air quality will be affected due to the project activity.

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
Environment Court Act, 2010	Ministry of Environment and Forests and judiciary	• The 2010 Environmental Court Act supports the Environmental Conservation Act (1995) and the Environmental Conservation Rules (1997) by providing for the establishment of environmental courts for the trial of offences relating to environmental pollution; • It includes protocols for the establishment of the court, and defines the court's jurisdiction, appropriate penalties, powers of search and entry, and procedures for investigation, trial and appeal.	Applicable as the project activity associated with environmental issues.
National Land-use Policy, 2001	Ministry of Land	• To deal with several lands uses including agriculture (crop production, fishery, and livestock), housing, forestry, industrialization, railways and roads, tea and rubber; • To identify land use constraints in all these sectors.	Applicable as land usage involved in this project and there are agricultural lands and water body around the project area.
Natural Water Bodies Protection Act 2000	Ministry of Land	• According to this Act, the character of waterbodies i.e., rivers, canals, tanks, or floodplains identified as water bodies in the master plans or in the master plans formulated under the laws establishing the municipalities in division and district towns will not be changed without approval of concerned ministry. • This Act is under the Rajdhani Unnayan Katripakkha/Town Development Authority/Municipalities.	Applicable as the project will withdraw water from adjacent water body during project operation
Bangladesh Water Act, 2013	Ministry of Water Resources (MoWR)	• All forms of water (e.g., surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people; • The private landowners will be able to use the surface water inside their property; • Requirement for permits/licenses for large scale water withdrawal by individuals and organizations beyond domestic use.	Applicable as the proposed project will require groundwater for drinking, sanitation and construction purpose.

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
The Ground Water Management Act, 2018	Ministry Of Water Resources	• Management of groundwater resources; • Installation of tube wells at any place after licensing from Upazila Parishad only.	Proposed Project will use groundwater for cooling, drinking and sanitation purpose.
Wildlife (Conservation and Security) Act 2012	Forest Department Ministry of Environment and Forests	• Under the act, the hunting, trapping, killing of wildlife are strictly prohibited. There are certain provisions kept in this act, e.g., entrance, management, rules and regulation of the protected area. If any person without license performs any kind of trade, he will be jailed for at least one year.	Applicable as there may be wildlife around the project area and they may be impacted due to project activity.
National Fisheries Policy, 1998	Ministry of Fisheries and Livestock	• Enhancement of the fisheries production; • Poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers; • Achieve economic growth through earning foreign currency by exporting fish and fisheries products; • Control measures will be taken against activities that have a negative impact on fisheries resources and vice-versa; and • Laws will be formulated to ban the disposal of any untreated industrial effluents into the water bodies.	Applicable as there may be some negative impact occur on fish fauna resulting from project activities.
The Protection and Conservation of Fish Act 1950 (amended in 1973, 1982, 1995 and 2002)	Ministry of Fisheries and Livestock	• Protection and conservation of fish in Government-owned water bodies.	Project construction activity may negatively impact fish

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
Acquisition and Requisition of Immovable Properties Act 2017	Ministry of Land	• Current GOB Act and Guidelines, relating to acquisition and requisition of land.	Applicable as the transmission route needs to acquire land and property
The Electricity Act, 2018	Ministry of Power, Energy and Mineral Resources	• An Act to repeal and re-enact the Electricity Act, 1910 with modification for developing and reforming the sectors of power generation, transmission, supply and distribution and for better service delivery to consumers and meeting the increasing demand for electricity. • Subsection 12 of section 3, (1) If any damage, harm or inconvenience is caused while doing civil works under this Act, the licensee will, in such manner as may be prescribed by rules, pay compensation to the person affected or the owner of the land affected for acquiring land for construction of electricity towers. (2) If any dispute arises from the amount payable as compensation under sub-section (1), the provisions of the Commission Act will apply to settle such dispute. • Subsection 27 of section 5, No licensee will harm or obstruct or interfere with railways, highways, airports, waterways, canals, docks, wharves and jetties and pipes, during power generation, transmission, supply or distribution; and will, in co-ordination with the concerned authority, take measures for protection and safety of the same. • Subsection 28 of section 5, The licensee will take all logical precautions during construction of power supply lines and doing civil works so as not to have any harmful effect on the communication system of telegraph, telephone or electromagnetic signal emitting lines by way of induction or any other means.	Applicable as a transmission line will be installed.

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
Electricity Rules, 2020	Ministry of Power, Energy and Mineral Resources	• Electricity Rules has been published by ministry on November 2020 based on Clause 59 of Electricity Act 2018 (SRO 297 of Act/2020). • The main observation is to provide compensation for the installation of transmission line towers to the land owners as per the applicable laws and policy.	Applicable as some household and agricultural land may get affected by this project transmission line.
Bangladesh National Building Code (BNBC) 2020	Ministry of Housing and Public Works	• This code is followed in Bangladesh to build safe houses and buildings; • Earthquakes and wind effect of different building systems are incorporated in this code.	Applicable as the structural work for steel mill should follow the code
Bangladesh Labor Act, 2006	Ministry of Labor and Employment	• Provides health, safety, and well-being of workforce during project life cycle. In addition, it also stipulated that child under 18 years are not allowed to be employed during project life cycle and therefore, this law requires to be complied with.	Applicable as skilled, semi- skilled and day laborer will be working in the project.
Solid Waste Management Rules 2021	Ministry of Environment, Forest and Climate Change (MOEFCC)	• In the case of resource recovery from waste, taking into account the waste hierarchy, all steps of waste generation, rejection, waste reduction, reuse, recycling, recovery, purification, residue management must be followed in sequence before final disposal. The waste generated from the construction should be kept separately until it is handed over to the local government authorities so that the dust does not spread into the air or fall into the drains through rainwater.	Applicable as different kinds of solid waste will be generated due to project activities.
Hazardous Waste (E-waste) Management Rules, 2021	Ministry of Environment, Forest and Climate Change (MOEFCC)	• Applicable to persons/organization engaged in manufacture, marketing, purchase, sale, import, export, storage, stocking for research in laboratories, disposal, repair, processing and transportation or all related activities of electrical and electronic products.	Applicable as different kinds of hazardous waste will be generated during the project construction and operation phase

Act/ Rule/ Law	Ministry/ Authority	Key Features	Applicability to the Project
Antiquities Act, 1968	Ministry of Law, Justice and Parliamentary Affairs	• To preserve the national cultural heritage; • To protect and control ancient monuments; • To regulate antiquities as well as the maintenance, conservation and restoration of protected sites and monuments; • To control planning, exploration and excavation of archaeological sites.	Applicable for the preservation of cultural heritages around the project site.
Fire Prevention and Extinction Rules, 2014	Department of Fire Service and Civil Defense Ministry of Home Affairs	• These rules provide project specific instruction for fire prevention and extinction • Fire license application procedure, duration, expiration etc. are mentioned in the rules	Applicable as fire outbreak may take place during both phases.
Fatal Accidents Act, 1855	Ministry of Labor and Employment	• This Act was promulgated to provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. The company will be liable to pay compensation in case of death of any worker/employee or damages in case death has not ensued but such circumstances could have resulted in death.	Applicable as accident/ incidents can occur to the worker/ employee and compensation should be provided according to the act.
Industrial Policy, 1991	Ministry of Industry (MoI)	• To conserve ecological balance and prevent pollution during industrialization; • To take effective steps for pollution control and conservation of environment during industrialization; • To ensure embodying of necessary pollution control and preventive measures by industrial investment project endangering environment.	Applicable as the project type is an industrial development which may have impacts on ecology and may pollute the environment.

2.3 IFC's Environmental and Social Safeguards Policies

2.3.1 IFC project categorization / Environmental Assessment (OP/BP 4.01)

The Bank requires environmental assessment (EA) of projects proposed for Bank support to ensure that they are environmentally sound and sustainable, and thus to improve decision making. EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples and physical cultural resources); and trans-boundary and global environmental aspects. The borrower is responsible for carrying out the EA and the Bank advises the bower on the Bank's EA requirement. The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

- **Category A**: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

- **Category B**: The proposed project's potential adverse environmental impacts on human population or environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than Category A projects.

- **Category C**: The proposed project is likely to have minimal or no adverse environmental impacts.

According to this categorization, the proposed project falls under ***Category A.***

2.3.2 Natural Habitats (OP 4.04)

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

2.3.3 Indigenous Peoples (OP 4.10)

This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.

The Bank recognizes that the identities and cultures of Indigenous Peoples are inextricably linked to the lands on which they live and the natural resources on which they depend. These distinct circumstances expose Indigenous Peoples to different types of risks and levels of impacts from development projects, including loss of identity, culture, and customary livelihoods, as well as exposure to disease. Gender and intergenerational issues among Indigenous Peoples also are complex. As social groups with identities that are often distinct from dominant groups in their national societies, Indigenous Peoples are frequently among the most marginalized and vulnerable segments of the population. As a result, their economic, social, and legal status often limits their capacity to defend their interests in and rights to lands, territories, and other productive resources, and/or restricts their ability to participate in and benefit from development. At the same time, the Bank recognizes that Indigenous Peoples play a vital role in sustainable development and that their rights are increasingly being addressed under both domestic and international law.

2.3.4 Physical Cultural Resources (OP 4.11)

The World Bank's general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination. The specific aspects of the Policy are given below:

- The Bank normally declines to finance projects that will significantly damage nonreplicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage;
- The Bank will assist in the protection and enhancement of cultural properties encountered in Bank-financed projects, rather than leaving that protection to chance. In some cases, the project is best relocated in order that sites and structures can be preserved, studied, and restored intact in situ. In other cases, structures can be relocated, preserved, studied, and restored on alternate sites. Often, scientific study, selective salvage, and museum preservation before destruction is all that is necessary. Most such projects should include the training and strengthening of institutions entrusted with safeguarding a nation's cultural patrimony. Such activities should be directly included in the scope of the project, rather than being postponed for some possible future action, and the costs are to be internalized in computing overall project costs;
- Deviations from this policy may be justified only where expected project benefits are great, and the loss of or damage to cultural property is judged by competent authorities to be unavoidable, minor, or otherwise acceptable. Specific details of the justification should be discussed in project documents;

- This policy pertains to any project in which the Bank is involved, irrespective of whether the Bank is itself financing the part of the project that may affect cultural property.

2.3.5 IFC Performance Standards 1–8

As part of the technical requirements under OP/BP4.03, the eight IFC Performance Standards – adopted by the World Bank as the "World Bank Performance Standards"–are applicable to Bank support for sub-projects (or components thereof) that are designed, owned, constructed and/or operated by a Private Entity. Under OP/BP 4.03, the Bank requires FIs whose portfolio and/or proposed business activities present moderate to high social or environmental risks to ensure that any such activities supported by the Bank are operated in a manner consistent with the World Bank Performance Standards.

Table 2.2: IFC Performance Standards

Performance Standards	Specific Areas
Performance Standard 1	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2	Labor and Working Conditions
Performance Standard 3	Resource Efficiency and Pollution Prevention
Performance Standard 4	Community Health, Safety and Security
Performance Standard 5	Land Acquisition and Involuntary Resettlement
Performance Standard 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7	Indigenous Peoples
Performance Standard 8	Cultural Heritage

(IFC, 2012)

2.4 World Bank's Environmental and Social Standard (ESS)

The Environmental and Social Framework (ESF) enhances the World Bank's commitment to sustainable development through ten Environmental and Social Standards (ESS) that are designed to support Borrowers' environmental and social (E&S) risk management. The ESF uses a risk-based approach that applies increased oversight and resources to complex projects and promotes increased responsiveness to changes in project circumstances through adaptive risk management and stakeholder engagement.

2.4.1 Applicable ESS Standards

Table 2.3 below presents an outline of Environmental and Social Standard (ESS) that will have relevance to the proposed project with respect to the social and environmental considerations.

Table 2.3: Environmental and Social Standard (ESS) relevant to the Project

Standards	Objectives	Co-relation with Project
Environmental and Social Standard (ESS)- 01 **Assessment and Management of Environmental and Social Risks and Impacts**	• To identify and evaluate environmental and social risks and impacts of the project; • To adopt a mitigation hierarchy to anticipate and avoid risk, or where avoidance is not possible, minimize or reduce risk and, where residual impacts remain, compensate for or offset them, where technically and financially feasible; • To promote improved environmental and social performance; • To adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities resulting from the project.	Applicable as the project work will involve some Environmental and Social risks and adverse impacts on natural environment, water, human health and safety during the project phase.
Environmental and Social Standard (ESS)- 02 **Labor and Working Conditions**	• To promote safety and health at work; • To promote the fair treatment, non-discrimination and equal opportunity of project workers; • To protect project workers, including vulnerable workers such as women, persons with disabilities, children (of working age, in accordance with this ESS) and migrant workers, contracted workers, community workers and primary supply workers, as appropriate; • To prevent the use of all forms of forced labor and child labor; • To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law; • To provide project workers with accessible means to raise workplace concerns.	Applicable as skilled, semi-skilled workers will be engaged during the project phase.
Environmental and Social Standard (ESS)- 03 **Resource Efficiency and Pollution Prevention**	• To promote the sustainable use of resources, including energy, water and raw materials; • To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities;	Applicable as several resources (i.e., manpower, electricity, machineries etc.) will be used and different kinds of pollution like air, noise, surface water and solid waste will be generated.

Standards	Objectives	Co-relation with Project
	• To avoid or minimize project-related emissions of short and long-lived climate pollutants; • To avoid or minimize generation of hazardous and non-hazardous waste;	
Environmental and Social Standard (ESS)- 04 **Community Health and Safety**	• To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project life cycle from both routine and non-routine circumstances; • To promote quality and safety, and considerations relating to climate change, in the design and construction of infrastructure, including dams; • To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials; • To have in place effective measures to address emergency events; • To ensure that the safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities.	Applicable as safety and security of the community people around the project sites is one of the major concerns.
Environmental and Social Standard (ESS)- 05 **Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**	• To avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives; • To avoid forced eviction; • To mitigate unavoidable adverse social and economic impacts from land acquisition or restrictions on land use by: (a) providing timely compensation for loss of assets at replacement.	Applicable as the project Transmission route area land needs to be acquired. But the substation and steel mill area are own land of USML
Environmental and Social Standard (ESS)- 06 **Biodiversity Conservation and Sustainable Management of Living Natural Resources**	• To protect and conserve biodiversity and habitats; • To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity; • To promote the sustainable management of living natural resources; • To support livelihoods of local communities, including Indigenous Peoples, and inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.	Applicable as there may be impact on biodiversity due to project intervention.

Standards	Objectives	Co-relation with Project
Environmental and Social Standard (ESS)- 07 **Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities**	• To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities; • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, or when avoidance is not possible, to minimize and/or compensate for such impacts; • To promote sustainable development benefits and opportunities for Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities in a culturally appropriate manner; • To obtain Free, Prior, and Informed Consent (FPIC) of the Affected Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities in the three circumstances described in this ESS.	Not applicable as no indigenous people were found within and around the project influence area.
Environmental and Social Standard (ESS)- 08 **Cultural Heritage**	• To protect cultural heritage from the adverse impacts of project activities and support its preservation; • To address cultural heritage as an integral aspect of sustainable development; • To promote meaningful consultation with stakeholders regarding cultural heritage; • To promote the equitable sharing of benefits from the use of cultural heritage.	Not applicable as no historical, archaeological and cultural heritages were observed within the vicinity of the project area.
Environmental and Social Standard (ESS)- 09 **Financial Intermediaries**	• To set out how the FI will assess and manage environmental and social risks and impacts associated with the subprojects it finances; • To promote good environmental and social management practices in the subprojects the FI finances; • To promote good environmental and sound human resources management within the FI.	Applicable for promoting good environmental and social management practices.
Environmental and Social Standard (ESS)- 10	• To establish a systematic approach to stakeholder engagement that will help Borrowers identify stakeholders and build and maintain a constructive relationship with them, in particular project-affected parties;	Applicable for maintaining constructive relationship between stakeholders and project affected parties.

Standards	Objectives	Co-relation with Project
Stakeholder Engagement and Information Disclosure	• To promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them; • To ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format; • To provide project-affected parties with accessible and inclusive means to raise issues and grievances, and allow Borrowers to respond to and manage such grievances.	

2.5 ADB Guidelines

2.5.1 ADB's Safeguard Policy Statement, 2009

The SPS applies to all ADB-financed and/or ADB-administered projects and their components, regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS. The objectives of ADB's safeguards are to:

- ✓ avoid adverse impacts of projects on the environment and affected people, where possible;
- ✓ minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- ✓ Assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- ✓ Environmental safeguards;
- ✓ Involuntary Resettlement safeguards; and
- ✓ Indigenous Peoples safeguards.

To help borrowers and clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- ✓ Safeguard Requirements 1: Environment (Appendix 1 of SPS);
- ✓ Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- ✓ Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- ✓ Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

In addition, ADB does not finance activities on the prohibited investment activities list (Appendix 5 of SPS). Furthermore, ADB does not finance projects that do not comply with its safeguard policy statement, nor does it finance projects that do not comply with the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law.

2.5.1.1 ADB Project Categorization

The ADB Safeguard Policy Statement 2009 sets out the requirements for ADB's operations to undertake an environmental assessment for projects funded by the bank. The environmental assessment requirements for projects depend on the significance of impacts on the environment by the project. Each proposed project is scrutinized as to its type; location; the sensitivity, scale, nature, and magnitude of its

potential environmental impacts; and availability of cost-effective mitigation measures. A project is classified as one of the environmental categories (A, B, C, or FI).

- **Category A:** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An EIA is required.
- **Category B:** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An EIA is required.
- **Category C:** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- **Category FI:** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

According to this categorization, the proposed project falls under ***Category A***.

❖ **Basic Environmental Assessment Requirements**

Category A: An EIA is required for Category A projects to determine whether or not significant environmental impacts will take place. The EIA is regarded as the final environmental assessment report. Public consultation must be undertaken during the EIA process. For Category A projects deemed environmentally sensitive, the EIA should be submitted to the Board at least 120 days prior to the Board consideration. The Bank may make the EIA available to locally affected groups and NGOs, upon request, through the Board Member of the DMC concerned, or through the Bank's Depository Library program, except where confidentiality rules would be violated.

❖ **Involuntary Resettlement**

A project's involuntary resettlement category is determined by the category of its most sensitive component in terms of involuntary resettlement impacts. The involuntary resettlement impacts of an ADB-supported project are considered significant if 200 or more persons will experience major impacts, which are defined as (i) being physically displaced from housing, or (ii) losing 10% or more of their productive assets (income generating). The level of detail and comprehensiveness of the resettlement plan are commensurate with the significance of the potential impacts and risks. A project is assigned to one of the following categories depending on the significance of the probable involuntary resettlement impacts:

- **Category A:** A proposed project is classified as category A if it is likely to have significant involuntary resettlement impacts. A resettlement plan, including assessment of social impacts, is required;

- **Category B:** A proposed project is classified as category B if it includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, including assessment of social impacts, is required;
- **Category C:** A proposed project is classified as category C if it has no involuntary resettlement impacts. No further action is required; and
- **Category FI:** A proposed project is classified as category FI if it involves the investment of ADB funds to, or through, a financial intermediary (paragraphs 53–58).

The main mill area land is owned by USML and its falls under ***Category C***, but the transmission route land is not owned by USML and its falls under ***Category B*** according to this categorization.

❖ **Indigenous Peoples**

ADB also screen all projects to determine whether or not they have potential impacts on Indigenous Peoples. For projects with impacts on Indigenous Peoples, an Indigenous Peoples Plan needs to be prepared. The degree of impacts is determined by evaluating (i) the magnitude of the impact on Indigenous Peoples' customary rights of use and access to land and natural resources; socio-economic status; cultural and communal integrity; health, education, livelihood systems, and social security status; or indigenous knowledge; and (ii) the vulnerability of the affected Indigenous Peoples.

There are no Indigenous people around the project site.

2.6 AIIB Environmental and Social Framework, 2016, (Amended In 2019, 2021 & 2022)

The Asian Infrastructure Investment Bank (Bank) is a multilateral financial institution, whose purpose, as set out in its Articles of Agreement (Articles), is to: (a) foster sustainable economic development, create wealth and improve infrastructure connectivity in Asia, by investing in infrastructure and other productive sectors; and (b) promote regional cooperation and partnership in addressing development challenges by working in close collaboration with other multilateral and bilateral development institutions.

2.6.1 Objectives of AIIB's Environmental and Social Framework

The objectives of the AIIB's Environmental and Social Framework (ESF) are:

- Reflect institutional aims to address environmental and social risks and impacts in Projects.
- Provide a robust structure for managing operational and reputational risks of the Bank and its shareholders in relation to Projects' environmental and social risks and impacts.
- Ensure the environmental and social soundness and sustainability of Projects.
- Support integration of environmental and social aspects of Projects into the decision-making process by all parties.

- Provide a mechanism for addressing environmental and social risks and impacts in Project identification, preparation and implementation.
- Enable Clients to identify and manage environmental and social risks and impacts of Projects, including those of climate change.
- Provide a framework for public consultation and disclosure of environmental and social information in relation to Projects.
- Improve development effectiveness and impact to increase results on the ground, both short- and long-term.
- Support Clients, through Bank financing of Projects, to implement their obligations under national environmental and social legislation (including under international agreements adopted by the member) governing these Projects.
- Facilitate cooperation on environmental and social matters with development partners.

2.6.2 Key Elements of Environmental and Social Framework

Overarching Policy

The objective of this overarching policy is to facilitate achievement of these development outcomes, through a system that integrates sound environmental and social management into Projects. The overarching policy comprises Environmental and Social Policy (ESP), and Environmental and Social Standards (ESSs).

Environmental and Social Policy

The ESP sets out mandatory requirements for the Bank and its Clients relating to identification, assessment and management of environmental and social risks and impacts associated with Projects supported by the Bank.

Environmental and Social Standards

The environmental and social standards (ESSs) set out more detailed mandatory environmental and social requirements, as described below.

Table 2.4: Environmental and Social Standards (ESS) for AIIB

Environmental and Social Standards		Applicability	Status
ESS – 1	Environmental and Social Assessment and Management	ESS 1 is applicable if the Project is likely to have adverse environmental risks and impacts or social risks and impacts (or both)	Applicable, since the proposed project is likely to have some site specific adverse environmental and social impacts. The present EIA has been conducted.
ESS – 2	Involuntary Resettlement	ESS 2 is applicable if the project is likely to cause	Not applicable for the proposed mill area but applicable for transmission route area.

Environmental and Social Standards		Applicability	Status
		involuntary resettlement impacts.	
ESS – 3	Indigenous People	ESS 3 is applicable if Indigenous People are present in the project area and they are likely to be affected by the project.	Not applicable, since no Indigenous People (IP), as defined in the ESS 3 are present in the project area or project influenced area. The community in the project area are local permanent residence of Bangladesh.

2.6.4 Categorization of the Projects

All AIIB-financed projects are required to be screened and categorized in order to determine the nature and level of the required environmental and social reviews and assessment, type of information disclosure and stakeholder engagements for the respective project. The project's category is determined by the category of the project's component that presents the highest environmental or social risk, including direct, indirect, cumulative and induced impacts. As per AIIB there are 4 types of project categorizations, they are;

- **Category A:** A project is categorized as 'Category A' if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented;
- **Category B:** A project is categorized as 'Category B' when it has a limited number of potentially adverse environmental and social impacts; few if any of them are irreversible or cumulative; they are limited to the project area; and can be successfully managed using good practice in an operational setting;
- **Category C:** A project is categorized as 'Category C' when it is likely to have minimal or no adverse environmental and social impacts; and
- **Category FI:** A project is categorized FI, if the financing structure involves the provision of funds to or through a financial intermediary (FI) for the project, whereby the Bank delegates to the FI the decision-making on the use of the Bank funds, including the selection, appraisal, approval and monitoring of Bank-financed sub-projects.

The proposed project of USML falls under ***Category A*** as it has some site specific adverse environmental and social impacts which are mostly minimized by mitigation measures.

2.7 Equator Principles (EP4, July 2020)

Large infrastructure and industrial Projects can have adverse impacts on people and on the environment.

2.7.1 Statement of Principles

Principle 1: Review and Categorization

When a project is proposed for financing, the Equator Principles Financial Institutions (EPFIs) will, as part of its internal environmental and social review and due diligence, categories the Project based on the magnitude of potential environmental and social risks and impacts, including those related to human rights, climate change, and biodiversity. Such categorization is based on the International Finance Corporation's (IFC) environmental and social categorization process. The categories are:

- **Category A** – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented;
- **Category B** – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and
- **Category C** – Projects with minimal or no adverse environmental and social risks and/or impacts.

The EPFI's environmental and social due diligence is commensurate with the nature, scale and stage of the project, and with the categorized level of environmental and social risks and impacts.

According to this categorization, the proposed project falls under ***Category A***.

Principle 2: Environmental and Social Assessment

The EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project. The Assessment Documentation should propose measures to minimize, mitigate, and where residual impacts remain, to compensate/offset/remedy for risks and impacts to workers, affected communities, and the environment, in a manner relevant and appropriate to the nature and scale of the proposed Project.

Principle 3: Applicable Environmental and Social Standards

The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. EPFIs operate in diverse markets: some with robust environmental and social governance, legislation systems and institutional capacity designed to protect their people and the environment; and some with evolving technical and institutional capacity to manage environmental and social issues.

The EPFI's due diligence will include, for all Category A and Category B Projects globally, review and confirmation by the EPFI of how the Project and transaction meet each of the principles. The EPFI will,

with supporting advice from the Independent Environmental and Social Consultant where applicable, evaluate the Project's compliance with the applicable standards as follows:

- For Projects located in Non-Designated Countries, compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines).
- For Projects located in Designated Countries, compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.

Principle 4: Environmental and Social Management System and Equator Principles Action Plan

For all Category A and Category B Projects the EPFI will require the client to develop and / or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree to an Equator Principles Action Plan (EPAP). The EPAP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.

Principle 5: Stakeholder Engagement

For all Category A and Category B Projects the EPFI will require the client to demonstrate effective stakeholder engagement, as an ongoing process in a structured and culturally appropriate manner, with affected communities, workers and, where relevant, other stakeholders.

Principle 6: Grievance Mechanism

For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by affected communities and workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

Principle 7: Independent Review

For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, will carry out an Independent Review of the Assessment process including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence and determination of Equator Principles compliance. The Independent Environmental and Social Consultant will also propose or opine on a suitable EPAP capable of bringing the Project into compliance with the Equator Principles, or indicate where there is a justified deviation from the applicable standards. The Independent Environmental and Social Consultant must be able to demonstrate expertise in evaluating the types of environmental and social risks and impacts relevant to the Project.

Principle 8: Covenants

An important strength of the Equator Principles is the incorporation of covenants linked to compliance

For all Projects, where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance. If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, including calling an event of default, as considered appropriate.

Principle 9: Independent Monitoring and Reporting

For all Category A and, as appropriate, Category B projects, in order to assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting. Monitoring and reporting should be provided by an Independent Environmental and Social Consultant; alternatively, the EPFI will require that the client retain qualified and experienced external experts to verify its monitoring information, which will be shared with the EPFI.

Principle 10: Reporting and Transparency

For all Category A and, as appropriate, Category B Projects:

- The client will ensure that, at a minimum, a summary of the EIA is accessible and available online and that it includes a summary of Human Rights and climate change risks and impacts when relevant.
- The client will report publicly, on an annual basis, GHG emission levels during the operational phase for Projects emitting over 100,000 tons of CO2 equivalent annually.
- The EPFI will encourage the client to share commercially non-sensitive Project-specific biodiversity data with the Global Biodiversity Information Facility (GBIF) and relevant national and global data repositories, using formats and conditions to enable such data to be accessed and re-used in future decisions and research applications.

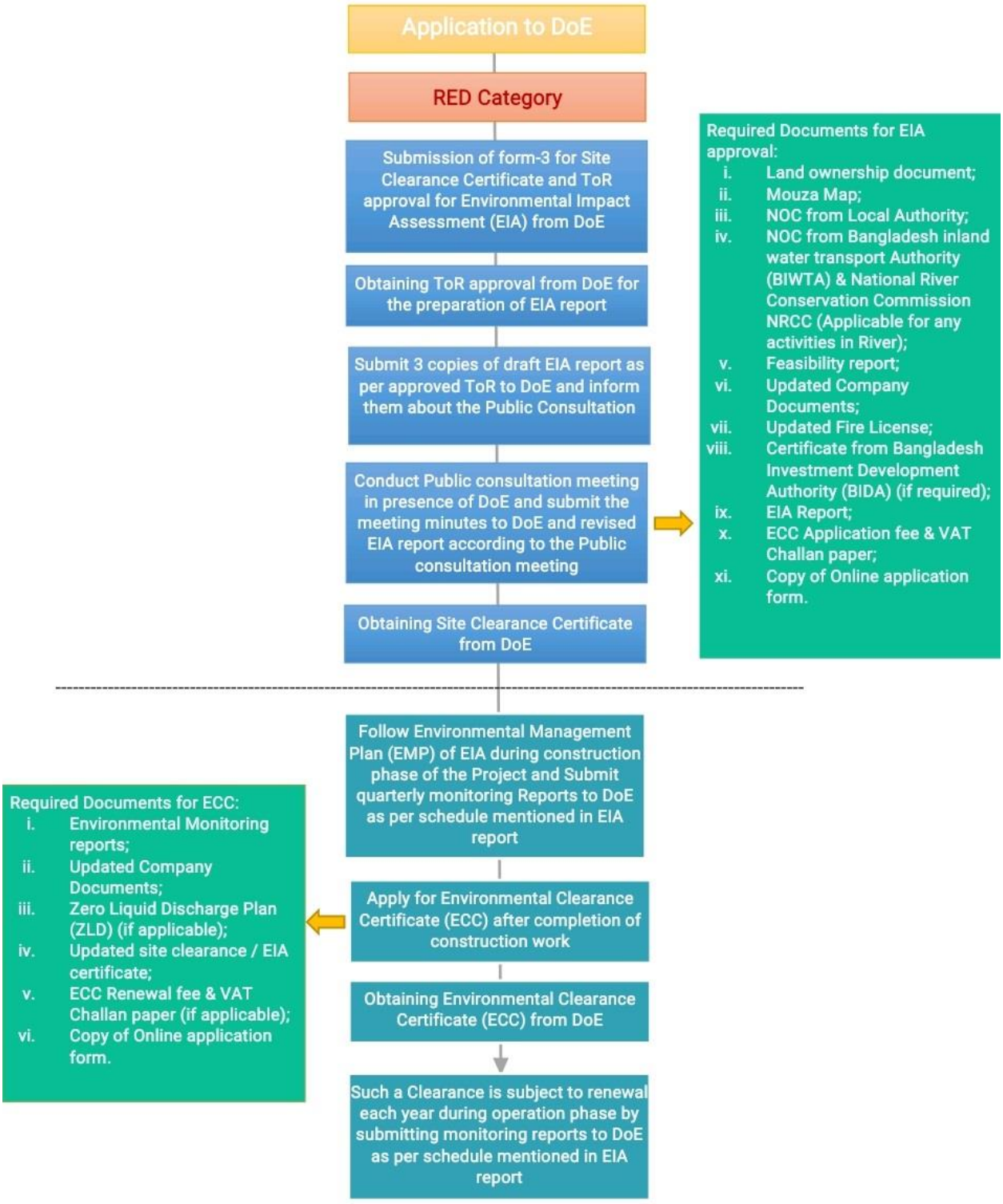
2.8 Environmental Clearance from DoE, Bangladesh

Environmental Clearance Procedure for any project in Bangladesh are set out in "Rules and Regulations under the Environmental Conservation Rules, 2023" as published in the official Gazette on March 27, 2023. According to ECR 2023, any project which falls under **Red Category** requires "**Environmental Clearance Certificate**" from the Department of Environment as per the ECR,2023.

2 steps will be followed for obtaining environmental clearance for the red category projects. First, the proponent needs to apply for Site Clearance Certificate for the project along with ToR against the EIA, form 3 and application processing fee. After DoE will provide an approved ToR for the EIA study. Then, the proponent needs to undertake and prepare EIA report and submit three copies of the draft EIA report as per the approved ToR to the DoE and inform them about the public consultation meeting. Public consultation should be conducted in the presence of the respective DoE personnel and other stakeholders, and the proponent. After incorporating the comments from the stakeholders, final EIA report needs to be submitted with other supporting documents (ECC application fee and VAT challan paper, fire license, NoC from local authority, updated company documents etc.) to the DoE. DoE will review the documents and provide a site clearance certificate after sub-sequent revision (if required) prior

to the construction of the project. After completing the construction of the project, the proponent shall apply for an Environmental Clarence Certificate (ECC) along with environmental monitoring reports as per the EIA report and submit quarterly monitoring reports to the DoE after completing the project's construction work. Finally, after reviewing the monitoring reports and conducting a site visit to observe whether the proponent has met all the conditions mentioned in the site clearance certificate and implemented all the management plans mentioned in the EIA report or not DoE will issue an Environmental Clearance Certificate (ECC) for the proponent after which the proponent can start project operation. Such an environmental clearance i.e., ECC is subject to renewal annually during operation phase upon submitting the monitoring reports at a prescribed duration mentioned in the ECC conditions and full filling other conditions mentioned in the ECC conditions and EIA report.

All the steel manufacturing mill falls under **RED category** according to ECR 2023. Obtaining EIA approval and Environmental Clearance Certificate (ECC) process for the RED Category projects/industries is shown in **Figure 2.1** below-



(ECR, 2023)

Figure 2.1: Process flow diagram for obtaining Environmental Clearance from DoE for RED Category Project

Chapter 3

3 DESCRIPTIONS OF THE PROJECT

3.1 Introduction

This is a steel manufacturing mill project proposed by Unitex Steel Mills Limited (USML) to fulfill the demand of infrastructure raw material of Bangladesh. The project site is a vacant land and the total land is for the proposed project is owned by Unitex Steel Mills Limited (USML), land ownership documents is provided in annexure 2. USML will design, engineer, manufacture, operate and maintain the steel mill with a purpose to produce 1,00,000 MTPA steel products. This section describes about the project location details, manufacturing process, present site condition, land marks around the project area, equipment/ machineries detail and other project related details. The basic data for the proposed project is given below in **Table 3.1**:

Table 3.1: The Basic Data of Steel Manufacturing Mill

Project Main Components	
21. Name of the Project	Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni
22. Project Proponent	Unitex Steel Mills Limited
23. Project Location	Thana: Chhagalnaiya, Gopal Union Parishad, Muhuriganj, Feni District, Bangladesh
24. Project area	60 Acre
25. Project cost	2,000 Crore BDT
26. Project starting date	01 November, 2023
27. Project duration	Project Preparation: 15-16 Months; Project Implementation: 2years (Tentative)
28. Land type	Own land of Unitex Steel Mills Limited
29. Present condition	Temporary construction of boundary wall is on-going
30. Fuel Type	Diesel oil for backup generator support
31. Net Production Capacity	1,000,000 MT/Y
32. Raw material Storage Capacity	50,000 MT/Y
33. End product Storage Capacity	65,000 MT/Y
34. Raw material Source	Imported from USA, UK, Europe, Japan, South Korea, Singapore, Hong-Kong, Australia, Brazil, UAE, Algeria
35. Raw material Type	Scrap, HBI/DRI
36. End product type	Rebars, angles, bars and rods
37. Total Manpower	Construction phase: 150 Operation phase: 516
38. Water Requirement	**Construction phase:** 6.75 m^3/day for sanitation and drinking purposes

	Operation Phase: 2400 m^3 (one time intake for entire project life), 150 m^3 /hr for make-up water and 24 m^3/day for sanitation and drinking purposes. Total requirement will be 174 m^3/day
39. Electricity Connection	Electricity will be supplied from National Grid. The Steel Mill will be connected to Korerhat 400/230/132/33 kV Substation of PGCB through a new 230/33 kV Grid Substation of Unitex.
40. Sub-component	ii. 230/33 kV Grid Substation area (East side within the project boundary) v. 3.785 km Transmission Line with 11 towers (from proposed Unitex substation to korerhat 400/230/132/33 kV Substation)

3.2 Statement of Need of The Project

The proposed project will elevate the steel manufacturing facility of Bangladesh as Bangladesh need more steel manufacturing industries to support:

- **Infrastructure Development**: Steel is crucial for building infrastructure, including roads, bridges, buildings, and transportation systems. Bangladesh, with its growing population and urbanization, requires a significant supply of steel to support infrastructure development.
- **Economic Growth:** The steel industry contributes to economic growth by generating employment opportunities, attracting investments, and fostering related industries. It plays a pivotal role in Bangladesh's industrialization and job creation.
- **Construction Boom**: Bangladesh is experiencing a construction boom in both residential and commercial sectors. This surge in construction projects demands a steady supply of steel for structural purposes.
- **Import Reduction**: Historically, Bangladesh has relied heavily on steel imports, which can be costly and affect the trade balance. Expanding domestic steel manufacturing can help reduce dependence on imports.
- **Export Potential:** A robust steel manufacturing sector in Bangladesh has the potential to produce surplus steel for export, thus contributing to foreign exchange earnings and boosting the country's export capabilities.
- **Rural Development**: The steel industry can stimulate economic development in rural areas by providing jobs and supporting related businesses in regions where steel manufacturing facilities are located.

In conclusion, steel manufacturing in Bangladesh is essential to meet the demands of rapid urbanization, boost the economy, reduce import dependency, and capitalize on export opportunities, all while fostering local development and employment.

3.3 Location of the project

The project site is in the Muhuriganj village, Gopal Union Parishad, Chhagalnaiya Upazila of Feni District, Bangladesh. Chhagalnaiya is an Upazila of Feni District in the Division of Chattogram, Bangladesh. Chhagalnaiya lies in the southern part of the district, bordering Tripura of India and

Mirsharai Upazila of Chattogram. The proposed project area is 149km away from the capital city, Dhaka. Muhuri and Feni River is 1.0 km and 1.78 km respectively away from the project area and 144.41 meters away from the Dhaka – Chattogram highway. Rahmat kha dighi is present at the east side, Muhuriganj community center at the north side, Old Muhuriganj bazar at the west side and Muhuriganj school at the south side of the proposed project area. The project location in District map & Upazila map and satellite map of the project are presented in **Figure 3.1 (a), 3.1 (b) and 3.1 (c)** respectively.

3.3.1 Project Land Marks

Land marks within the 5km radial zone of project location is shown in **table 3.2 and figure 3.2**

Table 3.2: list of Land marks around the 5km buffer area of the project site

Landmarks	Lat	Long	Distance (km)	Direction
Muhurigonj School and College	22°56'39.18"N	91°30'44.67"E	0.001	South-West
Family Graveyard	22°56'25.33"N	91°30'57.76"E	0.20	South
Ghopal Union Health Complex	22°56'48.78"N	91°30'34.65"E	0.36	North-West
Muhuri River	22°56'29.42"N	91°30'19.65"E	0.87	West
Noirajpur Graveyard	22°56'30.75"N	91°30'3.38"E	1.16	South-West
Adarsha High School	22°56'17.56"N	91°29'48.10"E	1.71	South-West
Nazim Shah Jame Mosque	22°56'27.41"N	91°28'26.75"E	3.9	South-West
Sultanpur Jame Mosjid	22°55'41.12"N	22°55'41.12"N	2.00	South-West
PHP Integrated Steel Mills Ltd	22°55'54.29"N	91°30'53.53"E	1.10	South-West
Boat Ghat	22°55'8.48"N	91°29'8.07"E	4.00	South-West
Wahidur Rahman Health Complex	22°55'16.60"N	91°30'51.23"E	2.35	South-West
Chhagalnaiya 33/11 KV Sub Station	22°55'32.24"N	91°31'18.01"E	1.90	South
Muhurigang Railway Station	22°56'18.17"N	91°30'53.28"E	0.65	South
Nizkunjara Post Office	22°55'19.36"N	91°31'22.01"E	2.32	South-East
Noapara Jame Mosjid	22°56'36.97"N	91°31'12.12"E	0.28	South-East
Feni River	22°56'35.91"N	91°32'1.53"E	1.7	East
Doulat Bibi Govt. Primary School	22°55'24.06"N	91°32'27.26"E	3.25	South-East
Korerhat Madrasah	22°55'33.01"N	91°33'7.92"E	4.03	South-East
Valukia Dhighi	22°56'12.83"N	91°32'51.76"E	3.23	South-East
PNG (BD) Ltd.	22°56'26.82"N	91°33'18.17"E	3.8	South-East

Landmarks	Lat	Long	Distance (km)	Direction
Korerhat 400/230/132kV GIS Grid Sub-Station	22°56'34.56"N	91°33'6.55"E	3.30	East
Joypur Kali Temple	22°56'46.63"N	91°33'11.83"E	3.7	East
Shuvapur Lake	22°57'29.19"N	91°32'53.01"E	3.32	North-East
Shuvapur Land Office	22°57'40.92"N	91°33'12.05"E	4.00	North-East
Joypur Sorojini High School	22°57'30.67"N	91°31'41.12"E	1.65	North-East
South Mondia Central Eidgah	22°58'18.77"N	91°31'37.60"E	2.88	North-East
Muhuriganj community center	22°57'5.36"N	91°30'41.30"E	0.50	North
Nachira Dhigi	22°59'17.31"N	91°30'46.56"E	4.44	North-East
Baitul Aman Mosque	22°57'4.53"N	91°30'18.02"E	0.94	North-East
Fazilpur Union Council Office	22°57'26.59"N	91°29'17.05"E	2.81	North-East

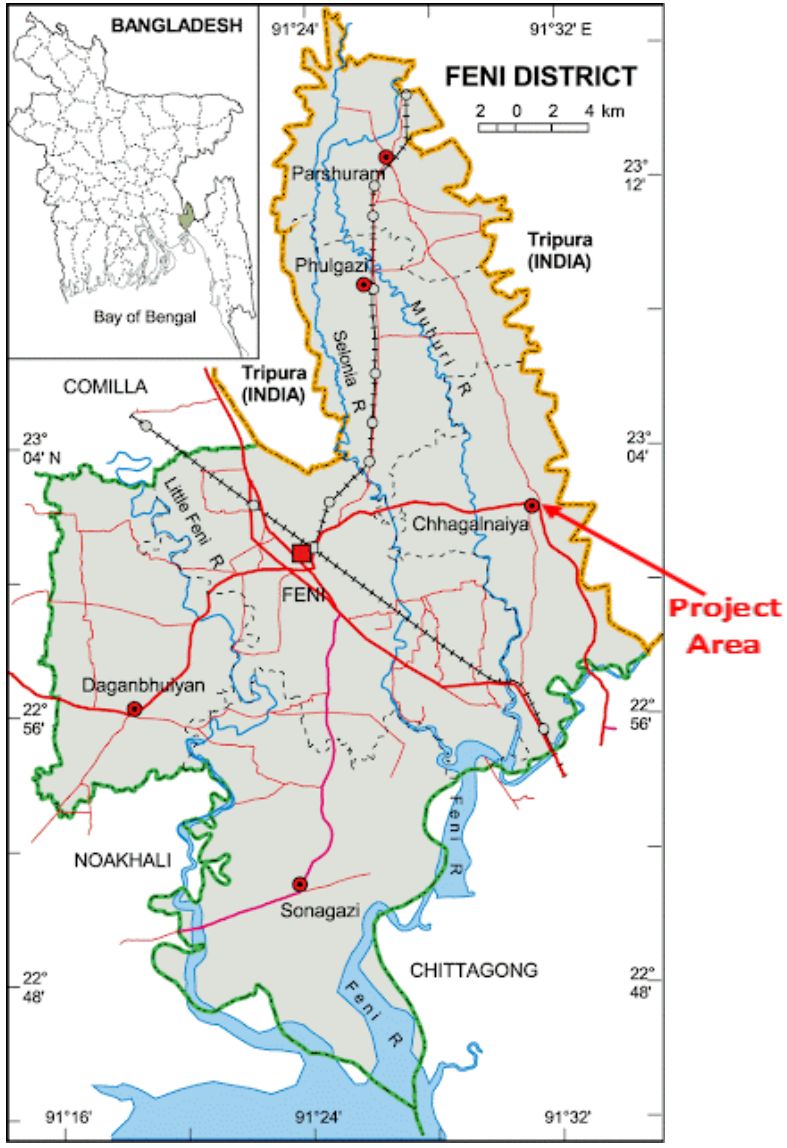


Figure 3.1 (a): Feni District Map

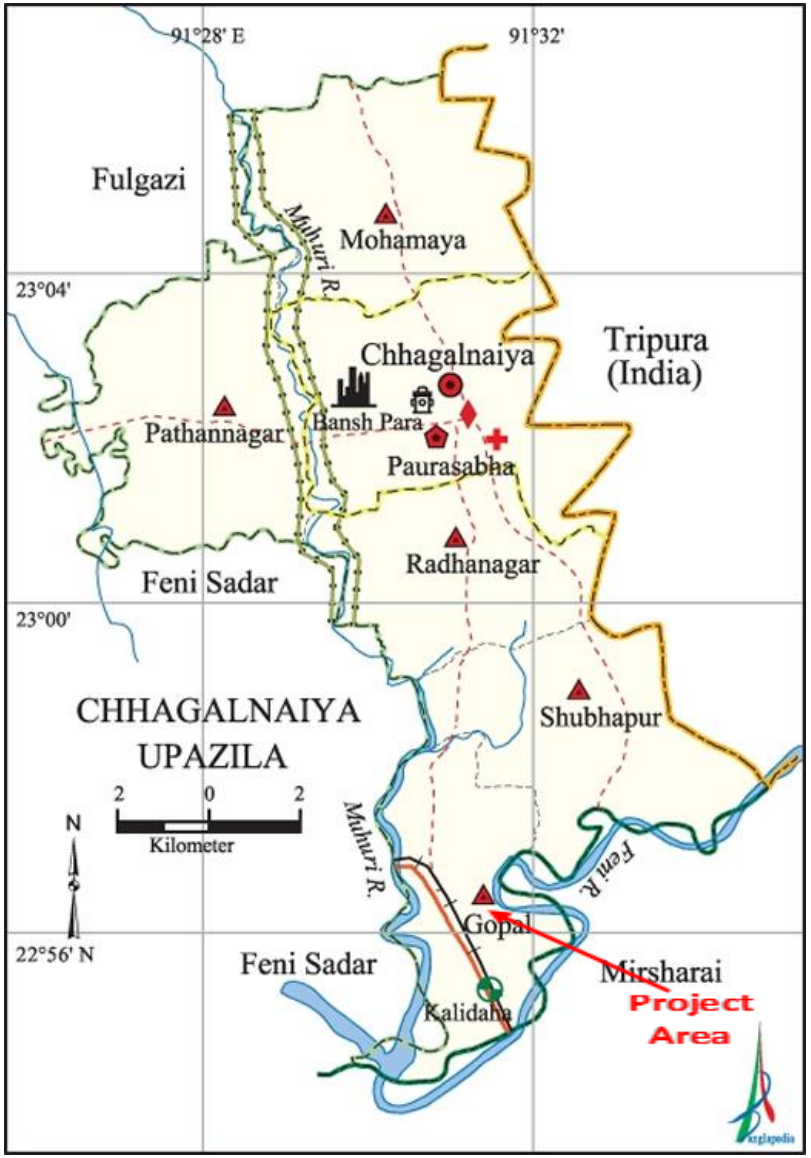


Figure 3.1 (b): Chhagalnaiya Upazila Map

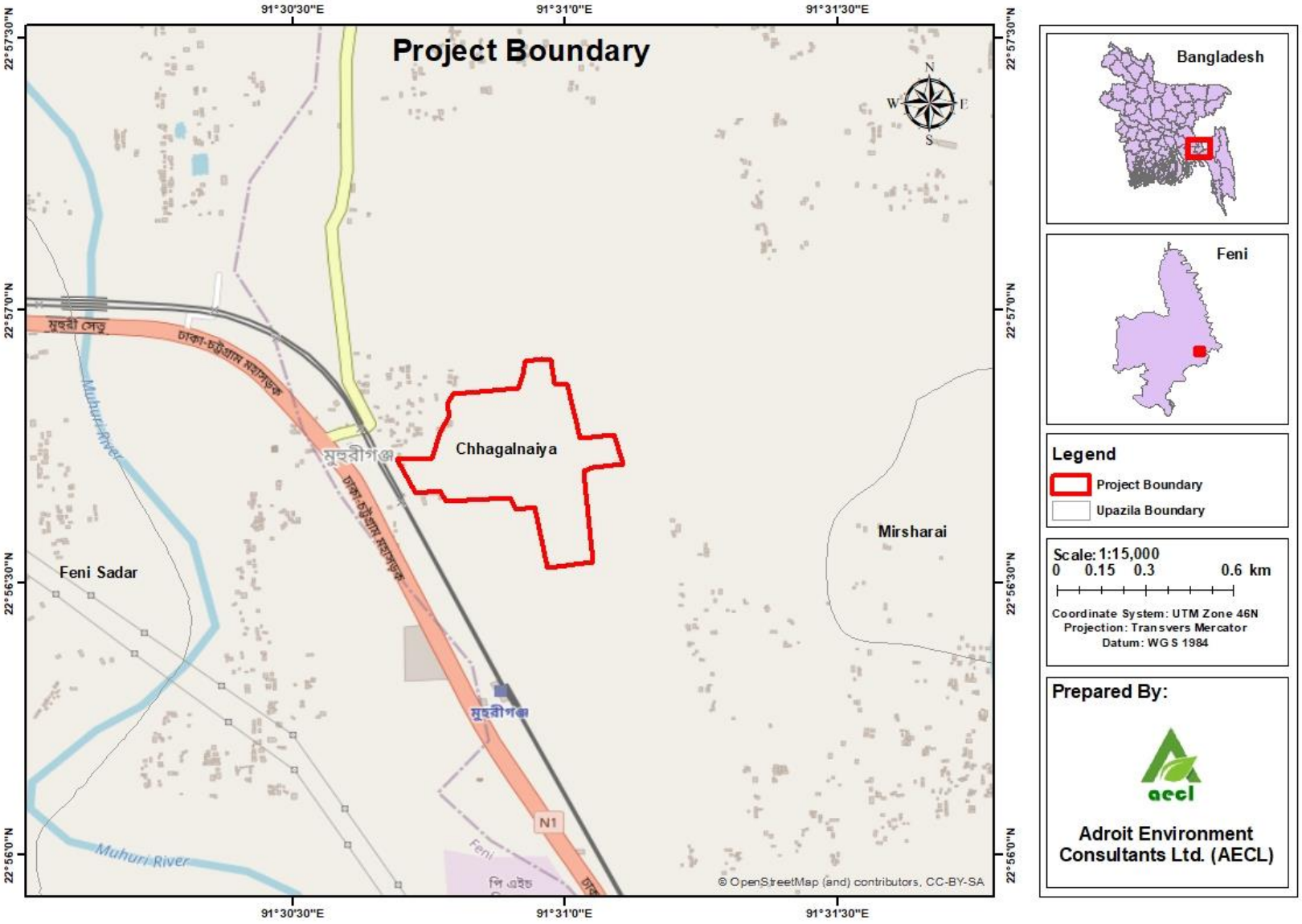


Figure 3.1 (c): Satellite Map of Project Boundary

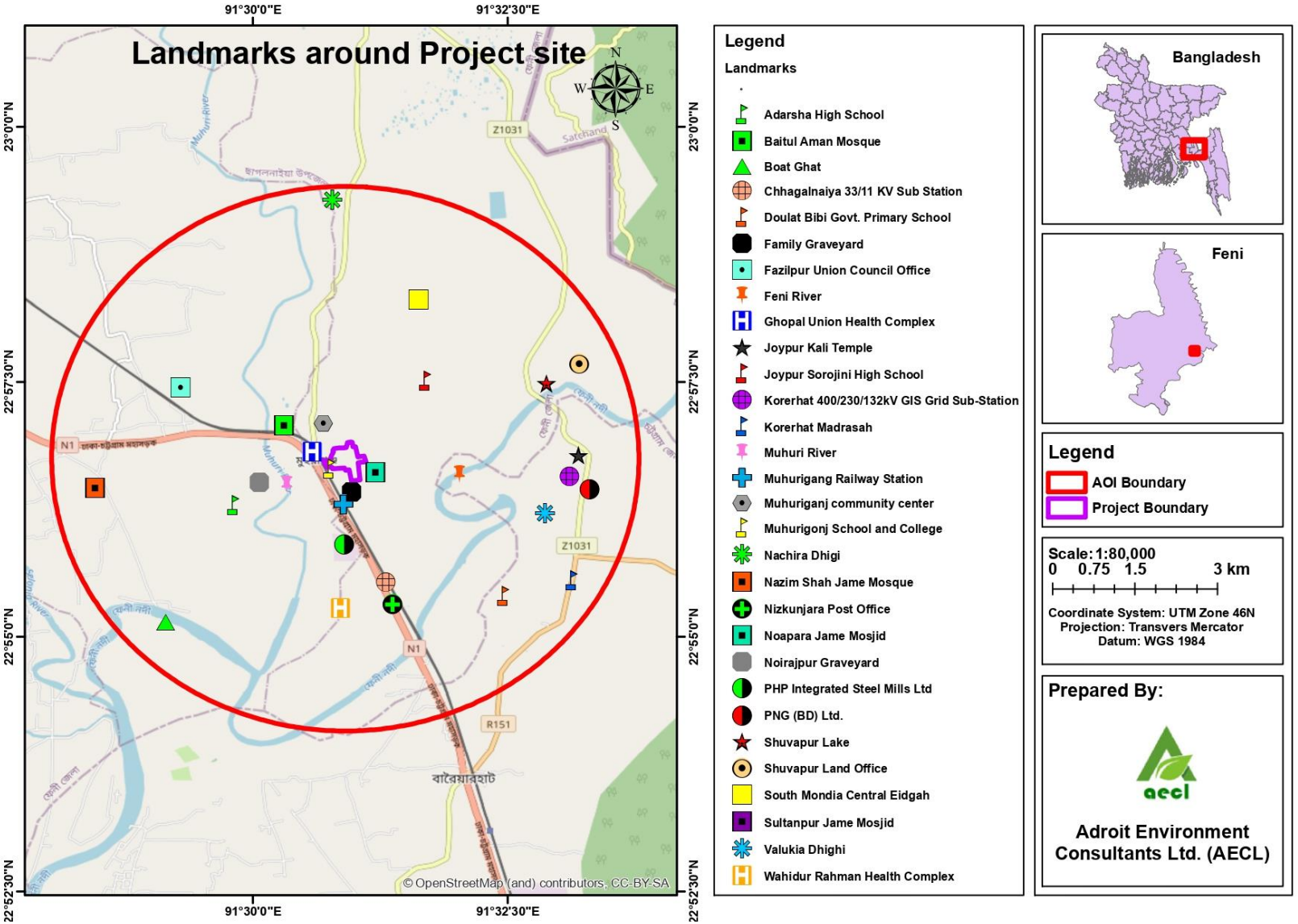


Figure 3.2 : Land Marks Around The Project Are

3.4 Accessibility to Project Site

There is a good roadway accessibility from Dhaka to project site through highway. The proposed project area is 149km away from the capital city, Dhaka and 53.07 km away from the Chattogram district. The Dhaka – Chattogram highway is just 0.15 km away from the project proposed main entrance. the proponent will construct a 24m width bitumen road from the project site to the Feni highway. The proposed road is for transportation of raw material, vehicle, etc. The road connectivity of the project site from Dhaka city and Chhagalnaiya Upazila is shown in **Figure 3.3**. The project proponent will transport Raw materials for steel manufacturing from Chattogram port, which is 77.59 km away from the project site. The road connectivity map from the project area to the Chattogram port is shown in **Figure 3.4**.

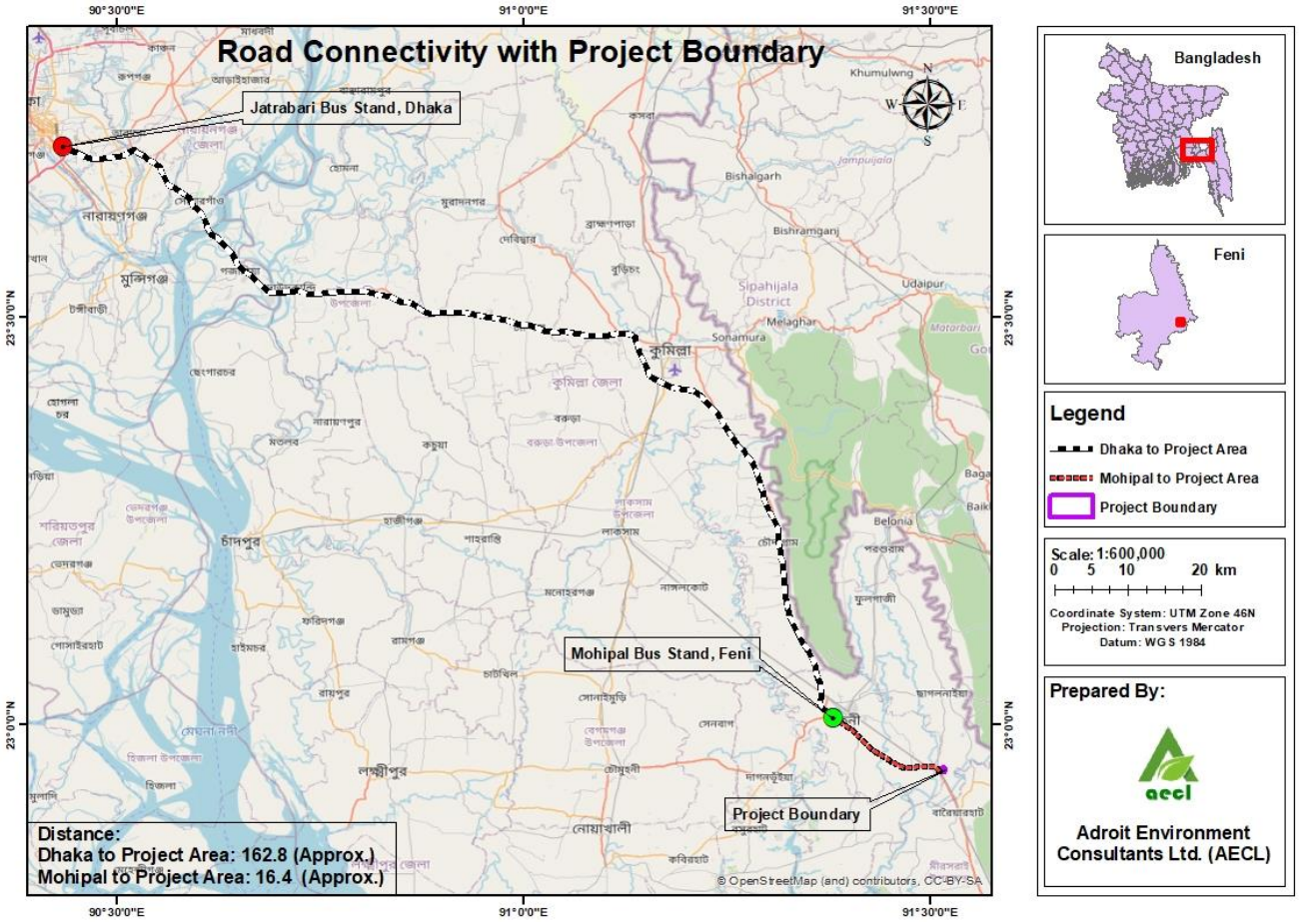


Figure 3.3 : Proposed Road Connectivity Map from the Dhaka City and Chhagalnaiya Upazila

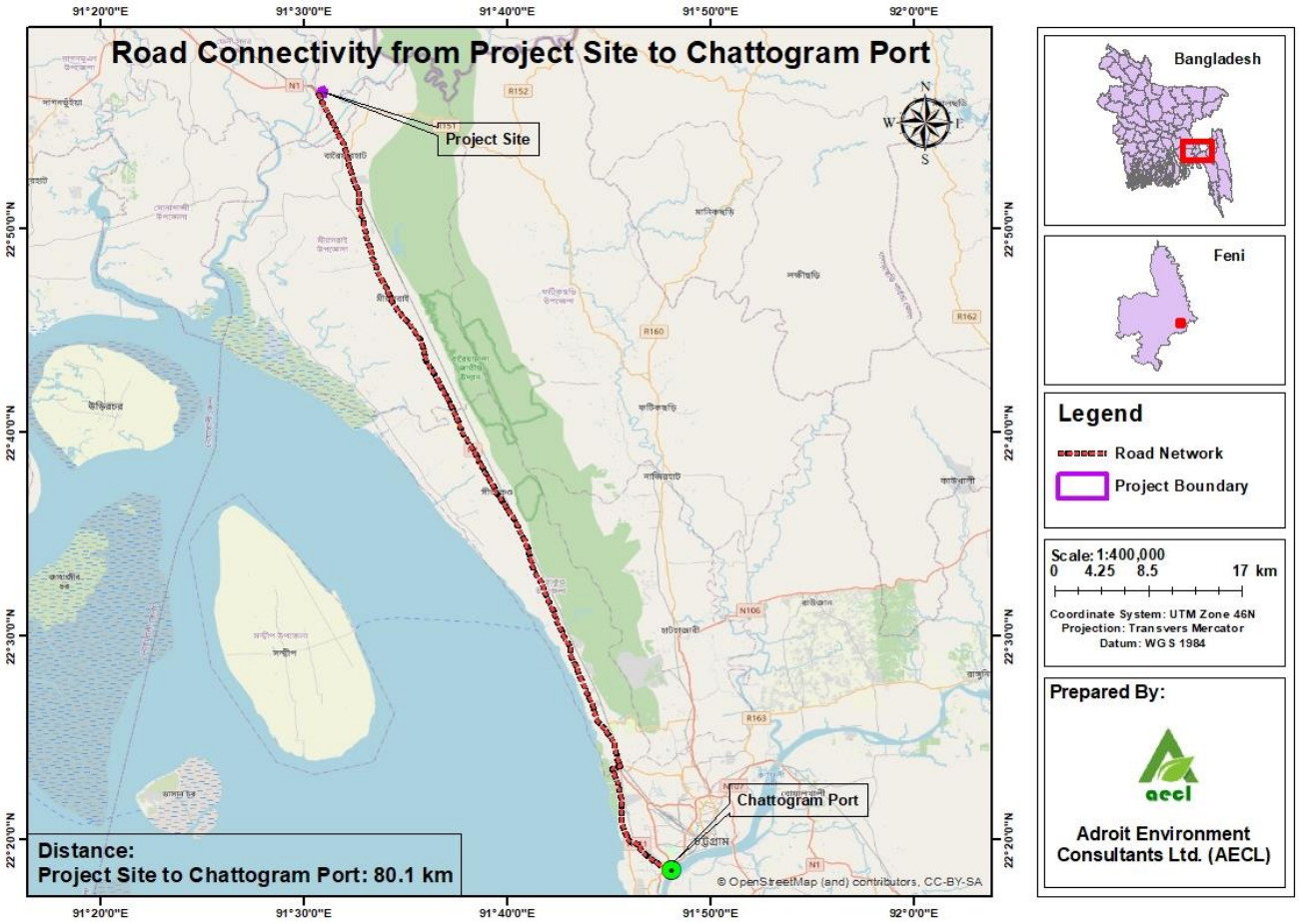


Figure 3.4 : Proposed Road Connectivity Map from the Chattogram port to Project Site

3.5 Project Details

3.5.1 Project Component

The following component and equipment/ machineries will generally be required for the proposed steel manufacturing mill project:

Table 3.3: Project component list

SL No.	Project Segment	Capacity / Quantity	Location Address
1	Scrap Processing Machine	160 MT/hr	Inside the Project Map
2	Scrap Pre heating Machine	200 MT/hr	Inside the Project Map
3	Electric Arc Furnace	100 MT/hr	Inside the Project Map
4	Ladle Refining Furnace	100 MT/hr	Inside the Project Map
5	Continuous Casting Machine	120 MT/hr	Inside the Project Map
6	Reheating Furnace	150 MT/hr	Inside the Project Map
7	Rolling Mill	150 MT/hr	Inside the Project Map

SL No.	Project Segment	Capacity / Quantity	Location Address
8	Air Separation Plant	200 TPD	Inside the Project Map
9	Fume Treatment Plant	2.4 million m^3/hr	Inside the Project Map
10	Water Treatment Plant	2400 m^3/hr	Inside the Project Map
11	Slag Treatment Plant	20 MT/hr	Inside the Project Map
12	230 kV Substation	150 MVA	Inside the project map
13	Transmission line	3.785 km	Outside the project boundary
14	Rain water harvesting pond	1250 m^3	Inside the project map

3.5.2 230/33 kV Grid Substation

The Steel mill project have an approval of 100MW/hr load sanction (2025-2050) from the Palli Bidyut, load sanction approval letter attached in Annexure 4. The electricity supply from the PGCB grid substation is 400/230kV but USML is planning to construct a new 230/33 kV Grid Substation of Unitex for steel mill operation. This Unitex substation will be connected with Korerhat 400/230/132/33 kV Substation of PGCB with a 3.785 km long transmission line through 11nos. transmission tower. Proposed area for Unitex grid substation is at the east side within the proposed steel mill and the land is an integral part of the overall project land, as indicated in the master plan Annexure 3.

3.5.2.1 Proposed Transmission Line

As per the third-party agreement among PGCB-BPDB & UNITEX, a double-circuit transmission line to be constructed to facilitate power transfer from the Korerhat 400/230kV grid substation to the Unitex 230/33kV substation. The length of the transmission line will be 3.785 km and the transmission line from the steel mill area will be stringed above the ground through the 11nos. transmission towers to the Korerhat substation. From the total length of the proposed transmission line, 263 m line will be crossing over the Feni River. Land for the transmission tower footing and transmission route is not owned by USML. The final route of the transmission line is subject to approval by the Power Grid Company of Bangladesh. Once Proponent received their approval, they will proceed with the acquisition of the necessary land while adhering to all local rules and regulations. Transmission route from the Unitex substation to korerhat substation is shown in **Figure 3.5.**

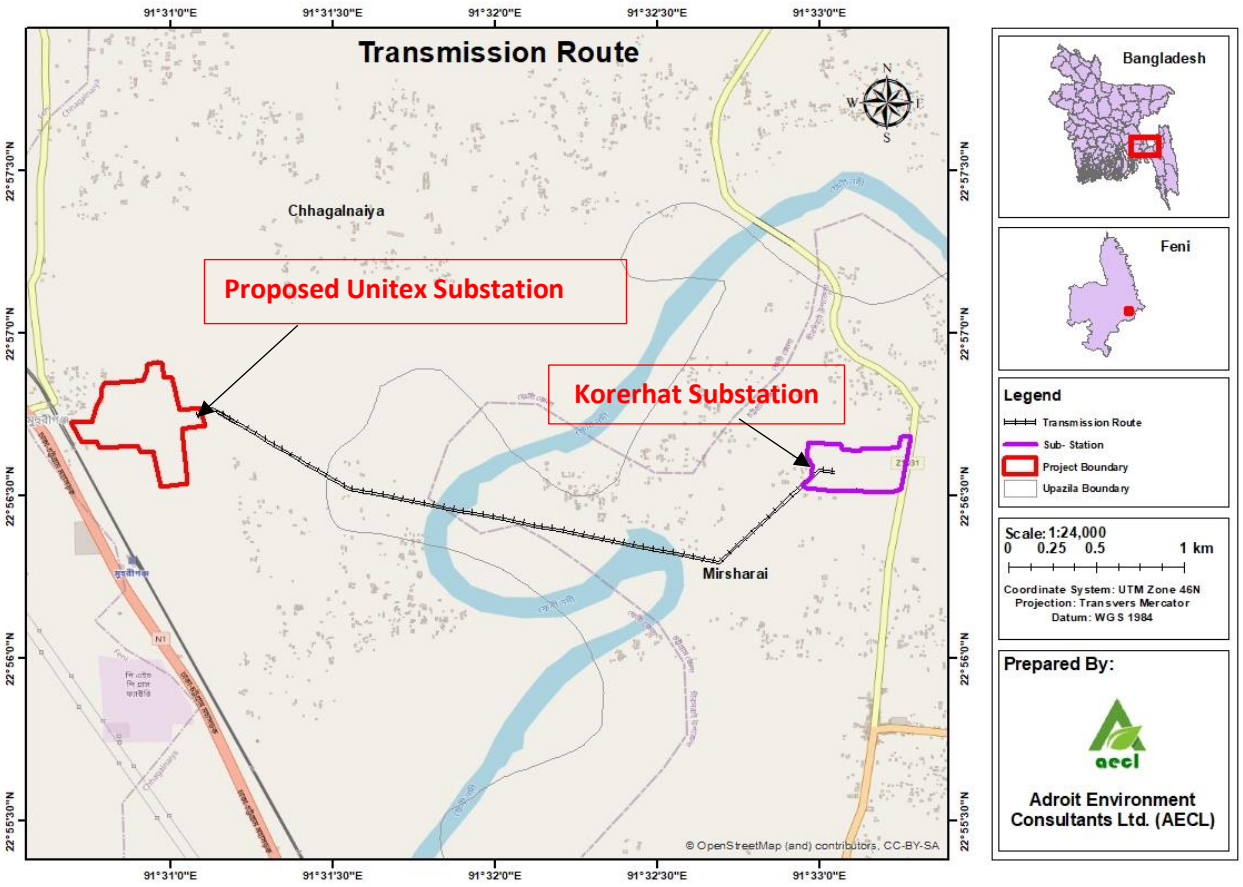


Figure 3.5 : Proposed Transmission Route Map

3.5.3 Raw Material, End Product and Other Chemicals Details

3.5.3.1 Raw Material Details

Different types of scrap/HBI/DRI material will be used as a raw material for this project. Most of these Raw materials will be imported from USA, UK, Europe, Japan, South Korea, Singapore, Hong-Kong, Australia, Brazil, UAE, Algeria. Imported raw materials will be collected from Chattogram port and transported to project area via truck and other vehicles, which is shown in the **Figure 3.4**. Raw material is stored in a storage area with a capacity of 50,000MT/Y. The list of raw materials required for 1,00,000 MTPA steel production for this project are shown in **Table 3.4**.

Table 3.4: Required raw material list

SL no.	Raw material type		Quantity (MT/Y)
1	Scrap	-Shredded	226,333
2		-Heavy Melting steel	703,820
3		-local	234,607
4	Dolomite		22,828

SL no.	Raw material type	Quantity (MT/Y)
5	Carbon	36,540
6	Lime	26,100
7	High-Carbon Ferromanganese (HC FeMn)	1,044
8	Silico Manganese (SiMn)	1,044
9	Ferro silicon (FeSi)	1,044
10	Burnt Lime	10,440
11	Fluorspar	2,090

3.5.3.2 List Of Other Chemicals

list of other chemicals required for steel manufacturing process are described in **Table 3.5**.

Table 3.5: Required other chemicals list

SL No.	Chemical Type	Chemical	Storage Quantity	Location
1	Coagulants And Flocculants	NALCO™ 9805	250 liters	Designated Storage Area
2	Disinfectants	NALCO™ 8338	250 liters	Designated Storage Area
3	Scale Inhibitors and Antiscalants	NALCO™ 7330	250 liters	Designated Storage Area
4	Cooling Water Treatment Chemical	NALCO™ 7722	250 liters	Designated Storage Area
5	Biocides And Microbiological Control	NALCO™ 7331	250 liters	Designated Storage Area
6	Ph Adjusters and Stabilizers	NALCO™ 7320	250 liters	Designated Storage Area
7	Wastewater Treatment Chemicals	NALCO™ 7336	250 liters	Designated Storage Area
8	Chemical Cleaning Agent	NALCO™ 7234	250 liters	Designated Storage Area

3.4.3.2 End Product Details

This project area has a 65,000 MT/Y finished manufactured/ End product storage capacity in the designated project master plan. Here is a list of finished manufactured product from this steel manufacturing project;

- Construction Grade Rebar;
- Plain Round Bars;
- Square Bars;
- Equal Angles;
- Flat Bars.
- C Channels;
- Unequal Angles;
- Tee;
- Wire Rod and

3.5.4 Steel Manufacturing Process

The entire manufacturing process as discussed below will be carried out through the complete set of machineries/ equipments consisting of several components and process flow is shown in **Figure 3.6.**

- **Initial Stage (Steel Melting)**

  The main raw material for Electric Arc Furnance (EAF) steelmaking is steel scrap. Today, the EAF is the most common way to recycle steel from scrap. There is a broad variety of steel scraps, both in terms of composition (from plain Carbon steel to highly alloyed tool steel) and geometry (from finely shredded sheet to large beams). By melting the scrap in the EAF with the help of electrodes and an electrical current, new, functional steel can be produced from old products. Instead of deploying ore based raw material resources, basic steel elements and valuable alloy steels can be reused, which is beneficial from both economic and environmental point of view. At a first glance, the basic processes of the EAF appear quite straight forward consisting of simply providing enough electrical energy to heat and melt the steel scrap. The electrical power is distributed among the three electrodes, which melt the scrap by creating an arc between themselves and the scrap. The electrodes are consumed during the process with a progressive wear by individual rate during power on. Some adjustments of the electrode positions need to be done to make sure that all three electrodes are in contact with the material so that energy is efficiently transferred. The EAF is a batch melting process which produces batches of liquid steel (LS) by heating. The tap-to-tap cycle of the EAF is made up of several steps consisting of (i) furnace charging, (ii) melting, (iii) refining, (iv) de-slagging, (v) tapping, and (vi) furnace turn-around. The melting duration is the main function of EAF operations. Normally less than 60 minutes (50-55 minutes) is required in modern EAFs. The heat needed to melt steel scrap is provided by electric arcs, created between the electrodes and scrap in the furnace. The electrical power of normal EAFs lies in the range of 50 MW to 120 MW, depending on the size of the furnace. Melting of the scrap occurs at a temperature range of 1,500^{o}C~1,550^{o}C, depending on the composition of the steel scrap. Primary fume generated from the EAF is colleted by a canopy hood and tranfered to the fume treatement plant.

  After the scrap has been melted, the temperature is normally increased so that refining reactions can be carried out. O_2 and C can be injected into the steel phase and slag phase respectively. However, the reactions can also create products which are detrimental to the steel quality and which therefore need to be handled carefully. To do that, a slag is formed with the help of slag forming agents, such as lime, calcined dolomite and fluorspar. Slag, having a lower density than steel, normally floats on the steel surface. In addition to absorbing impurities from the steel, the slag also protects the steel from the atmosphere. In addition, it protects the furnace walls from the arcs, thereby increasing the electrical efficiency. It is hence of great importance to maintain a high slag quality and provide it with foaming properties.

  Slag properties like viscosity, Shape and porosity etc. vary with composition and temperature. One of the main tasks during the refining operation is to maintain adequate slag properties by adding slag forming agents such as lime, calcined dolomite and / or fluorspar. Some of the metallic oxides which

end up in the slag are acidic. Hence adding basic slag forming agents helps to keep the basicity of the slag at an appropriate level. High slag basicity (i.e. high CaO / SiO_2 ratio) is also beneficial for the removal of P but care is needed not to saturate the slag with CaO as this leads to an increase in slag viscosity, which makes the slag less effective.

Refining operations in the EAF have traditionally involved the removal of P, S, Al, Si, Mn, and C from the steel. In recent times, dissolved gases, especially H_2 and N_2, have been recognized as a concern. Traditionally, refining operations are carried out following meltdown i.e., once a flat bath is achieved. These refining reactions are all dependent on the availability of O_2. O_2 is lanced at the end of meltdown to lower the bath C content to the desired level for tapping. Majority of the compounds which are to be removed during refining have a higher affinity for O_2 than that the C. Hence the O_2 preferentially reacts with these elements to form oxides which float out of the steel and into the slag.

- **Sceond Stage (Ladle Refining Furnace)**

  Ladle refining furnaces (LRF) in the steel-making process for manufacture of quality steel. It is basically an arcing process, arcing between molten metal and the graphite electrodes. After tapping the molten steel from Electric Melting Furnaces or BOF the molten steel is further refined in LRF with tight control of ladle metallurgy for producing high grades steels with controlled chemistry.

  LRF facilitates better cleaning, homogenizing, desulfurizing and removing many other types of impurities, as well as hold all of the molten steel for the next process of degassing. The reason they call these furnaces “ladle” refining furnaces is that the refining takes place with the molten metal inside the ladle itself.

  LRFs also act as buffers between the furnace and the continuous caster. When making critical grade steel or other specialty alloy, these operations are very important and are often very costly. The costs of running LRF include the additional electricity, expensive refractory and the graphite electrodes. The only thing that LRF cannot do is reduce phosphorus to very low levels of 0.015 max.

- **Third Stage (Continuous Casting)**

  The liquid metal flows from the ladle through a slide gate system underneath it into water cooled copper mould tubes which solidifies the liquid metal into a square shaped mould which we call as Billets (semi finished product).The actual casting time in turn will depend on heat size, size of the billets to be cast, steel grade, casting speed and number of strands used. It is important to avoid too long a casting time so that during casting no difficulty may arise from a decrease in the fluidity of the liquid metal.

- **Fourth Stage (Rolling Mill and Cooling)**

  After the casting process billets are reheated again and convey the hot billets to the long rolling machine to change the shape and format them in the desired end product (MS angle, Bars, rebars etc.). Whole operation is conducted at a particular temperature range and within a limited time span.

The hot bar coming out of rolling mill is then conveyed in a cooling bed after shearing. The bars at almost ambient temperature are sheared to commercial length stored and kept ready for dispatch.

- **Final satge Inspection & Dispatch**
  The material is finally moved to the Finish Product Storage Area with the help of Overhead Crane. During rolling inspection will be carried out for dimensional accuracy of the finished product. Gauges will be made for different section & size. There will be go-no-go gauge for on line checking. After inspection the material will be ready for dispatch.

The process of Manufacturing of Billet, Bar, wire Rod and other end products is proven technology. The company has proposed to procure modern steel mill which will be least of human interaction as far as possible during manufacturing process.

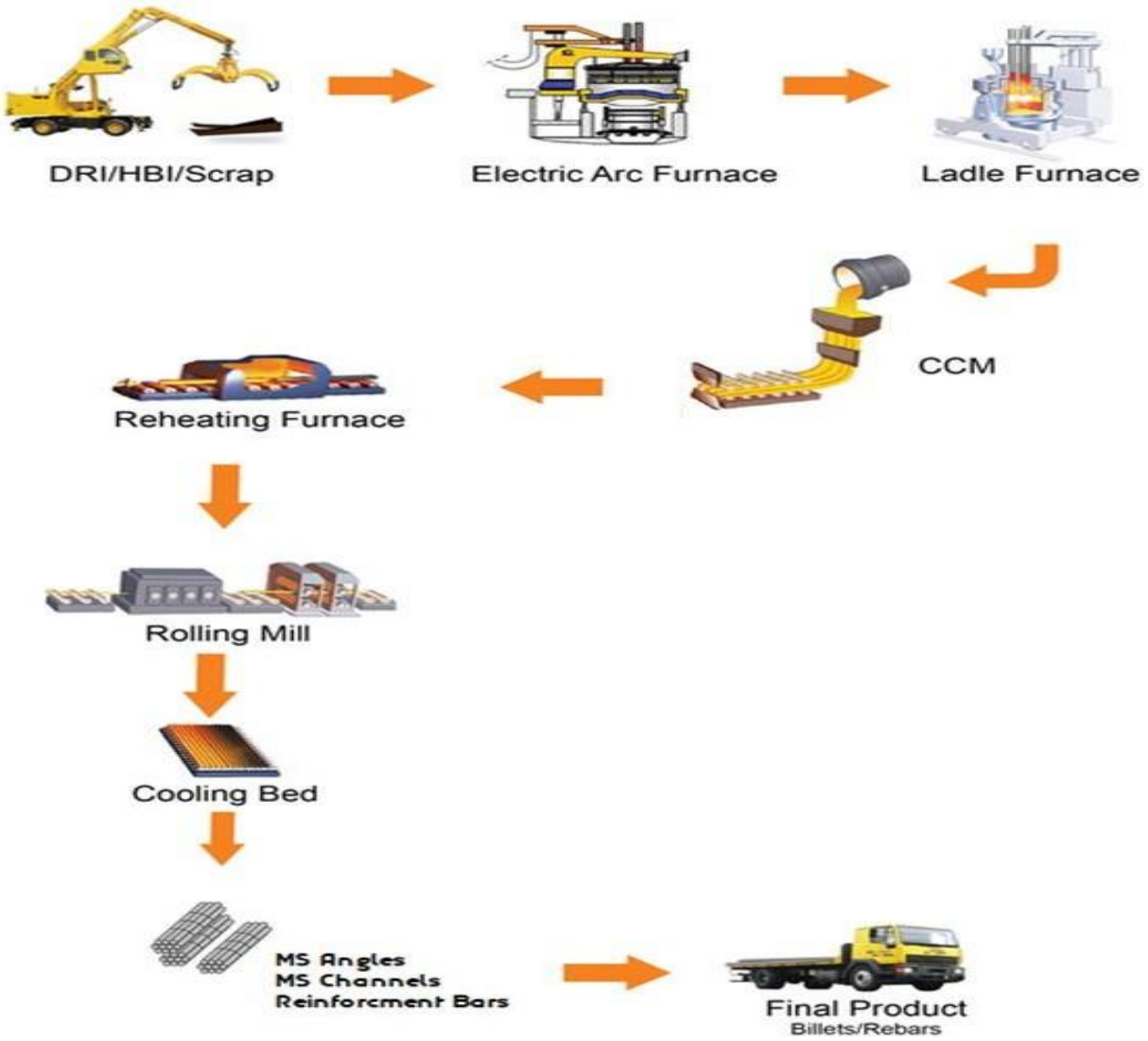


Figure 3.6 : Steel Manufacturing Process Flow

3.6 Present Site Condition

The proposed steel manufacturing mill project is located at the Chhagalnaiya Upazila of Feni district. The total project land area is 60 acres. The project land is a vacant land and the land is owned by Unitex Steel Mills Limited. Construction of temporary boundary wall is ongoing at the present site area. The project area has a temporary office shed for project staffs. Existing condition of the project Shown in **Figure 3.7**.

Project main entrance and temporary boundary

Temporary office sheds

khal inside project boundary

Present condition of main project area

Unitex Sub Station Area

Proposed Korerhat Substation Area

Project Sub Component condition

South side

North-east Side

East Side

West Side

North-west Side

North Side

Surrounding Condition of Project Site

Existing Dhaka-Chattogram Road

Lake side road

Dhaka- Chattogram rail track

Outside The Project Area Boundary

Figure 3.7: Existing Condition around the Project Area

3.7 Resources and Utilities demand

3.7.1 Power Supply

Electricity is the main source of power for this proposed project. Electricity will be supplied from National Grid. The Steel mill will be connected with Korerhat 400/230/132/33 kV Substation of PGCB by a new 230/33 kV Grid Substation of Unitex, which is already shown in project master plan Annexure 3. Unitex have 100 MW/hr load sanction approval from PGCB, attached in Annexure 4. Power consumption during operation phase will be around 85 MW/hr (proposed). There will be 2 sets of fuel-based diesel generators for back up electricity support.

3.7.2 Water supply

During construction phase there will be 150 employees and they will require 6.75 m^3/day considering the consumption rate to be 45 liters/day/capita for drinking and sanitation purposes. For sanitation and drinking purpose they will use ground water.

Water required for steel manufacturing process will be collected from adjacent cannel, bore well and proposed rainwater harvesting tank. There will be three underground rain water storage tank with the total capacity of 1250 m^3/day and the total surface area of the three tank is 56,000 m^2. Rain water will be collected from Roof of the Pre-engineered Building and transported to the storage tank through pipe line.

Before using the rain water/surface water they will convey to a surge pond for sedimentation and then addictive will be added to prepare the water for cooling tower, shown in Figure 3.8. Details of the proposed rain water harvesting tank is provided in Annexure 7.

During operation phase, initially 2400m^3 water will be up taken once in the entire project life cycle and will continuously run through the manufacturing process. In cooling systems, water can be lost from evaporation and the blowdown. The lost water must be continuously replaced by makeup water, which is 150 m^3/hr. Among this, 126m^3/hr and 24m^3/hr water will be lost by evaporation and blowdown respectively during steel production, shown in **Figure 3.8**. 150m^3/hr make up water will be collected from khal, bore well and rain water storage tank, where 100m^3/hr from bore well and rain water harvesting tank and 50m^3/hr from the khal inside the project boundary. The hot water from the cooling tower will pass through a process unit before reusing where the hot water will exchange heat.

The waste water generated from the cooling process i.e., blowdown water will be conveyed to the waste water treatment plant and the treated water will be reused in the slag treatment (cooling) process. Details of the WWTP is provided in **section 3.8.4** and layout is provided in Annexure 8. No waste water or treated water will be dumped in the nearest water body. Water will be continuously recycled and reused in the steel manufacturing process and when the manufacturing process is on a temporary break, the water will be stored in a reservoir for further use.

There will be 516 employees during operation phase and for their sanitation and drinking purposes 24m^3/day water is required considering the consumption rate to be 45 liters/day/capita. Total requirement during project operation will be 174 m^3/day or 7.25 m^3/hr.

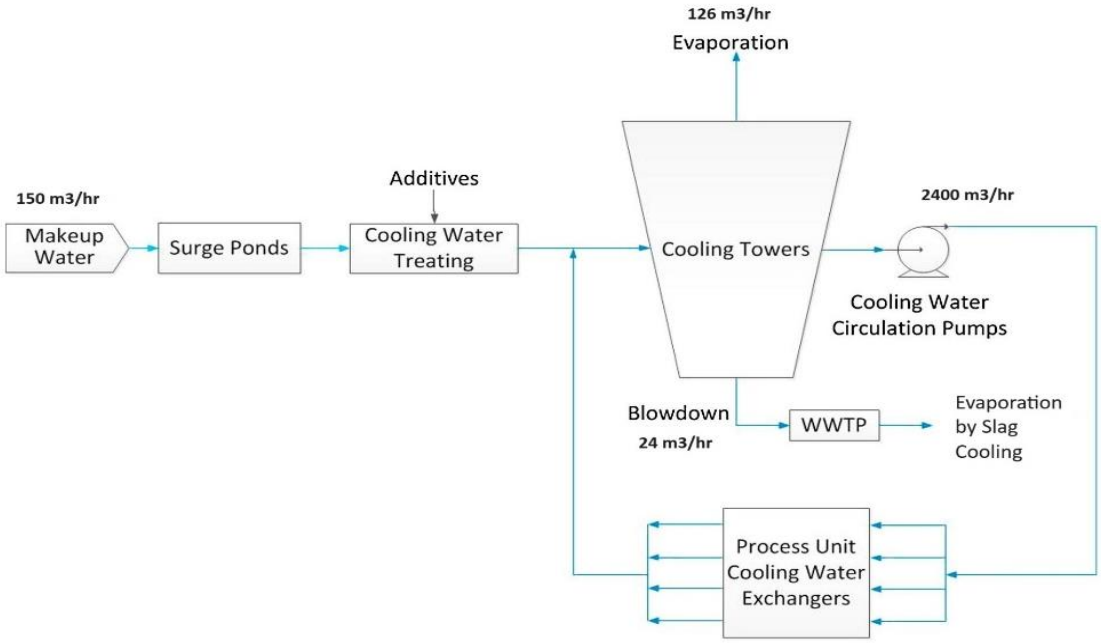


Figure 3.8: Water Flow Process in Steel Manufacturing

3.7.3 Fuel Requirement

The proposed project will require different fuels during operation. For furnace reheating Natural Gas/ HFO/ Light Diesel oil will be required. Project proponent already has the permission from Bakhrabad Gas Distribution Company for natural gas supply, which is attached in Annexure 5. Preliminarily the proponent will use gas for furnace reheating but if the gas is not available in that case HFO/ Light Diesel oil will be used. In scrap melting shop 5MT/year LPG fuel will be required for burner.

Table 3.6: list of Fuel required

SL no.	Fuel name	Purpose	Capacity Quantity
1	Heavy Fuel Oil	Furnace Reheating and D.G. sets (Any one Fuel)	350,000 liters/year
2	Light Diesel Oil		350,000 liters/year
3	Natural Gas		8500 m^3/hr
4	LPG	Melting Shop burner	5 MT/year

3.7.4 Infrastructure (road, drains)

Proponent is planning to construct a 25 m wide bitumen road at the northern side of the existing Chhagalnaiya link road for having access to the project area from Dhaka-Chittagong highway. This road will be used by USML authority and the road will be constructed at the west side of the project, shown in master layout (Annexure 3). This proposed road will be crossing 2 Dhaka- Chittagong railway line. Application has been submitted to the Bangladesh road, highway and railway department for getting permission to construct this proposed road. Permission letter has been attached in annexure 6.

3.7.5 Manpower

The proposed project will generate employment for around 146 people during construction phase and 516 people during operation phase. Priority for employment will be given to local persons. Following staff & workers are proposed to be employed during construction and operation phases are shown in **Table 3.7:**

Table 3.7: Manpower Details

Employee Position in project activity	Employee number
Construction phase	
Project management	18
Construction management	88
Maintenance	10
Quality	8
Administration	12
Daily casual worker	14
Total =	150
Operation phase	
Plant management	6
Process management	50
Maintenance	250
Quality	30
Administration	30
Daily casual worker	150
Total=	516

3.8 Project Other Facilities

3.8.1 Fume Treatment Plant (FTP)

Fume generated from Electric Arc Furnace and ladle furnace during operation phase need to treat before discharging it to the outer environment. Here is a detail of Fume treatment Plant (capacity 2.4 million m^3/hr) proposed by USML for this steel manufacturing mill project, a flow chart of this process is shown in **Figure 3.9**.

- **First Stage (Separation of Primary Fume)**

  The primary fumes from EAF chamber are collected by means of a water-cooled duct connected to the settling chamber. After the settling chamber, there is another water-cooled duct for a further cooling of the primary fumes, and when the temperature of the hot fumes is cooled down to a temperature in compliance with the downstream single-wall duct or cooling equipment, the water-cooled duct ends.

After that a Harpin cooler is used to reduce the temperature of the primary fumes before mixing them with the secondary fumes collected by the furnace canopy hood. The name of this particular heat exchanger derives from the long U-shaped fume tubes, which are naturally cooled by ambient air. This design is very efficient and, at the same time, does not require much maintenance as the forced draft coolers which have fume tubes of smaller diameter and require frequent cleaning to prevent an excessive increase of the cooler pressure drop.

- **Second Stage (Secondary Fume Collection)**

The secondary fumes emitted by the EAF, mainly during tapping phases, are captured by the canopy hood. During the tapping phases, the flow dampers are completely open and provide the necessary melt shop ventilation ensuring the suction of the generated fumes. The flow dampers of the canopy hood are positioned automatically to a pre-set value during the melting phase. This position is automatically adjusted by the computerized control system in order to allow the correct ventilation inside the building and the correct dilution air for primary fumes cooling.

An independent suction line is provided for the Ladle Furnace (LF). The fumes are sucked from the LF roof. This duct has a booster fan with regulating speed that exhausts the fumes and conveys them to the mixing point. The fumes are then mixed with those collected by the canopy hood over the EAF and conveyed to the filter plant.

- **Third Stage (Spark Arresting)**

An axial cyclone is used as spark arrestor to protect the bags of the filter (installed downstream) from the risk of being damaged by hot particles conveyed by the fumes. The cyclone is provided with a double-flap vane valve that allows the extraction of the settled material without infiltration of ambient air into the fume circuit. Depending on the requirements, the extracted material can be temporarily stored in a container or collected and sent to the centralized dust silo.

- **Fourth Stage (Fume Filtration)**

A pulse-jet bag filter technology combines efficient filtration of the fumes with low energy consumption. The filter bags are cleaned by compressed air jets blown through electric diaphragm valves. For each bag, the air jet takes place inside a Venturi tube and therefore a strong induced gas draft is used for expanding the bag, with a sudden removal of its dust cake. To maximize the cleaning efficiency, the bag compartment is automatically put in off-line mode during the cleaning operation. This procedure is used only during the EAF melting phase. The bag cleaning frequency is set by the automation system during the start-up of the plant, thus assuring effective filtration and low compressed air consumption in all operating conditions.

Upstream of the filter there is an emergency safety valve for dilution air intake. If the fume temperature exceeds more than the 160° C, this valve opens automatically. Normally, this safety valve is fully closed, even under the heaviest operating conditions.

- **Fifth Stage (Fume Suction and Exhaust)**

  The induced draft fans, installed downstream of the filter, suck the fumes from the whole circuit and deliver them to the centralized stack. The main fans are located downstream of the filter and therefore they operate with filtered fumes, so high efficiency fan impellers can be used. This design reduces the maintenance requirements and the consumption of electric energy as well.

- **Final Stage (Dust Collection and Storage)**

  The coarser dust sucked from the ECS (Evaporating Cooling System) outlet is intercepted in the settling chamber located nearby. The chamber has a maintenance door ensuring the access of a small front-end loader to remove the accumulated dust. The dust discharged in the filter, cyclone and cooler is collected by chain conveyors under the hoppers and is sent to a storage silo. The dust is discharged from the silo through a screw conveyor to the transport truck.

- **Maintenance of FTP**

  - ✓ Empty the dust tray on regular basis when the steel mill is running
  - ✓ Clean and change the filter bag, however this FTP has an automatic filter bag cleaning sensor.
  - ✓ The next step is to check your seals and valves for leaks. These are a major concern with fume treatment systems as they leave everyone vulnerable to toxic air. Make sure all the seals and gaskets in your system are functioning properly. If any damaged notice, then repairing needed and get your system serviced immediately.
  - ✓ Clean the canopy hood, exhaust fan and duct pipe on a monthly basis.

Fume treatment plant
Unitex Steel Mills Limited

Flow sheet

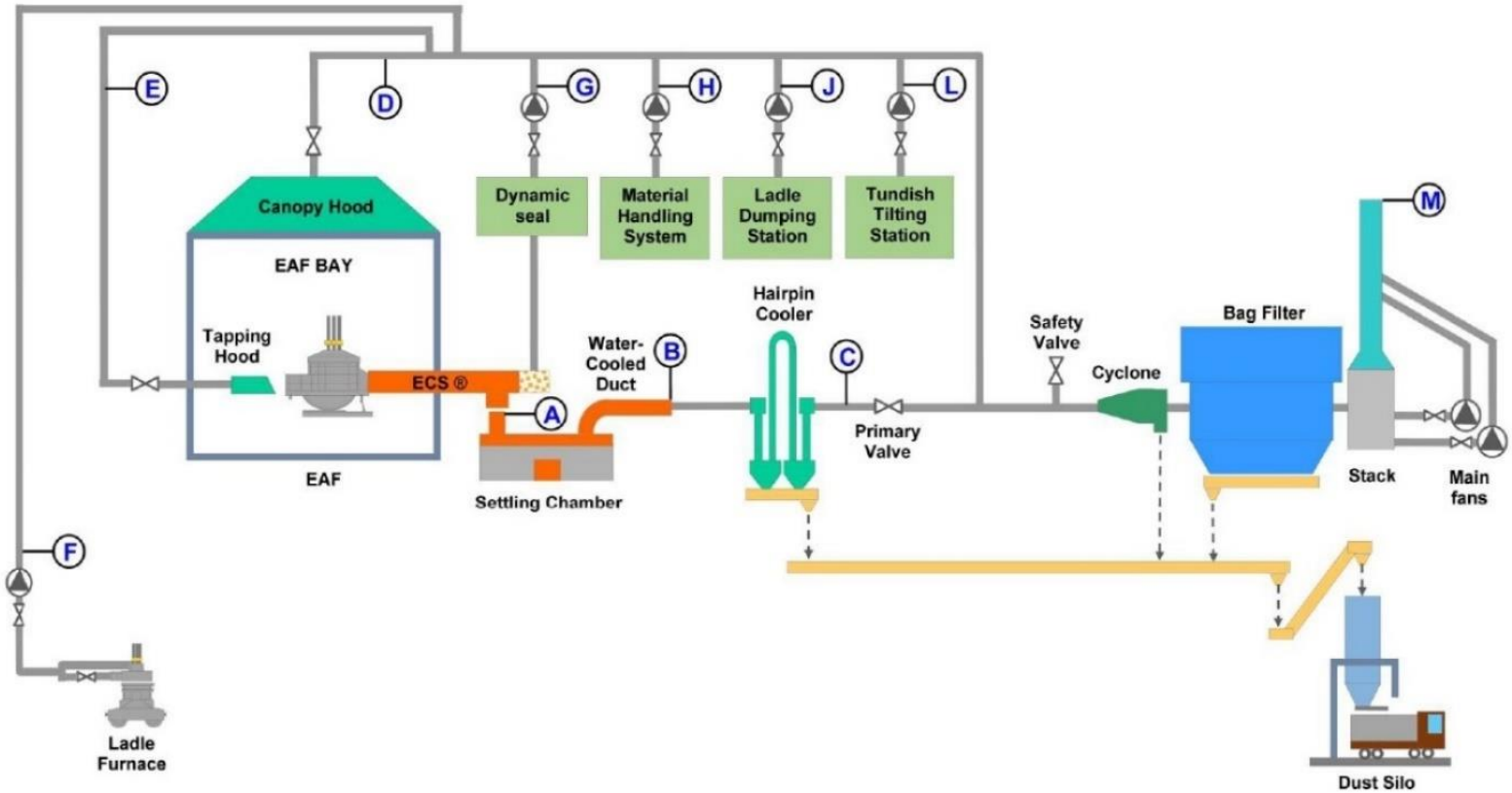


Figure 3.9: Fume Treatment Plant (FTP) proposed by USML

3.8.2 Air Separation Plant (ASP)

The proposed Air Separation Plant employs a process in which air is purified by molecular sieve at normal temperature to produce gaseous and liquid Oxygen & Nitrogen along with Argon. Oxygen is mainly used in blast furnace, melting reduction smelting furnace, converter, electric furnace smelting; Nitrogen is mainly used for furnace sealing, protective gas, steelmaking and refining, slag splashing in converter to protect furnace, security gas, heat transfer medium and system purging, etc. Argon gas is mainly used in steelmaking and refining. In order to meet the production requirements and ensure the safe and stable operation of production, steel mills are equipped with special ASP. This air separation plant is designed on the principle to ensure the long time, efficient and low energy production. In this air separation plant, the current advanced air separation and manufacturing technologies are utilized. The process and plant performance are on an international level.

3.8.2.1 Proposed ASP process

The process of proposed air separation plant by USML for this project is discussed below. Process flow chart is shown in Annexure 9.

a) Air filtration

- ✓ Air is sucked through an intake pipe and passes through an air filter to separate the air impurities. Then the air compressed to a pressure by air compressor. The compressed air flows into air cooling tower to be precooled. The mesh mist eliminator is set at the top of the air-cooling tower to prevent water from being taken out and remove water droplets in the air.
- ✓ The air comes from the air-cooling tower flows into switched molecular sieve adsorber where such impurities as moisture, CO_2, C_2H_2 and other impurities are adsorbed by molecular sieve.

b) Air cooling

- ✓ The purified air is divided into three streams: one stream is fed out to be instrument air; the second stream enters main heat exchanger (E1) to be cooled to the saturated temperature by reflux gas and then enters lower column (C1); the rest, after being boosted by the air boost compressor, will be divided into two streams: one stream, of which its content is similar with swelling capacity, enters main heat exchanger (E1), then it will be extracted from the middle portion of exchanger and sent to expander, the expanded air will be sent to the lower column; another one, after being boosted by boost end and fed into main heat exchanger (E1), will be cooled and liquefied before being throttled to the lower column (C1).

- ✓ Following preliminary rectification in lower column, the liquid air is obtained from the bottom of the lower column and the gaseous nitrogen is obtained from the top. The gaseous nitrogen will be liquefied into liquid nitrogen in the main heat exchanger (E1). Part of liquid nitrogen is fed out to be the reflux liquid; the rest with the liquid air withdrawn from the lower column (C1) will be sub-cooled by the liquid air and liquid nitrogen sub-cooler, then sent into the corresponding part of the upper column (C2).

c) Formation and collection of liquid nitrogen, oxygen and argon

- ✓ Following further rectification, the pure gaseous nitrogen and liquid nitrogen are obtained from the top of upper column, after exiting the sub-cooler, the gaseous nitrogen will be reheated by heat exchanger before sent out from the cold box. The liquid nitrogen will be evaporated into gaseous nitrogen in the main heat exchanger (E1) after being boosted to a certain pressure by liquid nitrogen pump, and will be sent out from the cold box to user.

- ✓ The waste gaseous nitrogen obtained at the top of upper column is fed out of cold box after being sub-cooled in sub-cooler and re-warmed in main heat exchanger. Then it is sent to water cooling tower after meeting the need as the gas for regeneration of molecular sieve first.

- ✓ The liquid oxygen is obtained from the main condenser, a small part of it will be withdrawn and sent to the storage system, the rest, after being boosted by liquid oxygen pump and vaporized by the main heat exchanger, will be sent to Steel Plant from cold box with pressure.

- ✓ A certain amount of argon fraction withdrawn from the middle of upper column is fed to the crude argon column. The crude liquid argon is obtained through argon fraction rectified in crude argon column and fed to the middle portion of pure argon column. The pure liquid argon obtained at the bottom of pure argon column following rectification.

3.8.2.2 Maintenance and Safety of ASP

In order to ensure the safety and reliability of the air separation plant, the below measures are suggested by USML:

- ✓ The production of argon by means of complete cryogenic rectification process ensures the safety to a greater extent.
- ✓ Extraction of liquid oxygen from the main condenser can effectively prevent the accumulation of such dangerous impurities as hydrocarbons. The safe running of condenser/evaporator can be effectively guaranteed without special operation and maintenance.
- ✓ The air precooling system is equipped with an air-cooling tower, which can effectively eliminate acidic substances such as SO2, NOX, HCl, Cl2, they are harmful to the molecular sieve in the raw air, it can ensure the effective service life of the molecular sieve.
- ✓ All pressure vessels, pressure retaining pipelines and parts are designed, manufactured and inspected strictly in accordance with the state applicable regulations.
- ✓ The cold box and pipelines inside columns are accepted through strength calculation. The pipelines inside cold box are accepted through stress calculation as to ensure the safety under the low temperature condition.
- ✓ The air separation plant employs conventional molecular sieve process with internal compression, its process is mature and easy to operate; in particular, it is easier to operate as the fractionating column adopts complete rectification process to produce argon; at the same time, the main equipment of the low-temperature cold box is low-pressure equipment, and has high reliability, easy for maintenance. Maintenance parts required are considered to be maintainable in the design, such as: easy to disassemble, cryogenic parts end can be maintained in the normal temperature.

3.8.3 Slag Treatment Plant

Slag is a byproduct generated during the production of steel in electric arc furnaces. Steel slag is one of the main waste products in the steelmaking process. Because of its chemical composition and technical properties, it can be reused as raw material in steel mills and can serve as a substitute for aggregates in civil engineering. Proposed project planned to implement a slag treatment plant with a capacity of 20 MT/hr in the project boundary area.

3.8.3.1 Slag Treatment Process

In Slag treatment process, waste slag is collected from the slag disposal area and mixing the waste slag with other materials such as sand, gravels, cement, etc. for transforming the waste slag into a raw material or slag chip for secondary use. Before and after formation of new product from a slag waste, laboratory test is required for its safe use. Details of the slag treatment plant is shown in **Figure 3.10.**

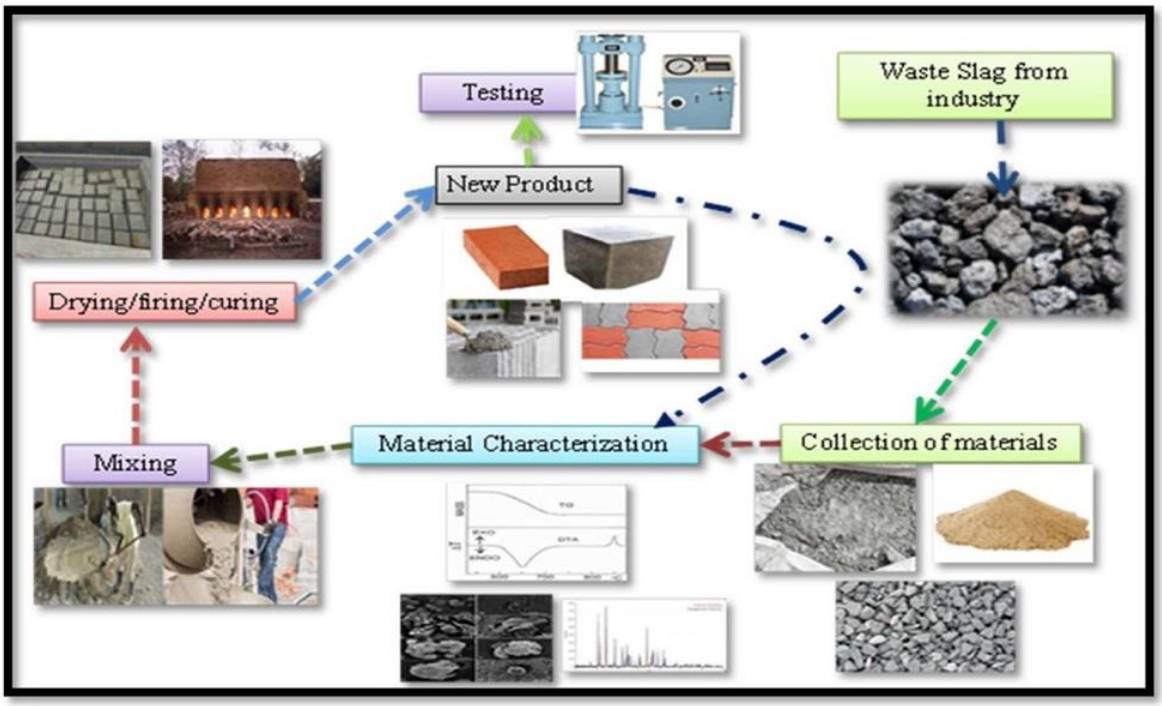


Figure 3.10: Slag Treatment Process

3.8.3.2 Secondary Uses of Slag

The use of electric arc furnace slag helps reduce waste and conserves natural resources while contributing to various industries, including construction, agriculture, and manufacturing. Its versatility makes it a valuable secondary resource in many applications. Here are some common uses of EAF slag:

- **Construction and Road Building:** EAF slag can be crushed and used as aggregates in construction materials, such as concrete and asphalt. It enhances the strength and durability of these materials and is often used in road construction, where it provides excellent stability.

- **Cement Production:** EAF slag can be ground into a fine powder and used as a supplementary cementitious material. When added to cement, it improves its workability and reduces the carbon footprint of the construction industry.
- **Agricultural Lime:** Some EAF slags, after proper processing, can be used as a source of agricultural lime. It helps improve soil pH levels and provides essential nutrients to plants, promoting healthier crop growth.
- **Railroad Ballast:** Due to its durability and excellent load-bearing capacity, EAF slag is used as a railroad ballast material. It provides stability and support for railway tracks.
- **Abrasive Material:** Crushed EAF slag can be used as an abrasive material in applications such as sandblasting and abrasive cleaning due to its hardness.
- **Land Reclamation:** EAF slag can be used in land reclamation projects, especially in areas where soil quality is poor. It can improve soil structure and fertility over time.
- **Fill Material:** In construction and civil engineering projects, EAF slag can be used as fill material in embankments, road construction, and foundation work. Its density and stability make it suitable for such applications.
- **Concrete Block Manufacturing:** EAF slag can be incorporated into the production of concrete blocks and bricks, improving their strength and durability.
- **Erosion Control:** It can be used in erosion control applications, such as lining channels and waterways, to prevent soil erosion.
- **Environmental Remediation:** EAF slag can be used in environmental remediation efforts, such as capping landfills or contaminated sites, due to its impermeable and stable nature.
- **Railway Ballast:** EAF slag's durability and load-bearing capacity make it suitable for use as railway ballast, providing stability and support to railway tracks.

3.8.4 Waste Water Treatment Plant (WWTP)

Steel plants use a large amount of water for a variety of usage which includes cooling, dust suppression, cleaning, temperature control (heat treatment), transport of waste materials (ash, sludge, and scale etc.), and other usages. Use of large amount of water also generate huge quantity of waste water which may contain suspended solids and many dissolved substances and chemicals. The quality of treated waste water depends on the process where the water is used and for the purpose for which it is used. The major environmental effects of the untreated waste waters of the steel plant if discharged into the receiving water bodies are namely (i) toxicity to aquatic life, (ii) reduction of dissolved oxygen, (iii) silting due to suspended solids, (iv) taste and odour problems, (v) temperature rise affecting the dissolved oxygen, (vi) effect on the aquatic life, and (vii) formation of oil slicks due to the floating oil etc. The large volumes of process water that come into direct contact with the raw materials, products, and off gases is required to be treated for reuse of water, for recycle of the water, or for the removal of pollutants to the levels fixed by the regulatory authorities prior to its discharge. The quality of waste water controlled by adopting improved technologies developed for different processes. Technologies are also available now to treat the waste water fit for either recycling in the same process or in other processes. Treatment of waste water also results into recovery of some solid waste materials which can be recycle back in the process either as such or with some further processing and thus contributing to the conservation of the natural resources. In order to conserve water as a resource, there is a movement towards not just preventing the waste water

from causing pollution, but also to treat the waste water and recycle it in a closed system so as to reduce the consumption of fresh water.

3.8.4.1 Purpose of WWTP

- **Control of suspended solids**

Removal of suspended solids from the waste water is practically necessary for all of the production shops in the steel plant from coke making to the finishing mills. Solid particulates become suspended in process water streams during cleaning and cooling of flue and off-gases, slag granulation, descaling, roll and product cooling, flume flushing in rolling mills, and during product rinsing in finishing operations etc. The methods which are generally employed for removing suspended solids are (i) sedimentation, (ii) centrifugal separation, and (iii) filtration. The process is generally carried out either in a clarifier or inclined plate separator specially designed for a given application. Clarifiers are usually in circular shape but also can be constructed in a rectangular shape. Both clarifiers and inclined plate separators are designed for continuous removal of the collected sludge from the bottom of the unit. The underflow sludge is usually thickened by gravity before being further dewatered in one of the several types of sludge dewatering equipment's (examples are filter press, belt press, or centrifuge etc.). This is done to reduce the sludge volume so that it can be handled easily and economically during its disposal. Coagulating agents, such as alum, ferric chloride, ferric sulphate, ferrous sulphate, ferrous chloride, and commercial organic polyelectrolytes etc. are frequently added to the waste water prior to clarification for promoting flocculation of the solid particles. This increases their effective size and thus increases their settling rate. Centrifugal separation is a technology which is being used to remove suspended materials from the water column utilizing centrifugal forces. The separation technique is also sometimes being called as cyclone separation. The process is highly dependent upon particle size and specific gravity. Larger particles and higher particle density improves the separation performance. Multi-media or single media filtration, by either pressure or gravity, are other methods for the removal of fine suspended particulates and these are generally applied to the waste waters of the steel plant. The waste water is passed through a filter media contained in a container. The system is normally comprised of a number of individual filtration units working in parallel. Sometimes side-stream filtration is utilized to treat a portion of the waste water which is then blended with the unfiltered portion. Normally the design of the filter system is such that it has the highest feasible flow rate through the filter media so that the required size and cost are minimized. In a typical multi-media system, the waste water first passes through a relatively coarse layer of media (e.g. anthracite coal) and then through a layer of fine media (e.g. sand). Most of the particulates are removed by the coarse media layer, while the fine layer does the final polishing of the waste water. Multi-media filters are generally used when there is a high oil and grease content in the waste waters. High oil and grease concentrations can result in fouling and/or blocking of the media in both single and multi-media filters. The collected particulate is to be removed periodically from the filter media by back washing. In the operation of back washing, the incoming flow of waste water is stopped and a stream of treated water, and sometimes air, is passed through the filter media in the opposite direction to flush out the collected solids. The back wash stream is usually settled in a back wash holding tank, and the solids are processed through a thickener and sludge dewatering equipment. Both single media and multi-media filters are capable of yielding a high degree of clarity to the waste water streams. However, clarifiers are generally used for pre-treatment of waste water which are heavily laden with solids to remove the majority of the particulates prior to the filtration. Filters can be used alone without prior

clarification in case waste water is having lesser solids. The quantity of suspended solids and other particulates discharged to a receiving water stream can usually be greatly reduced by recirculating the water back to the process. However, the degree of recirculation that is feasible gets limited by the number of suspended solids present in the waste water and the build-up in the concentration of dissolved solids in the system, which can ultimately lead to deposition and blockages in the piping and the equipment. Hence, a certain portion of the circulating water volume is always required to be released as blow down to control the concentration of dissolved solid to an acceptable level.

- **Control of oil and grease**

Oil and grease are usually found in waste waters from continuous casting machines, hot and cold rolling mills, pickling, electroplating, and coating operations. The oils originate from equipment, product lubricants and coolants, hydraulic systems, and preservative coatings applied on the product during certain processes. Oil and grease are usually removed from the waste waters by employing several methods which include skimming, gravity separation, air flotation, filtration and ultra-filtration. If the oils are insoluble in water, they are removed from waste water by gravity separation and skimming. Gravity oil separators generally have rectangular chambers in which the velocity of the waste water stream is slowed down sufficiently so as to provide time for the oil and grease to float to the surface, from where they are removed by any of the various kind of available skimming devices. Some examples of skimming devices are rotary drum skimmer, rope and belt type skimmers, and scraper blades, which are also used to scrape the heavier solids that have settled to the bottom. Insoluble oils also can be removed along with suspended solids in the multi-media filters. If the oils are emulsified or water soluble, such as those found in waste cold rolling solutions or rinse waters, they are required to be treated by acid or emulsion breakers to break the emulsion, followed by gravity sedimentation and skimming, or by air flotation and/or membrane separation technologies. Skimming can be used on any waste water which contains ingredients that float to the surface and is normally used to remove free oil, grease, and soaps. Skimming is often used with air flotation or clarification to improve removal of both settling and floating materials. The removal efficiency of a skimmer is a function of the density of the material to be floated and the retention time of the waste water in the tank. Gravity-type separators tend to be more suitable for use where the amount of surface oil flowing through the system is fairly large in amount and consistent. Air flotation process is generally used to separate floatable materials having a density which is close to the density of water and hence cannot be effectively separated by gravity alone. In the flotation process, gas bubbles (usually of air) which are released in the waste water, gets attached to the oil and fine solid particles, causing them to float more rapidly to the surface where they are skimmed off as a froth. Chemical additive agents are sometimes used to improve the performance of the flotation process. Ultra filtration process includes the use of pressure and semi-permeable polymeric or ceramic membranes to separate emulsified or colloidal materials suspended in a liquid phase. The membrane used in an ultra-filtration unit forms a molecular screen which retains molecular particles based upon their differences in size, shape, and chemical structure. The membrane permits passage of solvents and molecules with lower molecular weight. In the ultra-filtration process, the waste water is pumped through a tubular membrane unit. Water and some low molecular weight materials pass through the membrane under the applied pressure ranging from 0.7 kg/sq cm to 7 kg/sq cm. Emulsified oil droplets and suspended particles are retained, gets concentrated, and are removed continuously.

- **Control of Heavy Metals**

Regulatory authorities normally limit the discharge of heavy metals from the steel plant process waters from furnace shop, steel melting shop, as well as from pickling, cold rolling, electroplating, and hot coating operations. The normal method used for removal of these trace metals is chemical precipitation followed by clarification or filtration. It is a well-known fact that the solubility of heavy metals in water is a function of pH. Usually, metals become less soluble as the pH increases. Hence to remove dissolved metals, the waste water is treated with an alkaline material in a mixing tank with a pH controller. In most of the chemical precipitation processes the separation of heavy metals is by hydroxide and sulphide precipitation. In hydroxide precipitation, lime, which is the least expensive reagent, is normally used, although caustic soda, magnesium hydroxide, or other alkalis are also sometimes used for this purpose. After the pH is raised to a level where the dissolved metals precipitate as hydroxides, the water is passed either through a clarifier and/or through a filter for the removal of the precipitated metal hydroxides. The addition of a coagulating agent is normally needed. The use of a coagulating agent such as ferric chloride at an alkaline pH result in the formation of an oxy-hydroxide surface, which improves additional removal of metals by adsorption. Other coagulating agents such as alum, ferrous sulphate, and polymeric flocculants can also be used to improve the particle formation. If chromium is present in the hexavalent form, it must first be chemically reduced to the trivalent form before it can precipitate. The rate of this reduction reaction is a function of the pH condition of the system. As an example, the pH of the system is to be adjusted in the range of 2.0 and 3.0 if sulphur dioxide, sodium bisulphite, or spent pickle liquor is used as the reducing agent. Hexavalent chromium can also be reduced to trivalent chromium with sodium hydrosulphite at a relatively higher pH (ranging from 8.5 to 9.5). The reduced trivalent chromium ion is then converted to insoluble chromium hydroxide and is removed by sedimentation. Dissolved metal ions and certain anions are normally chemically precipitated and removed by physical means such as sedimentation or filtration. In addition to the use of alkaline compounds, the following are other reagents which can be used. Metal sulphides—Except for chromium sulphide, the solubility of metal sulphides is lower than that of metal hydroxides. Hence the removal of dissolved metals can be improved using the sulphide precipitation process. Both soluble sulphides, such as hydrogen sulphide or sodium sulphide, and insoluble sulphides, such as ferrous sulphide can be used to precipitate many heavy metal ions as insoluble metal sulphides. Presently, the use of organic sulphide has become popular for the treatment of waste water. Normally the process of sulphide precipitation includes clarification and filtration.

3.8.4.2 Treatment of waste water

The waste water generated from steel manufacturing and hot rolling mill in steel manufacturing process is required treatment for further reuse. The parameters of most significance, which are generally regulated by the statutory authorities are suspended solids, oil and grease, phenol, cyanide, ammonia, and heavy metals such as lead, zinc, chromium, and nickel. The steel mill proponent will install a 2400m^3/hr capacity waste water treatment plant at the proposed location. The layout of the waste water treatment plant is shown in Annexure 8 and the process is described below

- **Step 1: Screening**

The wastewater stream will pass through rotating bar screen that will remove any solid particles. This screen will have auto cleaning system. The water then flows to equalization tank through oil & grease trap, where it will be allowed to stay for around 12-14 hours depending on the nature of wastewater.

In this tank wastewater will be homogenized by using air flow by air blower and temperature will also be minimized.

- **Step 2: Primary Settling**

A clarifier or an inclined plate separator will used for separating solid particles which cannot be removed in previous stages. The settled material, called primary sludge, is pumped off the bottom and the wastewater exit the tank from the top. Floating debris such as grease is skimmed off the top and sent with the settled material to digesters. Gravity oil separator generally have rectangular chambers in which the velocity of the waste water stream is slowed down sufficiently so as to provide time for the oil and grease to float to the surface, from where they are removed by any of the various kind of available skimming devices. Some examples of skimming devices are rotary drum skimmer, rope and belt type skimmers, and scraper blades, which are also used to scrape the heavier solids that have settled to the bottom.

- **Step 3: Chemical Treatment**

Wastewater will be pumped to this section for neutralization by adding acid/alkali to adjust the pH of the wastewater if required. Usually, metals become less soluble as the pH increases. Hence to remove dissolved metals, the waste water is treated with an alkaline material in a mixing tank with a pH controller. In most of the chemical precipitation processes the separation of heavy metals is by hydroxide and sulphide precipitation. In hydroxide precipitation, lime, which is the least expensive reagent, is normally used, although caustic soda, magnesium hydroxide, or other alkalis are also sometimes used for this purpose. After pH adjustment the wastewater will be pumped to the secondary clarifier chamber.

- **Step 4: Coagulation & Flocculation**

After pH adjustment add coagulant and flocculant in the second tanks to control the suspended solid and some portion of COD. The addition of a coagulating agent is normally needed. The use of a coagulating agent such as ferric chloride at an alkaline pH result in the formation of an oxy-hydroxide surface, which improves additional removal of metals by adsorption. Other coagulating agents such as alum, ferrous sulphate, and polymeric flocculants can also be used to improve the particle formation. After coagulation and flocculation, the water will flow to the secondary clarifier for removing the suspended particles.

- **Step 5: Secondary Settling**

Wastewater then flow to final settling tanks, where the heavier solids settle to the bottom. We remove most of this secondary sludge and combine it with the primary sludge for thickening and digestion. By this process the WW is now over 90% treated.

- **Step 6: Filtration**

Treated water from the Clarifier tank will be disposed after passing through a dual media filter in which water will pass through sand and activated carbon in which further polish will be done. Normally the design of the filter system is such that it has the highest feasible flow rate through the filter media so that the required size and cost are minimized. In a typical multi-media system, the waste water first passes through a relatively coarse layer of media (e.g. anthracite coal) and then through a layer of fine

media (e.g. sand). Most of the particulates are removed by the coarse media layer, while the fine layer does the final polishing of the waste water.

High oil and grease concentrations can result in fouling and/or blocking of the media in both single and multi-media filters. The collected particulate is to be removed periodically from the filter media by back washing. In the operation of back washing, the incoming flow of waste water is stopped and a stream of treated water, and sometimes air, is passed through the filter media in the opposite direction to flush out the collected solids. The back wash stream is usually settled in a back wash holding tank, and the solids are processed through a thickener and sludge dewatering equipment.

- **Final Step: Sludge Thickening Tank and Sludge Drying**

After settling the sludge in sludge tank, it will be pumped to a PVC tank where the sludge is mixed with polymer. Then it will be filled in a geo bag by gravity that is controlled by a valve. There are three geo bag set-ups in this system. After filling the geo bag with the sludge, have to wait until the sludge will be dewatering, then the bag will be removed and a new geo bag attached. The process will be continued until needed.

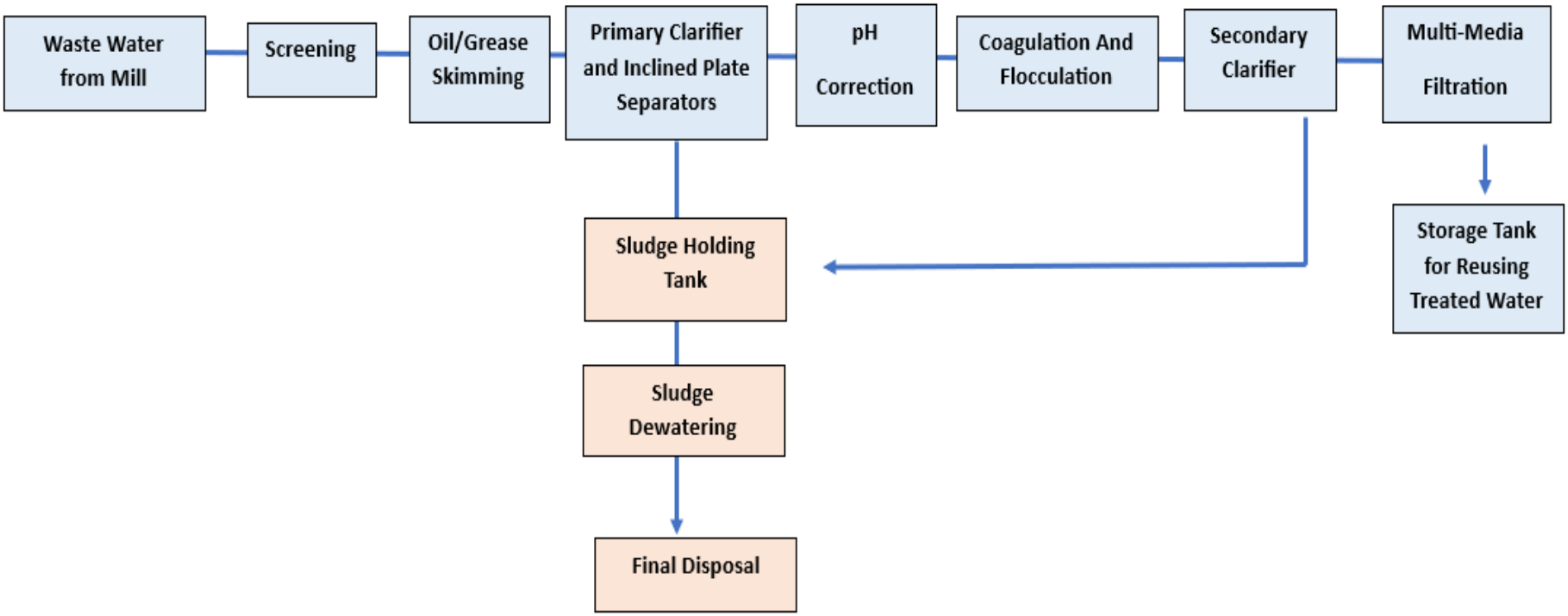


Figure 3.11: Waste Water Treatment Process

3.9 Project Schedule

The project preliminary schedule is discussed in Annexure 10.

Table 3.8: Project Time Schedule (Tentative)

SL no.	Project activity	Time schedule
1	Project starting date	01 November, 2023
2	Project preparation	15- 16 months
3	Project implementation	2 years (2025)

Chapter 4

4 ENVIRONMENTAL BASELINE STUDY

4.1 General Consideration

Baseline condition of environment states the present status of different components of environment i.e., physical, biological, environmental parameters quality in absence of the project. Environmental baseline study gives us clear idea of the existing environment prior to the project intervention, which can be compared with environmental condition both during implementation and in operation phases. Mainly there are two principal objectives in examining and defining the existing environment:

- To recognize potential environmental impacts of the project and enable mitigation measures to be identified;
- To provide an environmental and social baseline against which potential impacts from the construction and operational phases of the project can be compared.

The baseline environmental quality is assessed through primary and secondary studies within the impact zone for various components of the environment, viz. air, noise, water, soil, geology, hydrology, ecology etc.

4.2 Methodology

The methodology adopted for collecting the baseline data was as follows:

- Study area of 5 km radial zone from the center of the proposed project location was selected for the baseline studies;
- Primary data collection was through environmental monitoring and field survey for water, air, noise, traffic and ecology;
- Secondary data was collected from government reports, academic institutes, websites, published literature etc. for soil, geology, hydrology, seismic activities etc.

4.3 Physical Environment Surrounding Project Site & Study Area

The project site is in the Muhuriganj village, Gopal Union Parishad, Chhagalnaiya Upazila of Feni District, Bangladesh. Chhagalnaiya is an Upazila of Feni District in the Division of Chattogram, Bangladesh. Chhagalnaiya is located at 23.0361°N 91.5194°E. and lies in the southern part of the district, bordering Tripura of India and Mirsharai Upazila of Chattogram. Primary and Secondary data has been generated and collected for conducting the Baseline Study. The immediate surrounding extended area of about 5 km radius has been considered as “Area of Influence (AoI)” for this study. AoI of the project site is shown in **Figure 4.1**. and details of the Baseline study is presented in **Table 4.1**.

Table 4.1: Details of Monitoring

SL. No.	Attribute	Parameters	Frequency of Monitoring
1	Ambient air quality	SPM, SO2, NOx, CO and Particulate matter (PM2.5 & PM10)	The monitoring was carried out at 8 locations for 24 hours
2	Noise levels	Noise levels in dB(A)	Once during study period continuously for 24 hours at 8 locations
3	Surface Water quality	Temp, pH, TDS, TSS, DO, Pb, Cr, Nitrate and BOD	Once during the EIA study period from 8 locations
4	Ground water Quality	pH, temperature, TDS, alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Cl, Ca, Na, K, Total Coliform, Fecal Coliform, Oil and Grese	Once during the EIA study period from 1 location
5	Meteorology	Wind Speed, Direction, Temperature, Relative Humidity, Rainfall	Data collected from secondary sources like Meteorological Station.
6	Ecology	Existing terrestrial and aquatic flora and fauna	Based on data collected during the site visit
7	Geology	Geological history	Based on data collected from secondary sources
8	Traffic	Day and night Traffic data	Primary traffic data from 2 location during EIA study
9	Seismicity	Identify areas where seismic activity can occur	Based on Data collected from secondary sources
10	Socio-economic aspects	Socio-economic characteristics	Based on primary data collected through socio-economic survey and data published in latest census

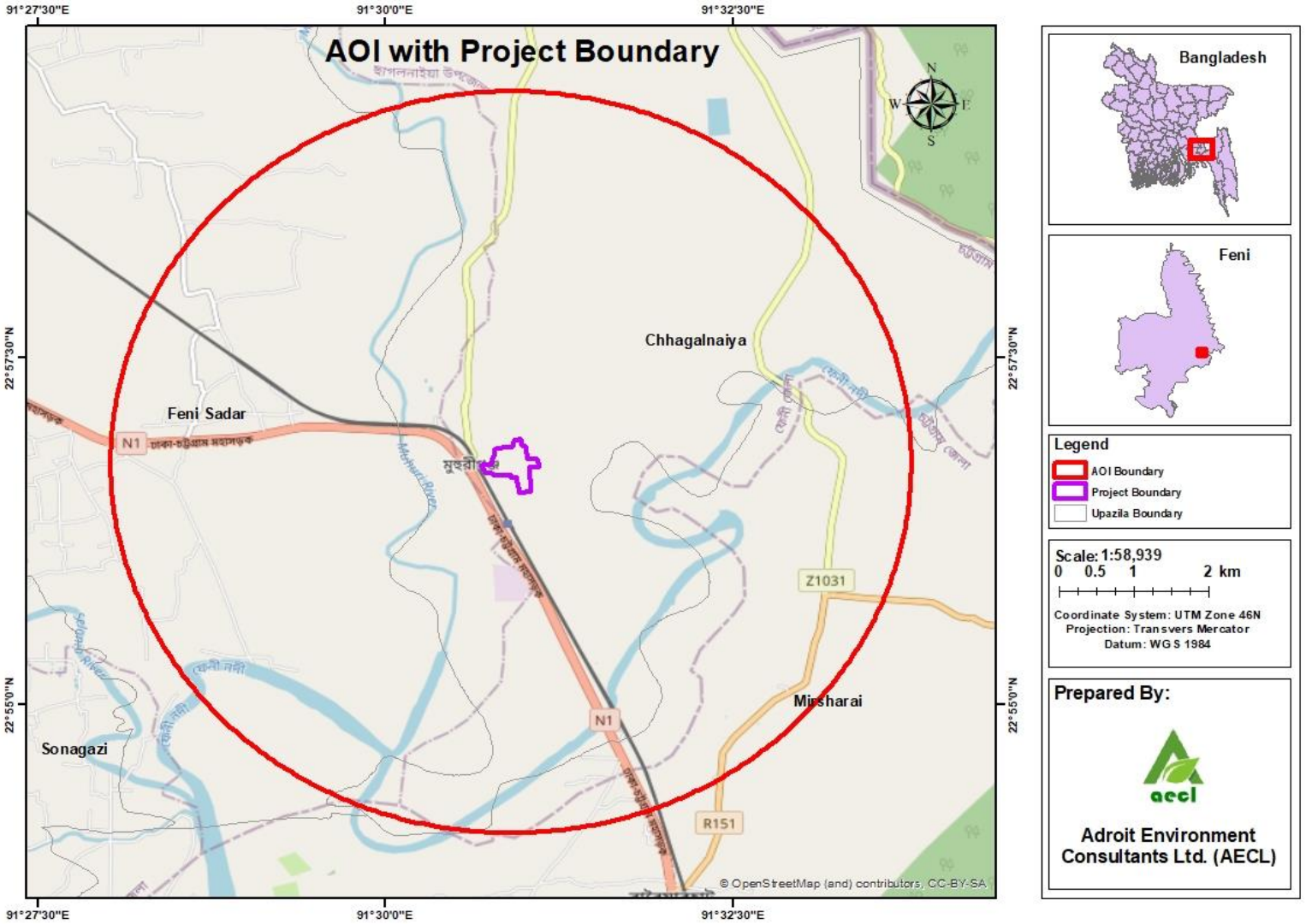


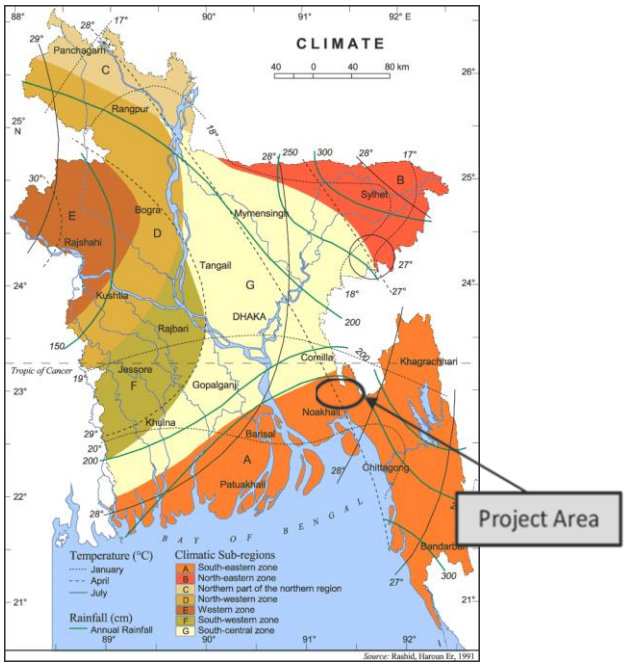
Figure 4.1: AOI of the Project Site

4.4 Climate

Bangladesh is located in the tropical monsoon region, and its climate is characterized by high temperature, heavy rainfall, often excessive humidity, and fairly marked seasonal variations. From the climatic point of view, three distinct seasons can be recognized in Bangladesh and these are:

- Summer/pre-monsoon - March to May
- Rainy season/monsoon - June to October
- Winter - November to February

January is the coolest month, and April is the warmest. Most places receive more than 1,525 mm of rain a year, and areas near the hills receive 5,080 mm per year. Most rains occur during the monsoon (June-September) and a very little occurs in winter (November-February). Climate map of Bangladesh is presented in **Figure 4.2.** According to the Climate map, the project area falls in **South-eastern zone (A)**. This zone comprises the Chattogram sub-region and a strip of land extending from southwest Sundarbans to the south of Comilla. The hills over 300m in height have north-eastern zone climate. The rest of the area has a small range of temperature, rarely goes over a mean of 32°C and below a mean of 13°C. Rainfall is heavy, usually over 2,540 mm. In winter heavy dew falling occurred. Long term climate data was collected from Bangladesh Meteorological Department. As there is no meteorological station at the Chhagalnaiya Upazila and Feni meteorological station is the nearest station from the project area. So the secondary meteorological data is collected from the Feni meteorological station for baseline study.



(Rashid, 1991)

Figure 4.2: Climate Map of Bangladesh

4.4.1 Rainfall

The rainfall follows the general climate pattern with the highest rainfall in the summer month of June to September and minimum rainfall in the cooler and drier months of November to March. Total monthly rainfall values of Feni Station are given in **Table 4.2.** Rainfall variability map of Bangladesh is presented in **Figure 4.4.** The maximum Monthly Average Rainfall is recorded in July, 2015 which was 1128 mm. According to the map, the rainfall variability of the project area is 18.1~20%.

Table 4.2: Monthly Total Rainfall in Feni (2015- 2022)

Year	Total Rainfall in mm											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	1	0	15	118	254	374	1128	487	478	243	1	0
2016	0	51	116	25	450	428	634	439	439	323	186	0
2017	0	0	169	446	220	773	1032	603	643	492	4	94
2018	0	2	16	222	418	623	572	523	196	89	0	1
2019	0	80	34	143	199	261	802	492	324	212	52	4
2020	67	6	18	186	414	548	746	321	375	352	72	0
2021	0	0	0	16	75	530	792	439	296	193	19	89
2022	8	13	3	30	379	483	315	403	644	202	0	0

(Bangladesh Meteorological Department)

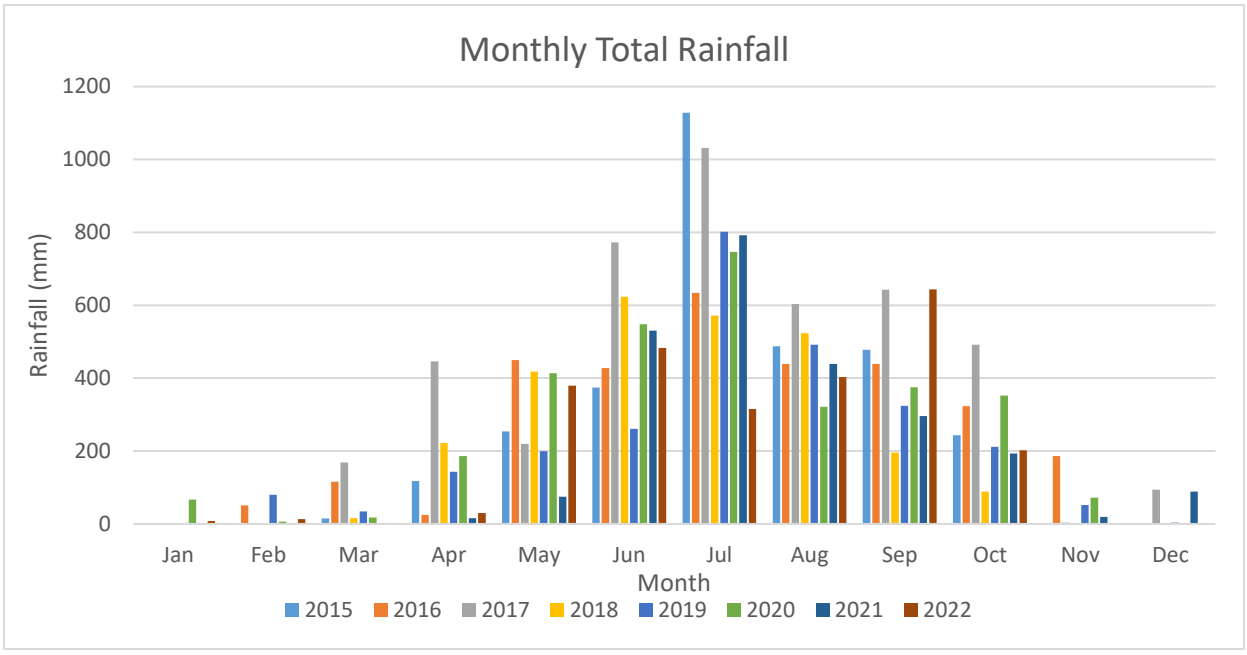
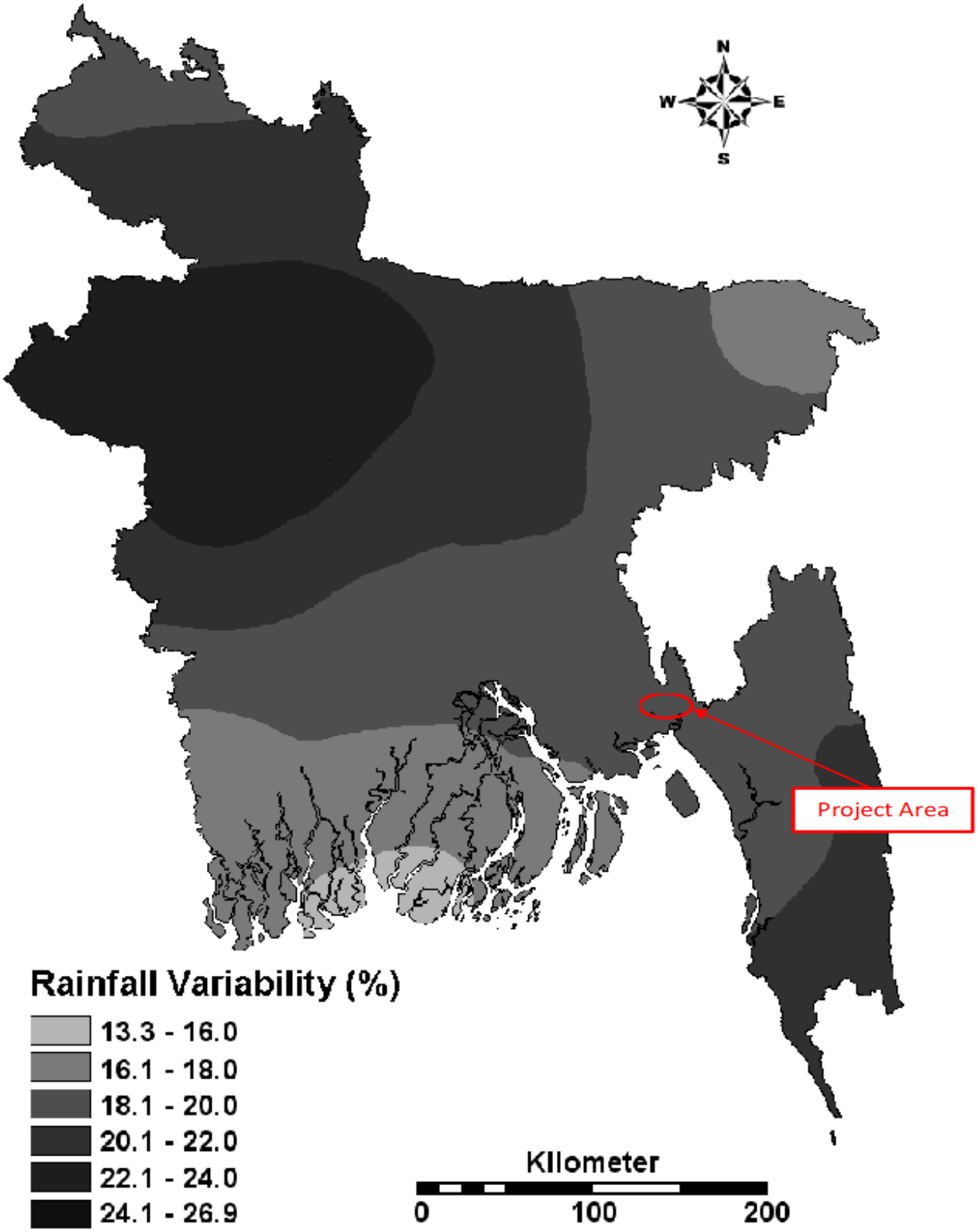


Figure 4.3: Monthly Total Rainfall data of Feni (2015- 2022)



(Bangladesh Agricultural Research Council)

Figure 4.4: Rainfall variability map of Bangladesh

4.4.2 Relative Humidity

Humidity during the wet season is naturally the highest compared to those occurring at other times of the year. The monthly average relative humidity from year 2015 to year 2022 are given in **Table 4.3**. Average Monthly Relative Humidity (maximum) for an average year is recorded as 90 % in July, 2015 and the minimum value is 64% in March, 2020.

Table 4.3: Average Monthly Relative Humidity of Feni (2015- 2022)

Year	Monthly Average Humidity in %											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	79	72	68	79	80	86	90	87	85	85	80	80
2016	78	79	75	80	79	80	86	82	82	82	80	78
2017	72	68	75	79	76	82	86	83	84	83	79	81
2018	78	73	71	74	83	84	86	83	82	82	76	76
2019	69	70	70	72	75	80	85	82	83	82	81	80
2020	79	69	64	75	77	84	84	82	83	83	78	80
2021	75	70	69	68	71	85	84	85	80	81	76	78
2022	78	70	66	74	79	83	79	79	85	80	76	78

(Bangladesh Meteorological Department)

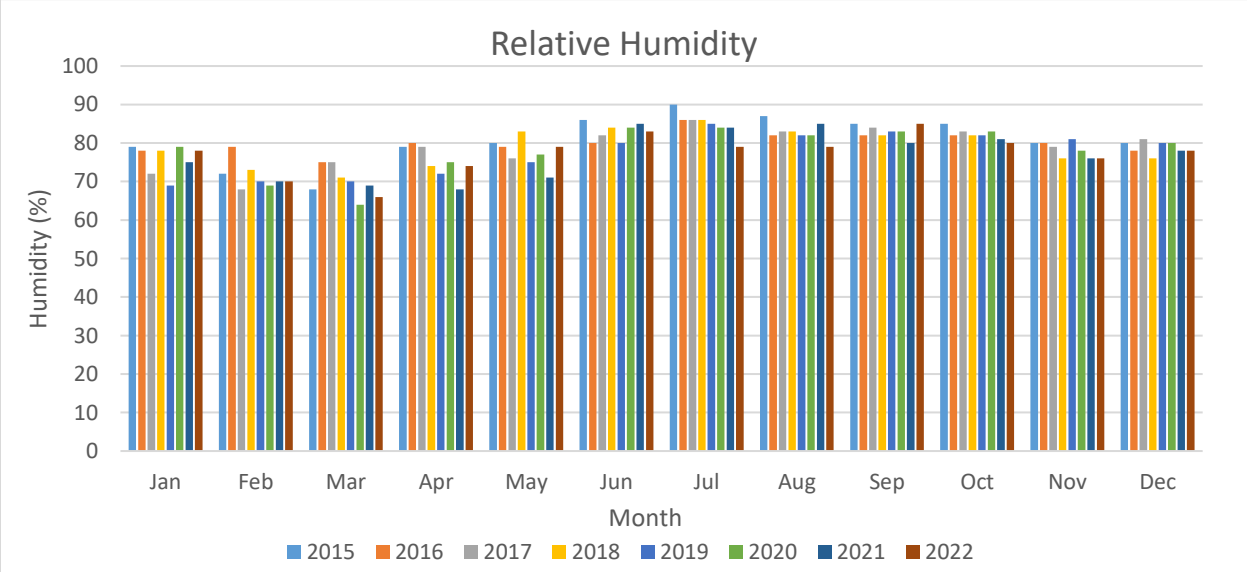


Figure 4.5: Average Monthly Relative Humidity of Feni (2015- 2022)

4.4.3 Wind Speed

According to Bangladesh Meteorological Department the average wind speed from 2015 to 2022 are given in **Table 4.4**. As per table 4.4, April, 2016 shows the highest wind speed and Feb, 2021 and 2019 show the lowest wind speed, which is 5km/h and 1.4km/h respectively. **Figure 4.7**, the wind rose of Chhagalnaiya Upazila indicates that most of the time wind blows to the South-East and North directions.

Table 4.4: Monthly Prevailing Wind Speed and Direction in Feni (2015- 2022)

Year	Wind Speed in Knots with Direction											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	3.5 NW	2.7 NW	3.6 NW	4.1 S	3.1 S	3.3 S	3.1 S	3.6 S	3 S	2.5 S	2.7 E	2.2 NE
2016	3.5 NW	3.7 NW	3.2 S	5S	3.6 S	3.4 S	3.5 S	3.5 S	3.3 SSE	2.6 SE	3.5 NE	3.5 S
2017	3.6 NW	4.1 S	3.8 S	4.3 S	3.6 S	3.5 S	3.2 S	3.2 S	3SE	3.1 S	3 NW	2.5 NW
2018	3.3 NW	3.2 NW	3.2 S	2.7 SE	3.2 S	2.8 S	2.7 S	2.7 S	3.3 S	2.3 SE	2.5 N	2.8 NW
2019	2.1 NW	1.4 S	1.6 S	2.9 S	3.1 S	2.4 S	2.5 S	2.6 S	2.1 S	1.8 N	1.7 N	1.9 N
2020	2.2 N	2.5 NW	2.3 NW	1.8 S	2.7 S	2.5 S	2.6 S	2.4 S	2.1 S	1.7 S	1.8 N	1.8 N
2021	2.1 N	1.4 N	2.2 S	2.7 SSE	2.6 S	2.5 S	2.6 S	2.3 S	2.3 S	2.7 S	2.2 N	1.9 NW
2022	2.1 NW	2.9 NW	2.5 S	3 S	2.6 S	2.6 S	2.3 S	2.5 S	2.1 S	2.1 N	2.3 NW	2 NW

(Bangladesh Meteorological Department)

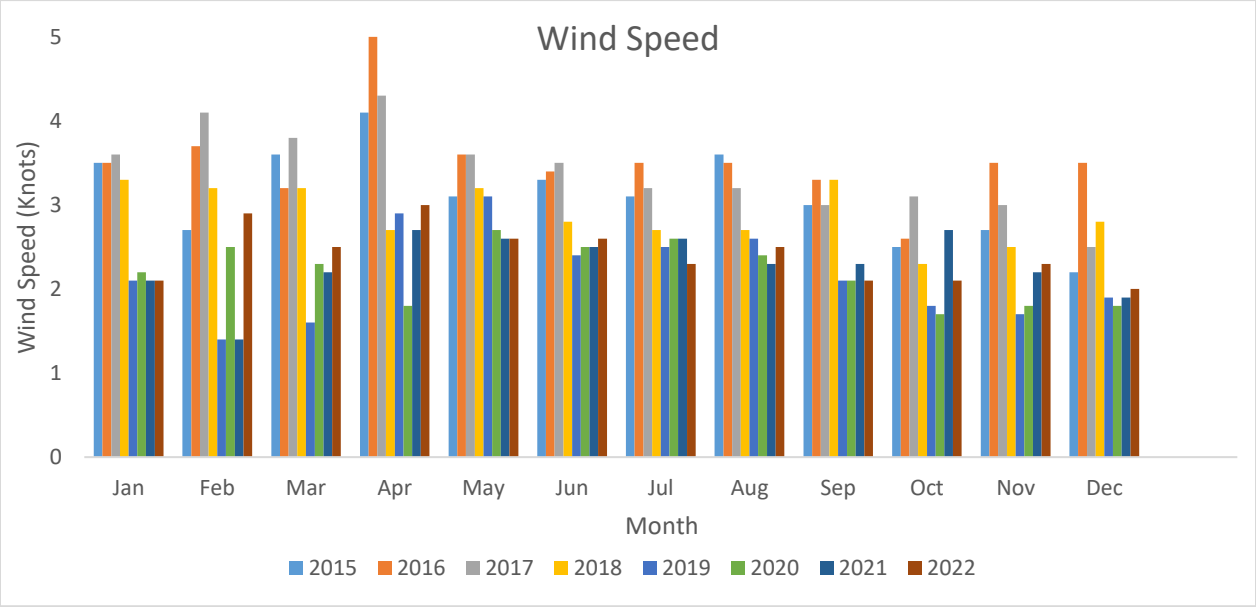


Figure 4.6: Monthly Prevailing Wind Speed of Feni (2015- 2022)

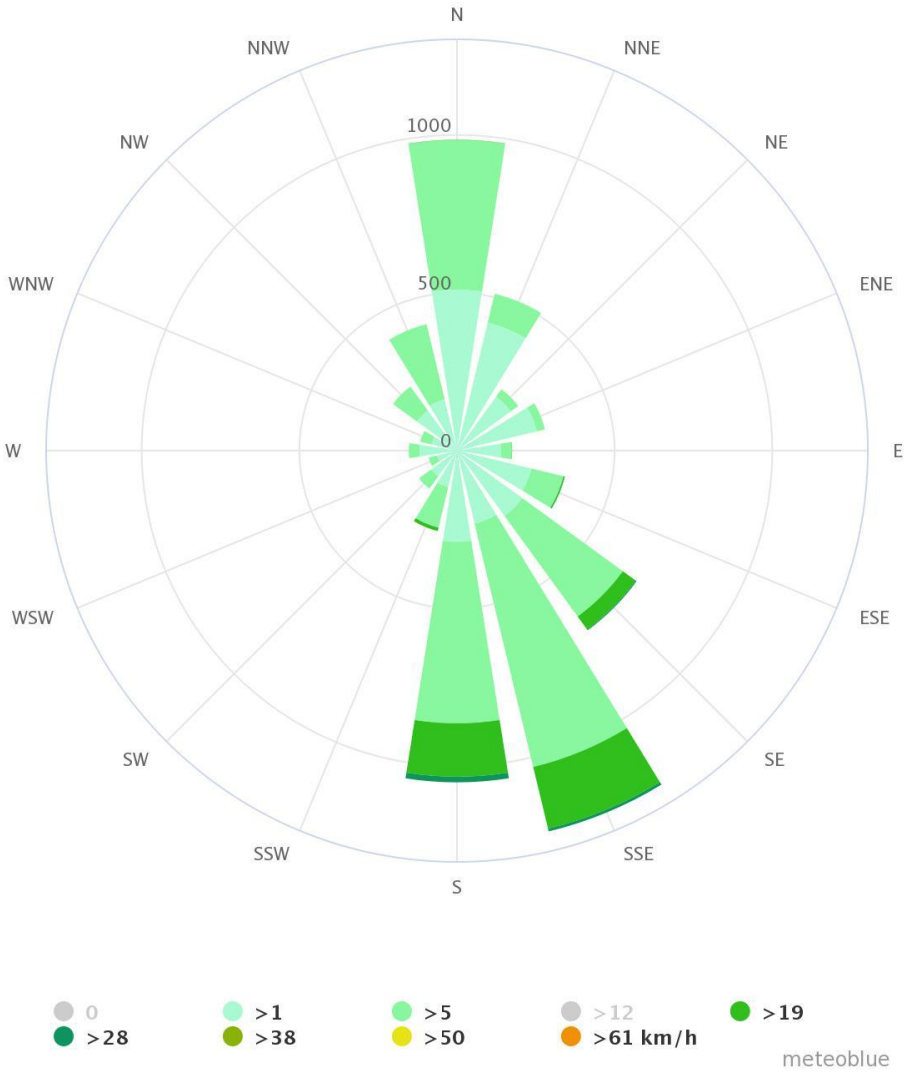


Figure 4.7: Wind Rose of Chhagalnaiya

4.4.4 Ambient Air Temperature

In general, cool seasons coincide with the period of lowest rainfall. **Table 4.5 - Table 4.7** shows the monthly average, maximum and minimum temperature in degree Celsius for the period 2015 to 2022. According to Bangladesh Meteorological Department, the monthly average Dry Bulb Temperature (maximum) is 29.5°C in May, 2019.

Table 4.5: Monthly average Dry Bulb Temperature in degree Celsius of Feni (2015- 2022)

Year	Monthly Average Temperature in degree Celsius											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	18.9	21.7	25.4	27.2	28.7	28.2	27.3	28.3	28.4	27.1	24	19.6
2016	18.3	23.4	26.8	29	28.2	28.9	27.8	28.5	28.6	27.7	23.3	20.8
2017	18.8	22.4	24.1	26.9	29.4	28.3	27.8	28.4	28.2	26.9	23.9	20.5
2018	17.2	22.4	26.2	26.9	26.7	28.2	28	28.5	28.6	26.1	23	18.8
2019	18.8	21.1	24.9	27.9	29.5	29.2	28	28.9	28.1	27.1	24.1	18.7
2020	17.9	20.1	25.2	26.8	28.4	28.2	28.3	28.6	28.7	28.2	23.6	18.8
2021	18.5	20.9	26.8	29.1	29.4	27.5	28.1	28.1	29	28.1	23.3	19.8
2022	18.3	20	25.9	28.8	28.1	27.9	29.1	29.1	28	27.5	24.3	19.9

(Bangladesh Meteorological Department)

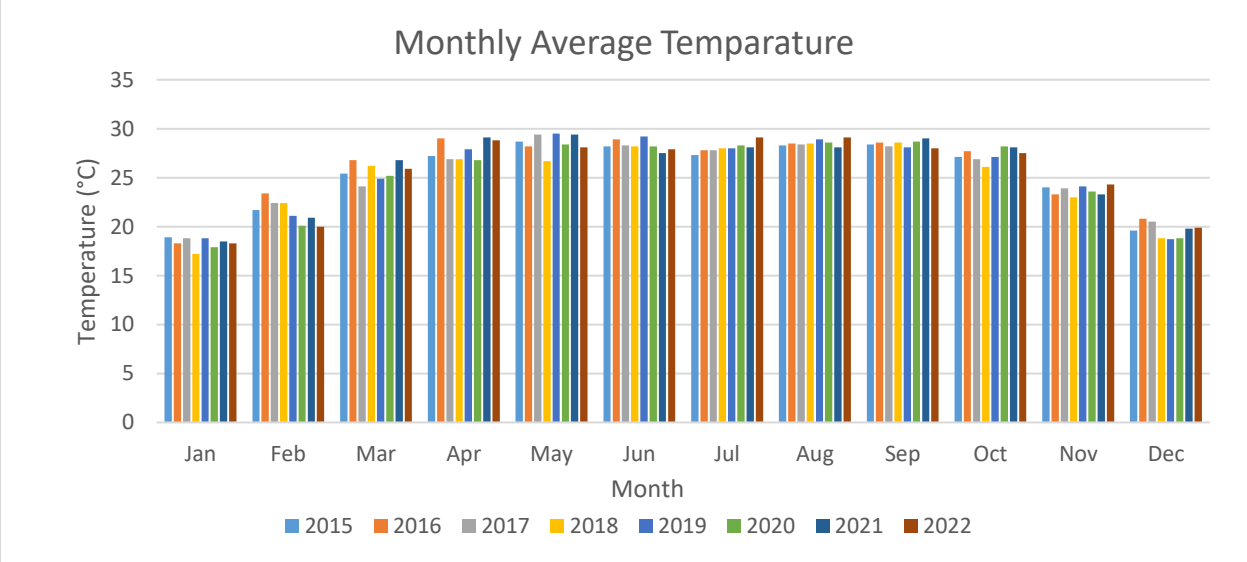


Figure 4.8: Monthly Ambient Average Temperature of Feni (2015- 2022)

Table 4.6: Monthly Maximum Temperature in degree Celsius of Feni (2015- 2022)

Year	Monthly Maximum Temperature in degree Celsius											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	31.7	32	35.2	35.8	35.5	35.4	34.5	33.6	35.4	34.5	32.5	29.5
2016	28	34	34.7	35.8	38.3	35.4	34.8	35.6	35	35	34.2	31.5
2017	31.4	32.4	32.8	35.4	36.7	36.4	34.8	34.6	35.4	35.2	34	30.4
2018	27.6	33.5	34.8	37.7	35.7	36	36.6	35.5	36.5	35	33.4	30

Year	Monthly Maximum Temperature in degree Celsius											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	32	32.5	35	37.3	36.2	36.2	36.2	37	35.8	35	33	31.5
2020	30.5	32.5	36.3	36.2	36.6	36	35	36	36.5	36	34.2	32.2
2021	31.5	32.5	38.5	39	38.8	35	36	35.2	36.6	37.3	34	32.3
2022	30	33.5	36.6	35	36.2	34.2	36.5	36.5	36	35.2	34	32

(Bangladesh Meteorological Department)

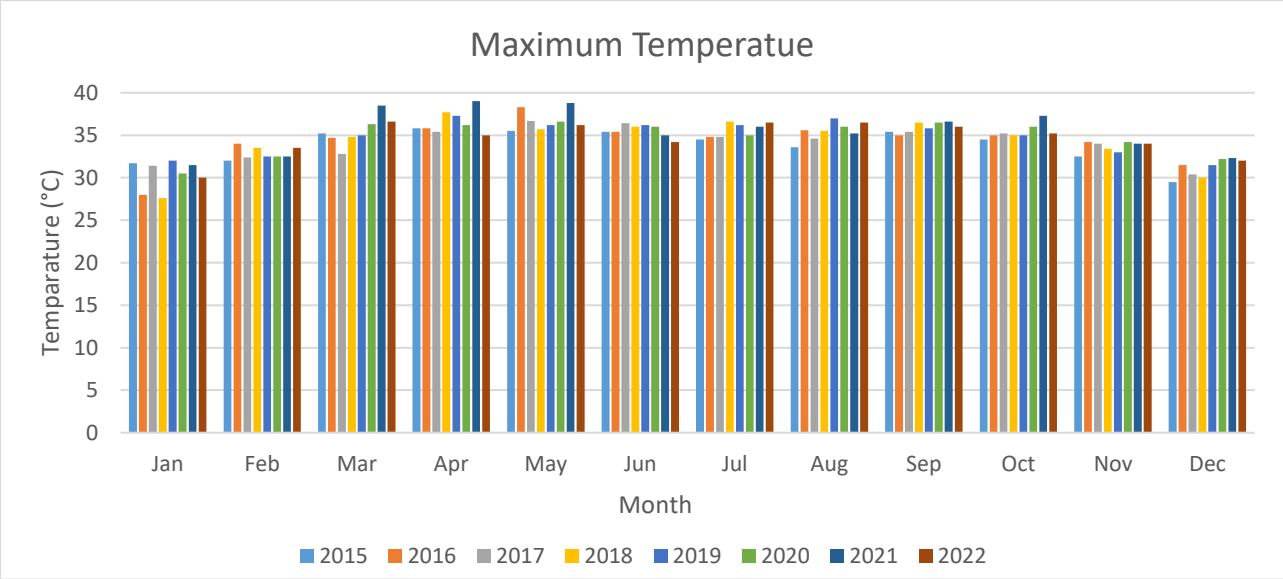


Figure 4.9: Monthly Maximum Temperature of Feni (2015- 2022)

Table 4.7: Monthly Minimum Temperature in degree Celsius of Feni (2015- 2022)

Year	Monthly Minimum Temperature in degree Celsius											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	11.1	10.5	14.6	19.5	21.2	22.6	22.4	24.3	24.6	21	16.8	11
2016	9	12.3	19.7	18.5	20.3	23.8	23.5	23.8	23.8	21.8	16.2	14
2017	8.5	12.5	15.2	19	21.5	22.4	24.6	24.8	23.6	18.5	14.8	13.3
2018	7.5	13.9	17	20	20.5	22.2	24.8	24.7	23.9	20.5	14.5	8.5
2019	10.5	11.6	13	17.5	21.5	22.7	23.7	25.2	23.9	21.5	17.7	12
2020	10.4	9.4	15.5	18.8	21	23.3	25	24	25	22.7	13.5	10
2021	10.1	8.5	18	19	20.8	22.2	24	24.6	24	22	13.6	12.2
2022	10	10.2	14.5	20	21	23.5	24.2	24.7	24	19	15.2	11

(Bangladesh Meteorological Department)

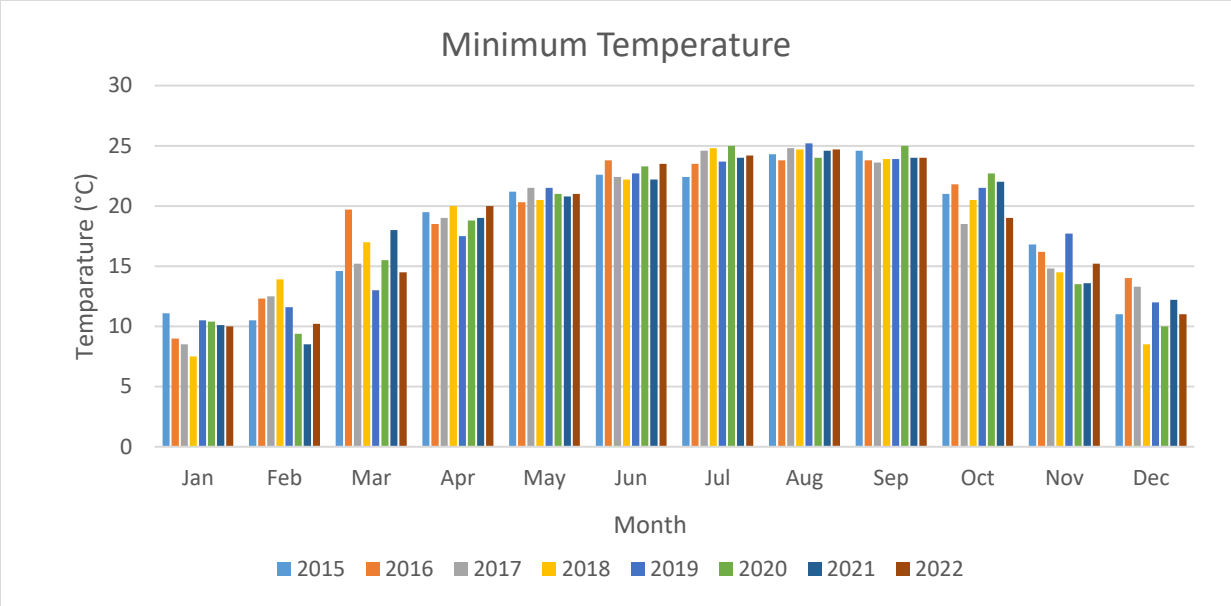


Figure 4.10: Monthly Minimum Temperature of Feni (2015- 2022)

4.5 Land Use/ land Cover

Land use/ land cover inventories are an essential component in land resource evaluation and environmental studies due to the changing nature of land use patterns. By proper analysis of Land use, existing land use pattern can be known easily. The land use study for the proposed steel manufacturing mini mill project and its 5 km buffer is undertaken with the following objectives:

- To study the land use/cover in the 5 km area of the proposed project and provide inputs for environmental planning of the proposed workover well project by analyzing the existing land use/land cover scenario;
- To establish the existing base line scenario using a GIS database for incorporation of thematic information on the different physical features including Agricultural Land, Water bodies, Settlement Area, gas collecting pipeline etc.

4.5.1 Land Use Interpretation of the Study Area

The evaluation of the existing environmental status of the study area is conducted within a 5 km buffer zone area. This shows that land within 5km buffer area mainly consists of agricultural land, water bodies, settlement area, bare land and project area.

A land sat 8-9 image has been used to make the detail analysis of Existing land use Pattern. The Existing Land Use Map has been given bellow **Figure 4.11**:

4.5.1.1 Land Use Analysis

There is a wide range of agricultural land present within the total 5 km radial area, which is around 55.47% (10765.6 acres). Among the 19407 acres (5 km around the project site), 1441.62 acres (7.43 %) are natural water bodies. The settlement area is situated scattered and about 34.47% (6689.45 acres) of land consists settlement area and high-density plantations. In addition, about 1.77% of the land is bare land, 0.3% of Highway and 0.2% of Rail line area is present within the 5 km buffer area, and our project site covers only 60 acres out of the total 19407 acres. The adjacent land area of the proposed steel mill area is used for agricultural and settlement purposes which can be seen in Figure 4.11. Details of the land use is presented in table below.

Table 4.8: Area Calculation of Existing Land use for 5 km Buffer Area

Land Use	Area (Acres)	Percentage
Agricultural Land	10765.6	55.47276756
Water Body	1441.62	7.428350595
Urban & Settlement Area	6689.45	34.46926367
Bare Land	344.36	1.774411295
Highway	60.5	0.311743185
Rail Line	45.47	0.234296903
Project Area	60	0.309166795
Total	**19407**	**100**

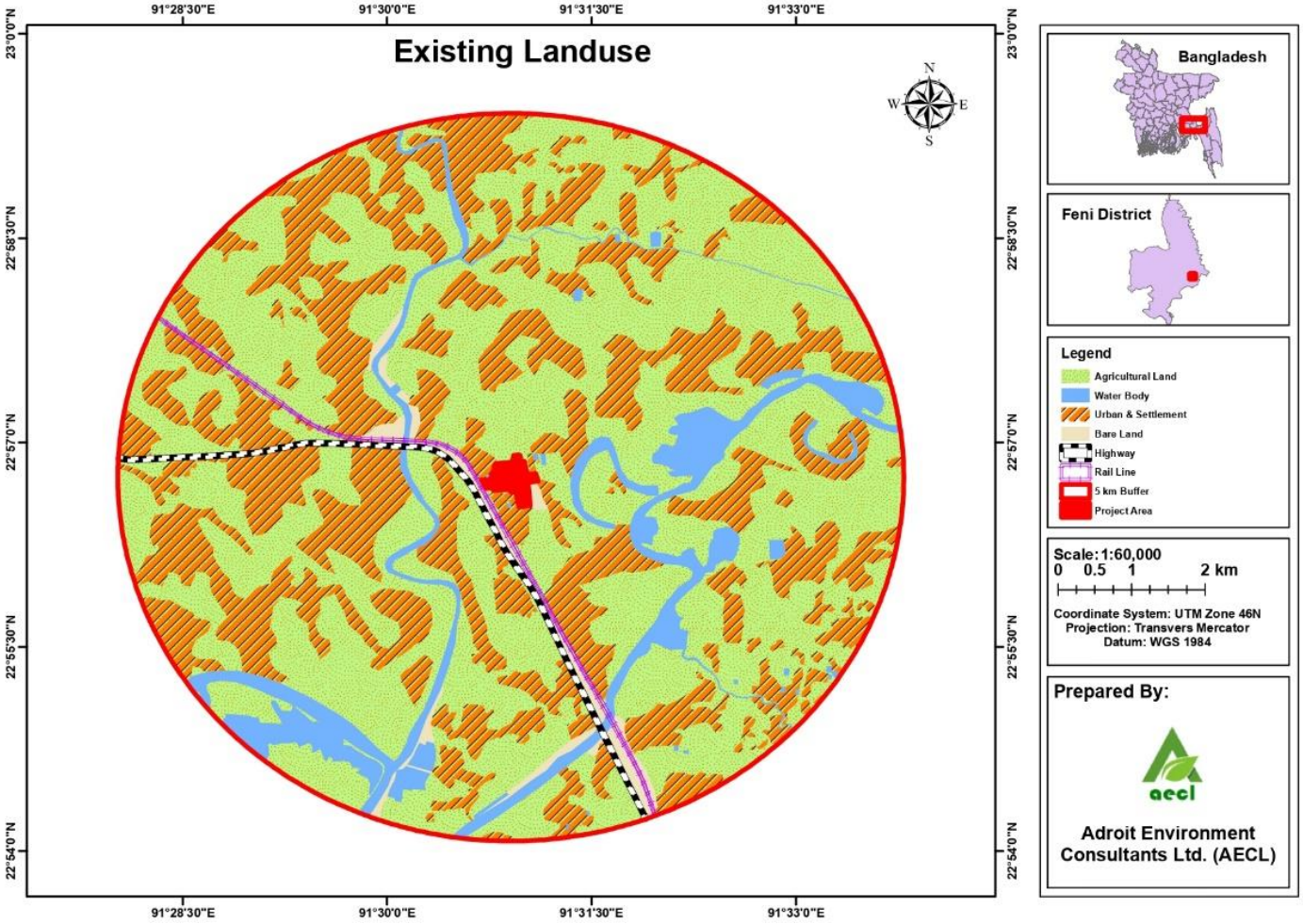


Figure 4.11: Existing Land Use Map for 5 km Buffer Area

4.5.2 Ecologically Critical Area

Bangladesh Government declared 13 areas as Ecologically Critical area (ECAs) in Bangladesh (1999). **Table 4.9** shows the ECA and their distance from the project site. According to the list, there is no ecologically critical area within 5 km of the project site. **Figure 4.12** shows the location of the project site in relation to the country's ecologically critical areas. The maps illustrates that no ecologically critical area or Protected Areas fall within 5 km area of the project site.

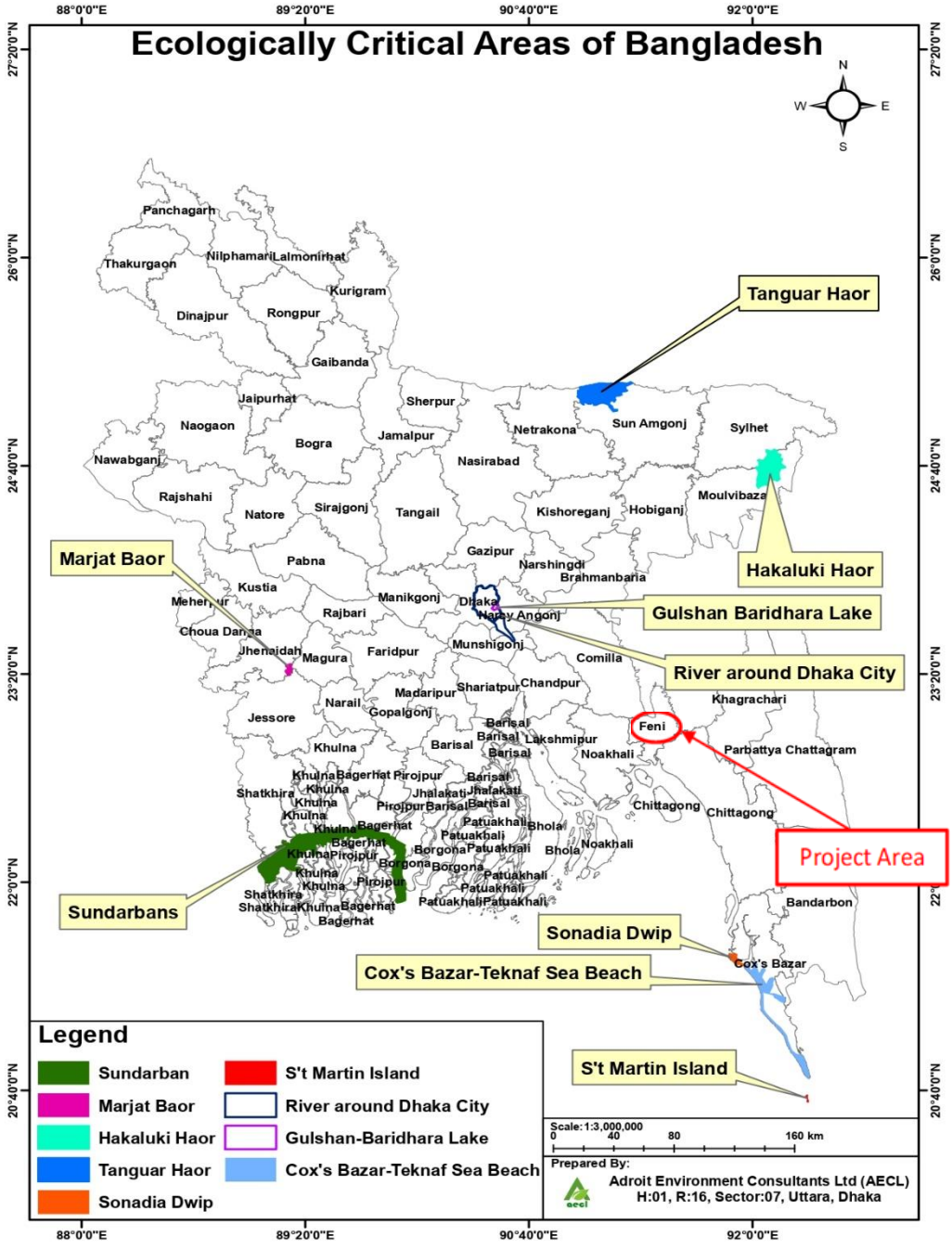


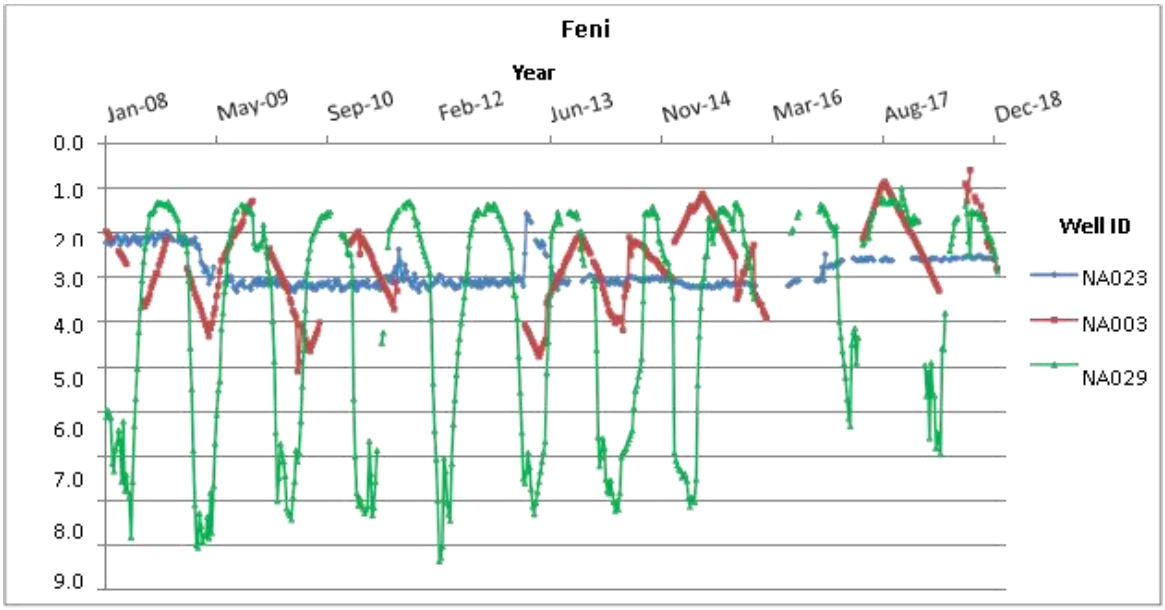
Figure 4.12: Ecologically Critical Areas of Bangladesh

Table 4.9: Ecologically Critical areas (ECA) of Bangladesh and their distance from project site

No.	Name of the ECA	Type of Ecosystem	Location	Areas (ha)	Year of Declaration	Distance from Project site
1.	Cox's Bazar-Teknaf Peninsula	Coastal-Marine	Cox's Bazar	20,373	1999	244.26 km
2.	Sundarbans (10 km landward periphery)	Coastal-Marine	Bagerhat, Khulna, Barguna, Pirojpur and Satkhira	292,926	1999	262.48 km
3.	St. Martin's Island	Marine Island with coral reefs	Teknaf Upazila, Cox's Bazar	1,214	1999	270.58 km
4.	Hakaluki Haor	Inland Freshwater Wetland	Sylhet and Moulvibazar	40,466	1999	198.49 km
5.	Sonadia Island	Marine Island	Moheshkhali, Cox's Bazar	10,298	1999	165.70 km
6.	Tanguar Haor	Inland Freshwater Wetland	Tahirpur, Sunamganj	9,727	1999	245.69 km
7.	Marjat Baor	Oxbow Lake	Kaliganj Upazila of Jhenaidah and Chaugacha Upazila of Jessore	325	1999	252.21 km
8.	Gulshan-Baridhara Lake	Urban Wetland	Dhaka city	101	2001	147.25 km
9.	Buriganga	River	Around Dhaka	1336	2009	140.57 km
10.	Turag	River	Around Dhaka	1184	2009	157.67 km
11.	Sitalakhya	River	Around Dhaka	3771	2009	142.72 km
12.	Balu including Tongi canal	River	Around Dhaka	1315	2009	157.76 km
13.	Jaflong-Dawki	River	Jaflong, Sylhet	1493	2015	250.23 km

4.6 Hydrology

Groundwater is an important segment of the hydrologic cycle and constitutes about one third of world's fresh water reserves. It is the only source of water supply for drinking and main source of irrigation. As other parts of the country this area also receives sufficient amount of rainfall and there is a good availability of ground water, which is being used by hand pumps for drinking and domestic purposes. The source of groundwater is either precipitation or seepage from large water bodies like reservoirs, lakes, River.



(BWDB, 2020)

Figure 4.13: Hydrographs of GWT of Feni

As per Hydrograph Report,2020 of Bangladesh Water Development Board (BWBD) there are 3 wells selected for Feni district hydrograph study, which is also shows in **Figure 4.13**. The 3 wells of Feni district are NA023, NA003 and NA029 which are in Chhagalnaiya, Feni Sadar and Parshuram respectively. Among these well NA029 has the normal trend. Seasonal fluctuation in this well is within 1m to 9.32m from surface and it reaches the static level during monsoon period. In well no. NA023 the water table fluctuated between 1.64m to 3.34m depth during this 11-year time. This well situated in the central area of Feni Sadar Upazila. NA023 is the closest among the other wells from the proposed project site and it shows a consistency in ground water level. Well no. NA003 shows abnormal trend which doesn't match with seasonal fluctuations.

4.6.1 Surface Water

The surface water sample was collected from the adjacent canal into the project boundary. The sample was analyzed in the laboratory. Table 4.10 shows the sampling location and Table 4.11 shows the surface water quality test result including standard values provided by DoE. According to the test results all the parameters are within the standard value of Bangladesh provided in ECR 2023. Surface water quality test report is attached as Annexure 11.

Sampling date: 12th September, 2023
Reporting date: 20th September, 2023 (Analyzed in AECL Laboratory)

Table 4.10: Surface Water Sample Location

Identification of Location	GPS Co-ordinate X	Y	Specific Location
Location 1, SW1	22°56'44.38"N	91°30'44.51"E	Pond outside the project north-east boundary
Location 2, SW2	22°56'37.90"N	91°30'48.22"E	Pond outside the project south boundary
Location 3, SW3	22°56'49.16"N	91°30'8.09"E	Muhuri river upstream
Location 4, SW4	22°56'26.04"N	91°30'22.66"E	Muhuri river down stream
Location 5, SW5	22°56'51.11"N	91°30'59.43"E	Khal inside the project north boundary
Location 6, SW6	22°56'43.02"N	91°31'2.23"E	Khal inside the proposed substation area
Location 7, SW7	22°56'27.35"N	91°31'48.70"E	Feni river near transmission route
Location 8, SW8	22°56'36.08"N	91°31'58.98"E	Feni river upstream

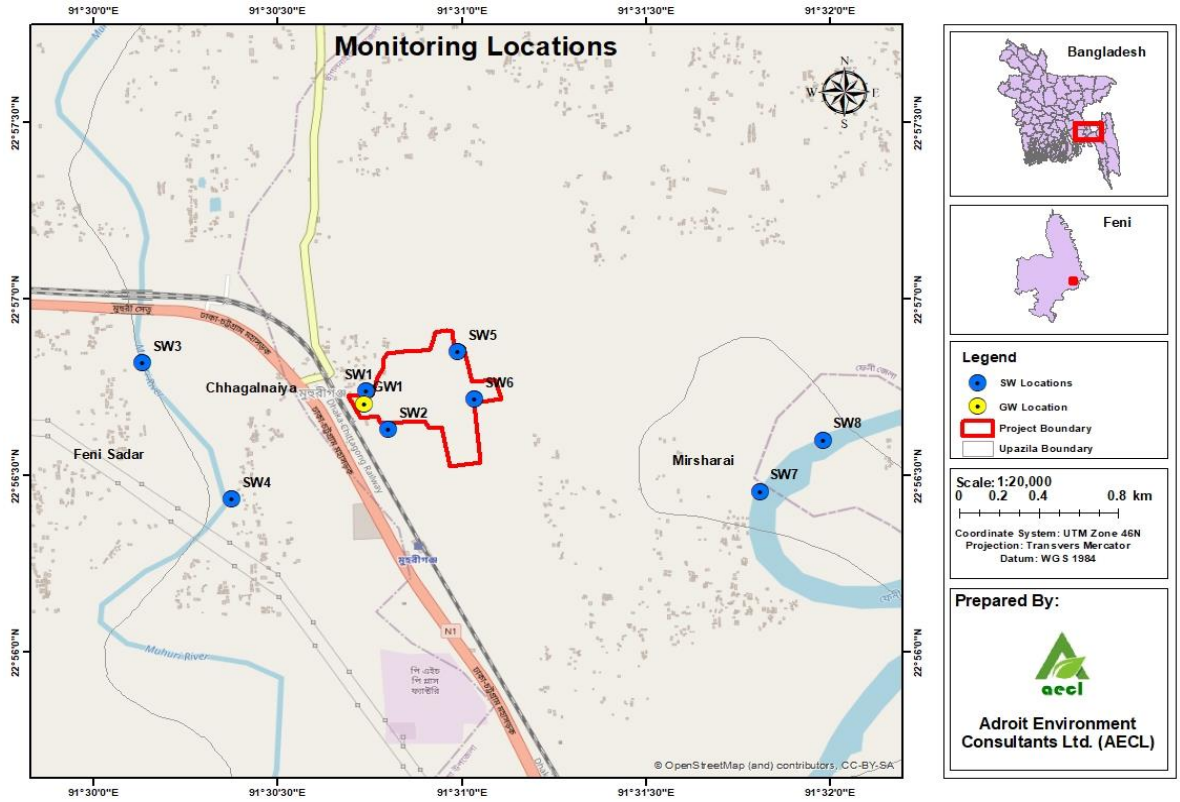


Figure 4.14: Surface and Ground Water monitoring location

Table 4.11: Surface Water Quality Test Result

Parameter	Concentration present								Unit	Bangladesh Standard	IFC Standard	Method of analysis
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8				
Temperature	23.7	20.1	23.6	25.7	22.4	23.7	23.9	24	°C	-	-	Mercury filled thermometer
pH	7.02	6.9	7.2	6.8	7.05	7.8	7.2	7.9	-	6-9	6-9	pH meter
Dissolved Oxygen (DO)	5.7	5.9	6	6.03	5.7	6.1	6.5	6.1	mg/l	>5	-	DO meter
BOD_5	3.2	3.1	2.6	2.4	4.2	3.8	2.2	2	mg/l	≤ 6	50	5-day BOD test
Pb	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	0.1	0.1	AAS
Cr	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	-	0.1	AAS
Nitrate	2.0	2.5	2.07	3.08	3.0	2.3	2.05	3.01	mg/l	7.0	-	Potentiometric
TDS	220	201	210	202	225	212	199	221	mg/l	1000	-	Sensor
TSS	14	13.4	21	18	20	19	18	19	mg/l	-	50	Dried at 105˚C

Sampling from Muhuri river

Sampling from Feni River

Sampling from project boundary inside Khal

Sampling from the settlement area pond

Figure 4.15: Surface Water Sampling

4.6.2 Ground Water

To determine quality of ground water, water sample was collected from a well to analyze for different parameters. The results shows that all the parameters remain within the allowable limit of drinking water value as per as DoE Standard for Bangladesh. The sample location is shown in **Table 4.12** and water quality test result is shown in **Table 4.13**. Ground water quality test report is attached as **Annexure 11.**

Sampling date: 12th September, 2023
Reporting date: 20th September, 2023 (Analyzed in AECL Laboratory)

Table 4.12: Ground Water Sample Location

Identification of Location	GPS Co-ordinate		Specific Location
	X	Y	
Location-01, GW-01	22°56'42.57"N	91°30'42.21"E	Tube well beside the temporary site office

Table 4.13: Ground Water Quality Result

Name of the Parameter	Concentration Present	DoE (Bangladesh) Standard for Drinking Water	WHO Standard for Drinking Water	Unit	Method of analysis
Temperature	24.4	20-30	-	˚C	
pH	6.84	6.5 – 8.5	6.5 – 8.5	-	pH Meter
TDS	410	1000	1000	mg/l	Sensor
Alkalinity	38.2	-	-	mg/l	Titrimetric
Hardness	22	500	-	mg/l	Titrimetric
BOD	0.1	-	-	mg/l	5-day BOD test
COD	0.7	-	-	mg/l	Digestion
Nitrate	19.5	45	50	mg/l	Potentiometric
Phosphate	0.07	6	-	mg/l	Photometric
Chlorine	20.1	-	5	mg/l	Spectrophotometric
Calcium	26.3	75	-	mg/l	AAS
Sodium	81.6	200	200	mg/l	AAS
Potassium	1.0	12			AAS
Total Coliform	0	0	0	n/100 ml	Membrane Filter Technique
Fecal Coliform	0	0	0	n/100 ml	Membrane Filter Technique
Oil & Grease	Not Detected	0.01	-		APHA 5520.B

N.B: *AAS – Atomic Absorption Spectrometer*
ND – Not Detected

Figure 4.16: Photograph of Ground Water Sampling

4.7 Air Quality

Air monitoring has been conducted at eight different locations. The air quality data of the project site is given in **Table 4.15**. The result for ambient air quality monitoring shows the PM2.5, PM10, SPM, SO2 & NOx concentrations of the ambient air is well within the DoE standard value. Air quality test report is attached as **Annexure 11.**

Sampling date: 12th September, 2023
Reporting date: 21th September, 2023 (Analyzed in AECL Laboratory)

Table 4.14: Sampling locations ID and Name with Longitude-Latitude

Identification of Location	GPS Co-ordinate		Specific Location
	X	Y	
Location-01, AQ1	22°56'42.60"N	91°30'45.29"E	Near temporary site office
Location-02, AQ2	22°56'53.13"N	91°30'56.48"E	North-East side of the project site (near adjacent canal)
Location-03, AQ3	22°56'43.87"N	91°30'53.16"E	Center points of the project area
Location-04, AQ4	22°56'32.59"N	91°30'59.88"E	South-East corner of the project site
Location-05, AQ5	22°56'29.31"N	91°30'50.27"E	Settlement area near the project south-west boundary
Location-06, AQ6	22°56'49.34"N	91°30'42.27"E	Settlement area near the project site access route
Location-07, AQ7	22°56'20.80"N	91°31'42.41"E	Settlement area near the proposed transmission route
Location-08, AQ8	22°56'25.16"N	91°32'30.02"E	Settlement area near the proposed transmission route

Table 4.15: Ambient Air Quality Analysis

Parameters	Method	Test Duration (hr)	Unit	AQ1	AQ2	AQ 3	AQ 4	AQ5	AQ6	AQ 7	AQ 8	DoE Standard	IFC Standard
PM2.5	Gravimetric	24	µg/m^3	35.4	27.3	35.7	31.5	33.4	27.4	35.01	28.3	65[a]	75[a]
PM10	Gravimetric	24	µg/m^3	46.2	39.6	45.3	40.2	39.2	39.4	44.1	39.2	150[a]	150[a]
SPM	Gravimetric	24	µg/m^3	84.2	79.5	88.1	82.3	79.2	76.8	83.1	76.3	200[c]	NF
SO2	West-Geake	24	µg/m^3	5.3	5.0	6.2	4.3	5.1	5.2	5.0	4.3	365[a]	125[a]
NOx	Jacob and Hochheiser	24	µg/m^3	6.3	8.1	11.1	9.1	10.3	8.9	8.1	8.1	100[b]	200[d]
CO	CO/O_3 Meter	1	ppm	0.3	0.5	1.1	0.5	0.6	0.3	0.8	0.5	9[c]	NF

NF – not found, DoE – Department of Environment; a= standard for 24 hours exposure, b= standard for yearly exposure, c= standard for 8 hours exposure, d= standard for 1 hour exposure

AQ1

AQ2

AQ3

AQ4

AQ5

AQ6

AQ7

AQ8

Figure 4.17: Ambient Air Quality Monitoring Sampling

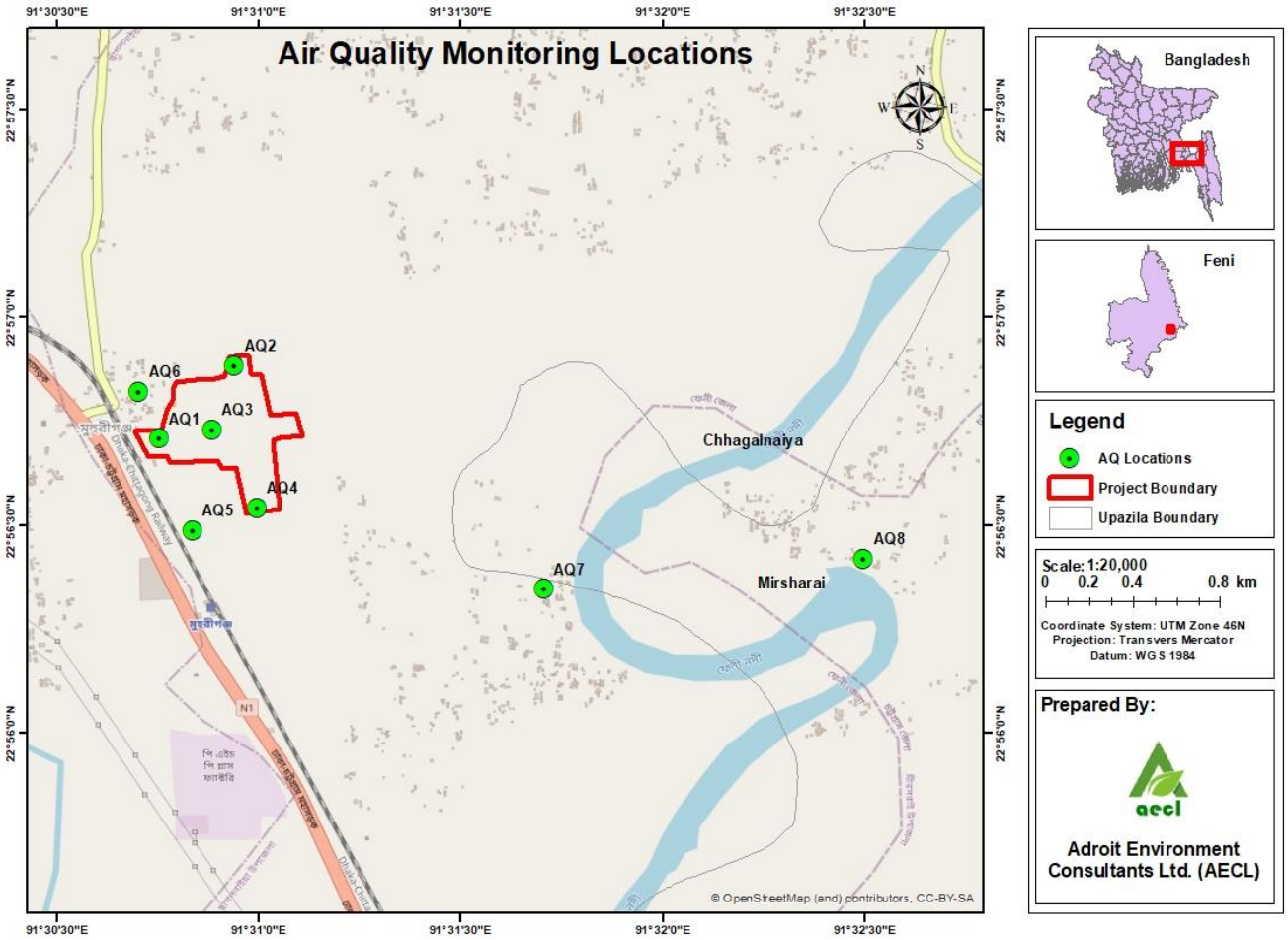


Figure 4.18: Air Quality Monitoring Location

4.8 Noise Level

The ambient noise level data were collected from four different locations of the project within 5 km radius area by noise level meter and has been given below in **Table 4.17.** The noise level at all four locations were found within standard value. Noise quality test report is attached as **Annexure 11.**

Sampling date: 12th September, 2023
Reporting date: 21th September, 2023 (Analyzed in AECL Laboratory)

Table 4.16: Sampling locations ID and Name with Longitude-Latitude

Identification of Location	GPS Co-ordinate		Specific Location
	X	Y	
Location-01, NL1	22°56'42.60"N	91°30'45.29"E	Near temporary site office
Location-02, NL2	22°56'53.13"N	91°30'56.48"E	North-East side of the project site (near adjacent canal)
Location-03, NL3	22°56'43.87"N	91°30'53.16"E	Center point of the project area
Location-04, NL4	22°56'32.59"N	91°30'59.88"E	South-East corner of the project site
Location-05, NL5	22°56'29.31"N	91°30'50.27"E	Settlement area near the project south-west boundary

Identification of Location	GPS Co-ordinate X	Y	Specific Location
Location-06, NL6	22°56'49.34"N	91°30'42.27"E	Settlement area near the project site access route
Location-07, NL7	22°56'20.80"N	91°31'42.41"E	Settlement area near the proposed transmission route
Location-08, NL8	22°56'25.16"N	91°32'30.02"E	Settlement area near the proposed transmission route

Table 4.17: Ambient Noise level Analysis

SN.	Site Location	Concentration present (LAeq) dBA. Day Time		Night Time	
		Minimum	Maximum	Minimum	Maximum
1.	NL1	37.2	45.6	30.2	36.5
2.	NL2	39.1	48.3	33.3	38.4
3.	NL3	35.8	40.7	28.7	35.4
4.	NL4	38.0	46.8	32.8	37.7
5.	NL5	37.2	45.6	30.2	36.5
6.	NL6	35.1	41.3	30.3	37.4
7.	NL7	33.8	40.7	28.7	35.4
8.	NL8	40.0	48.8	35.8	39.7
DoE (Bangladesh) Standard for Mixed area		60		50	
IFC/International Standard for Residential / Institutional / Educational		55		45	

NL1 (Day)

NL1 (Night)

NL2 (Day)

NL2 (Night)

NL3 (Day)

NL3 (Night)

NL4 (Day)

NL4 (Night)

NL5 (Day)

NL5 (Night)

NL6 (Day)

NL6 (Night)

NL7 (Day)

NL7 (Night)

NL8 (Day)

NL8 (Night)

Figure 4.19: Noise Quality Monitoring Sampling

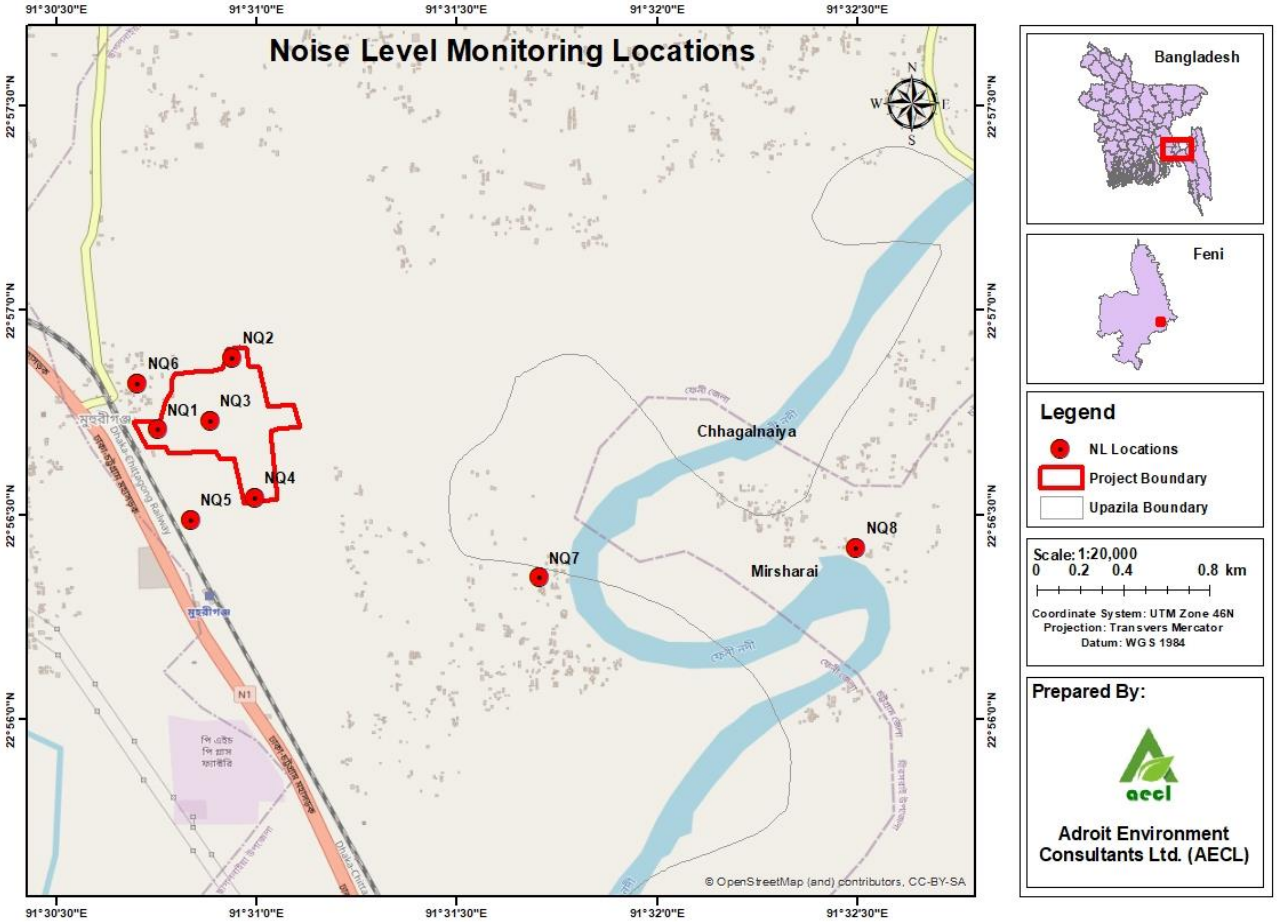
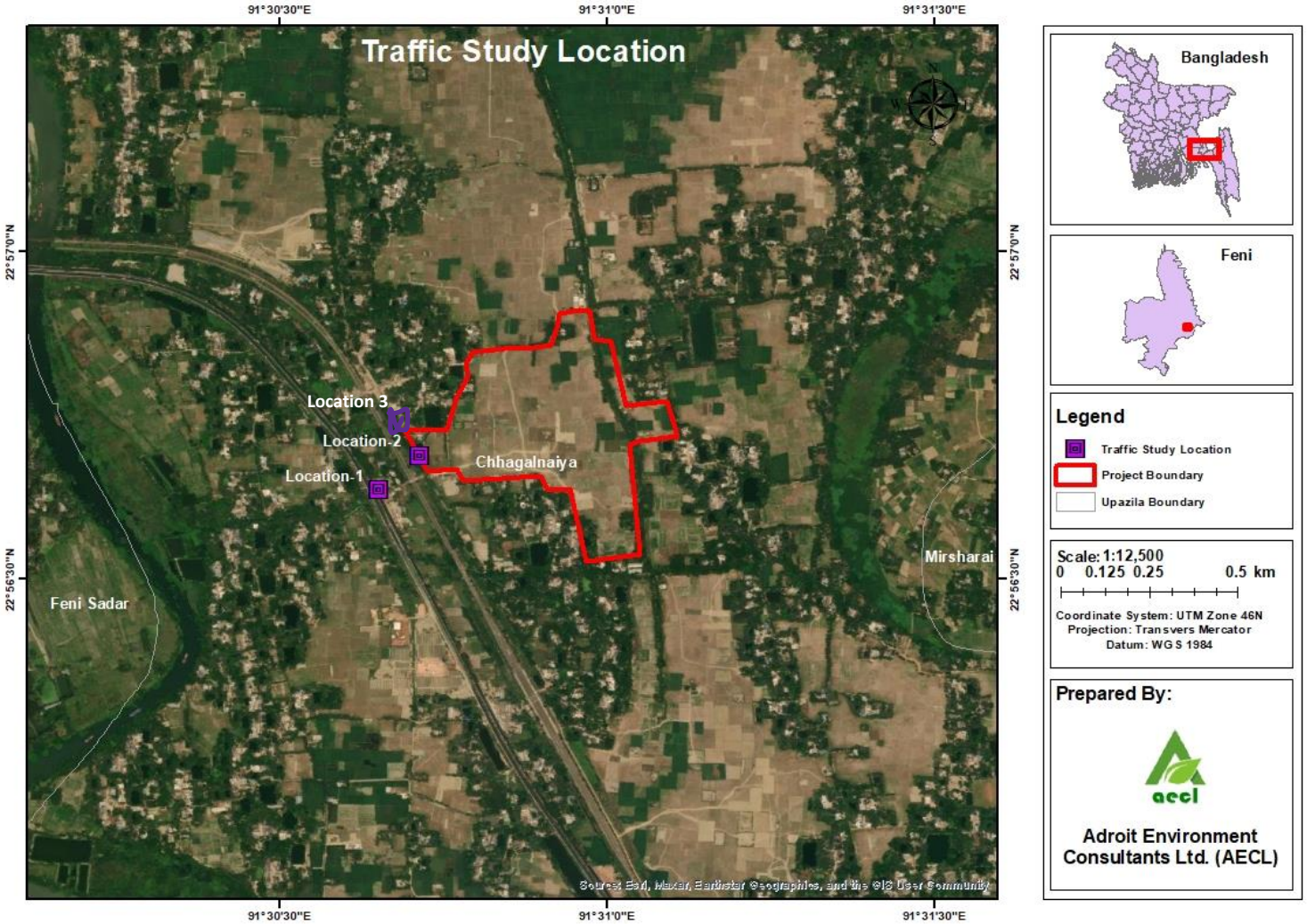


Figure 4.20: Noise Quality Monitoring Location

4.9 Traffic Volume Study

The proposed project area is located in Chhagalnaiya Upazila of Feni district in Gopal Union. The project area is 60 acres. Dhaka-Chattaogram Highway is located just 0.15 km away from the project proposed main entrance. The proponent is planning to construct a This traffic impact assessment has been conducted in 3 locations, one Infront of the project main entrance which is considered the main access road from Dhaka-Chattogram Highway to project side, another one is Infront of the Dhaka - Chittagong highway and the last one is the proposed access road from the highway to the project north boundary. Figure 4.21 shows the locations.

The traffic volume study was conducted on 12-13th September, 2023 from 7 am to next day 7 am. Study at 3 locations were conducted at the same date to discover the real scenario of the traffic condition. In this study pick hour has been considered from 12 am to 1 am for the Dhaka-Chattogram Highway, 9 am to 10 am for Access Road. The traffic volume study has been conducted at main entrance of project site (22°56'38.18"N, 91°30'39.15"E) to estimate the traffic flow from Dhaka to Chattogram Highway, Chattogram to Dhaka Highway, highway to project site and project site to highway for both existing and proposed road.



Location 1: Dhaka-Chattogram Highway; Location 2: Existing Access Road and Location 3: Proposed Access Road

Figure 4.21: Location of Traffic Study

Table 4.18: Traffic Volume Study with Passenger Car Unit (PCU)

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
1	7 am - 8 am	Car	74	97	171	1	171	5	1	6	1	6	5	1	6	1	6
		Truck	142	166	308	3	924	4	2	6	3	18	9	5	14	3	42
		Utility/Mini truck	105	107	212	1	212	3	0	3	1	3	3	0	3	1	3
		Minibus	34	38	72	3	216	2	9	11	3	33	2	9	11	3	33
		Bus	40	55	95	3	285	1	10	11	3	33	1	10	11	3	33
		CNG	28	35	63	0.75	47.25	6	7	13	0.75	9.75	6	7	13	0.75	9.75
		Easy Bike	22	31	53	0.5	26.5	1	0	1	0.5	0.5	1	0	1	0.5	0.5
		Bicycle	9	8	17	0.5	8.5	4	0	4	0.5	2	2	0	2	0.5	1
		Pickup	76	98	174	1	174	18	13	31	1	31	18	13	31	1	31
		Microbus	82	76	158	3	474	6	2	8	3	24	6	2	8	3	24
		Motor-cycle	23	12	35	0.75	107.25	17	9	26	0.75	19.5	17	9	26	0.75	19.5
		Van	23	29	52	3	156	21	18	39	3	117	21	18	39	3	117
		Total	**658**	**752**	**1410**		**2801.5**	**88**	**71**	**159**		**296.75**	**91**	**74**	**165**		**319.75**
2	8 am - 9 am	Car	57	63	120	1	120	3	2	5	1	5	3	2	5	1	5
		Truck	88	90	178	3	534	2	1	3	3	9	2	1	3	3	9
		Utility/Mini truck	76	77	153	1	153	0	0	0	1	0	0	0	0	1	0

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Minibus	31	28	59	3	177	12	8	20	3	60	12	8	20	3	60
		Bus	33	27	60	3	180	19	15	34	3	102	13	12	25	3	75
		CNG	6	4	10	0.75	7.5	6	4	10	0.75	7.5	6	4	10	0.75	7.5
		Easy Bike	5	8	13	0.5	6.5	5	5	10	0.5	5	5	5	10	0.5	5
		Bicycle	17	24	41	0.5	20.5	4	2	6	0.5	3	4	2	6	0.5	3
		Pickup	21	16	37	1	37	2	0	2	1	2	2	0	2	1	2
		Microbus	77	82	159	3	477	25	36	61	3	183	20	19	39	3	117
		Motor-cycle	43	21	64	0.75	48	24	16	40	0.75	30	24	16	40	0.75	30
		Van	13	25	38	3	114	4	5	9	3	27	4	5	9	3	27
		Total	**467**	**465**	**932**		**1874.5**	**106**	**94**	**200**		**433.5**	**95**	**74**	**169**		**340.5**
3	9 am - 10 am	Car	40	55	95	1	95	6	4	10	1	10	4	1	5	1	5
		Truck	92	80	172	3	516	0	2	2	3	6	0	2	2	3	6
		Utility/Mini truck	120	138	258	1	258	0	0	0	1	0	0	0	0	1	0
		Minibus	40	49	89	3	267	18	16	34	3	102	10	6	16	3	48
		Bus	37	43	80	3	240	21	15	36	3	108	8	11	19	3	57
		CNG	10	6	16	0.75	12	17	11	28	0.75	21	7	11	18	0.75	13.5
		Easy Bike	11	8	19	0.5	9.5	8	5	13	0.5	6.5	8	5	13	0.5	6.5
		Bicycle	5	10	15	0.5	7.5	2	2	4	0.5	2	2	2	4	0.5	2
		Pickup	23	14	37	1	37	3	1	4	1	4	3	1	4	1	4

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Microbus	50	41	91	3	273	31	27	58	3	174	1	23	24	3	72
		Motor-cycle	67	42	109	0.75	81.75	12	9	21	0.75	15.75	12	9	21	0.75	15.75
		Van	53	54	107	3	321	25	31	56	3	168	12	11	23	3	69
		Total	**548**	**540**	**1088**		**2117.75**	**143**	**123**	**266**		**617.25**	**67**	**82**	**149**		**298.75**
4	10 am - 11 am	Car	51	47	98	1	98	0	2	2	1	2	0	2	2	1	2
		Truck	85	61	146	3	438	5	3	8	3	24	2	3	5	3	15
		Utility/Mini truck	127	106	233	1	233	1	0	1	1	1	1	0	1	1	1
		Minibus	43	37	80	3	240	14	19	33	3	99	6	5	11	3	33
		Bus	57	40	97	3	291	17	13	30	3	90	2	4	6	3	18
		CNG	12	7	19	0.75	14.25	15	9	24	0.75	18	15	9	24	0.75	18
		Easy Bike	14	9	23	0.5	11.5	10	17	27	0.5	13.5	10	17	27	0.5	13.5
		Bicycle	13	20	33	0.5	16.5	1	0	1	0.5	0.5	1	0	1	0.5	0.5
		Pickup	30	27	57	1	57	1	0	1	1	1	1	0	1	1	1
		Microbus	67	79	146	3	438	23	31	54	3	162	10	31	41	3	123
		Motor-cycle	34	19	53	0.75	39.75	32	25	57	0.75	42.75	12	15	27	0.75	20.25
		Van	29	37	66	3	198	22	27	49	3	147	22	27	49	3	147
		Total	**562**	**489**	**1051**		**2075**	**141**	**146**	**287**		**600.75**	**82**	**113**	**195**		**392.25**

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
5	11 am - 12 pm	Car	78	51	129	1	129	7	1	8	1	8	7	1	8	1	8
		Truck	92	57	149	3	447	3	7	10	3	30	3	7	10	3	30
		Utility/Mini truck	117	101	218	1	218	3	1	4	1	4	3	1	4	1	4
		Minibus	34	25	59	3	177	11	16	27	3	81	12	11	23	3	69
		Bus	84	79	163	3	489	14	19	33	3	99	12	5	17	3	51
		CNG	15	26	41	0.75	30.75	23	28	51	0.75	38.25	23	28	51	0.75	38.25
		Easy Bike	17	21	38	0.5	19	14	9	23	0.5	11.5	14	9	23	0.5	11.5
		Bicycle	1	4	5	0.5	2.5	4	9	13	0.5	6.5	4	9	13	0.5	6.5
		Pickup	24	30	54	1	54	3	1	4	1	4	3	1	4	1	4
		Microbus	41	38	79	3	237	19	8	27	3	81	19	8	27	3	81
		Motor-cycle	31	15	46	0.75	34.5	34	21	55	0.75	41.25	33	21	54	0.75	40.5
		Van	16	23	39	3	117	6	3	9	3	27	6	3	9	3	27
		Total	**550**	**470**	**1020**		**1954.75**	**141**	**123**	**264**		**431.5**	**139**	**104**	**243**		**370.75**
6	12 pm - 1 pm	Car	75	53	128	1	128	8	3	11	1	11	8	3	11	1	11
		Truck	124	109	233	3	699	2	4	6	3	18	2	4	6	3	18
		Utility/Mini truck	88	74	162	1	162	2	6	8	1	8	2	6	8	1	8
		Minibus	30	58	88	3	264	15	10	25	3	75	15	10	25	3	75

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Bus	79	85	164	3	492	16	13	29	3	87	16	13	29	3	87
		CNG	10	9	19	0.75	14.25	8	5	13	0.75	9.75	8	5	13	0.75	9.75
		Easy Bike	5	3	8	0.5	4	4	2	6	0.5	3	4	2	6	0.5	3
		Bicycle	3	0	3	0.5	1.5	2	7	9	0.5	4.5	2	7	9	0.5	4.5
		Pickup	20	17	37	1	37	0	2	2	1	2	0	2	2	1	2
		Microbus	35	40	75	3	225	17	21	38	3	114	17	21	38	3	114
		Motor-cycle	25	18	43	0.75	32.25	21	10	31	0.75	23.25	21	10	31	0.75	23.25
		Van	9	15	24	3	72	3	4	7	3	21	3	4	7	3	21
		Total	**503**	**481**	**984**		**2131**	**98**	**87**	**185**		**376.5**	**98**	**87**	**185**		**376.5**
7	1 pm - 2 pm	Car	75	89	164	1	164	0	5	5	1	5	0	5	5	1	5
		Truck	146	179	325	3	975	1	2	3	3	9	1	2	3	3	9
		Utility/Mini truck	79	82	161	1	161	5	2	7	1	7	5	2	7	1	7
		Minibus	23	30	53	3	159	6	13	19	3	57	6	13	19	3	57
		Bus	19	27	46	3	138	11	16	27	3	81	16	16	32	3	96
		CNG	5	8	13	0.75	9.75	3	2	5	0.75	3.75	3	2	5	0.75	3.75
		Easy Bike	0	4	4	0.5	2	3	0	3	0.5	1.5	3	0	3	0.5	1.5
		Bicycle	4	1	5	0.5	2.5	5	2	7	0.5	3.5	5	2	7	0.5	3.5
		Pickup	17	10	27	1	27	1	0	1	1	1	1	0	1	1	1
		Microbus	27	38	65	3	195	16	11	27	3	81	16	11	27	3	81

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Motor-cycle	3	12	15	0.75	11.25	23	18	41	0.75	30.75	23	18	41	0.75	30.75
		Van	5	11	16	3	48	4	7	11	3	33	4	7	11	3	33
		Total	**403**	**491**	**894**		**1892.5**	**78**	**78**	**156**		**313.5**	**83**	**78**	**161**		**328.5**
8	2 pm - 3 pm	Car	68	49	117	1	117	6	9	15	1	15	6	9	15	1	15
		Truck	108	93	201	3	603	3	10	13	3	39	3	10	13	3	39
		Utility/Mini truck	102	71	173	1	173	0	3	3	1	3	0	3	3	1	3
		Minibus	76	83	159	3	477	15	10	25	3	75	15	10	25	3	75
		Bus	56	47	103	3	309	13	21	34	3	102	13	21	34	3	102
		CNG	5	8	13	0.75	9.75	3	0	3	0.75	2.25	3	0	3	0.75	2.25
		Easy Bike	0	4	4	0.5	2	2	1	3	0.5	1.5	2	1	3	0.5	1.5
		Bicycle	0	0	0	0.5	0	4	0	4	0.5	2	4	0	4	0.5	2
		Pickup	75	54	129	1	129	19	0	19	1	19	9	1	10	1	10
		Microbus	27	38	65	3	195	18	6	24	3	72	18	6	24	3	72
		Motor-cycle	12	2	14	0.75	10.5	16	8	24	0.75	18	10	8	18	0.75	13.5
		Van	31	11	42	3	126	1	3	4	3	12	1	3	4	3	12
		Total	**560**	**460**	**1020**		**2151.25**	**100**	**71**	**171**		**360.75**	**84**	**72**	**156**		**347.25**
9	3 p	Car	31	24	55	1	55	2	5	7	1	7	2	5	7	1	7

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Truck	85	93	178	3	534	1	3	4	3	12	1	3	4	3	12
		Utility/Mini truck	60	55	115	1	115	0	0	0	1	0	0	0	0	1	0
		Minibus	27	33	60	3	180	14	19	33	3	99	14	19	33	3	99
		Bus	32	57	89	3	267	8	13	21	3	63	8	13	21	3	63
		CNG	3	2	5	0.75	3.75	2	1	3	0.75	2.25	2	1	3	0.75	2.25
		Easy Bike	4	8	12	0.5	6	4	5	9	0.5	4.5	4	5	9	0.5	4.5
		Bicycle	11	19	30	0.5	15	2	3	5	0.5	2.5	2	3	5	0.5	2.5
		Pickup	8	6	14	1	14	2	2	4	1	4	2	2	4	1	4
		Microbus	30	39	69	3	207	12	9	21	3	63	12	9	21	3	63
		Motor-cycle	2	4	6	0.75	4.5	5	9	14	0.75	10.5	5	9	14	0.75	10.5
		Van	2	8	10	3	30	6	3	9	3	27	6	3	9	3	27
		Total	**295**	**348**	**643**		**1431.25**	**58**	**72**	**130**		**294.75**	**58**	**72**	**130**		**294.75**
10	4 pm - 5 pm	Car	46	33	79	1	79	8	2	10	1	10	8	2	10	1	10
		Truck	67	53	120	3	360	0	5	5	3	15	0	5	5	3	15
		Utility/Mini truck	70	76	146	1	146	0	0	0	1	0	0	0	0	1	0
		Minibus	30	38	68	3	204	19	24	43	3	129	19	24	43	3	129
		Bus	18	17	35	3	105	9	11	20	3	60	9	11	20	3	60

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		CNG	3	2	5	0.75	3.75	0	6	6	0.75	4.5	0	6	6	0.75	4.5
		Easy Bike	4	8	12	0.5	6	5	5	10	0.5	5	5	5	10	0.5	5
		Bicycle	14	19	33	0.5	16.5	1	6	7	0.5	3.5	1	6	7	0.5	3.5
		Pickup	8	6	14	1	14	0	2	2	1	2	0	2	2	1	2
		Microbus	37	14	51	3	153	8	4	12	3	36	8	4	12	3	36
		Motor-cycle	31	29	60	0.75	45	12	8	20	0.75	15	12	8	20	0.75	15
		Van	19	25	44	3	132	15	20	35	3	105	15	20	35	3	105
		Total	**347**	**320**	**667**		**1264.25**	**77**	**93**	**170**		**385**	**77**	**93**	**170**		**385**
11	5 pm - 6 pm	Car	89	103	192	1	192	3	7	10	1	10	3	2	5	1	5
		Truck	76	123	199	3	597	3	6	9	3	27	3	6	9	3	27
		Utility/Mini truck	90	98	188	1	188	0	0	0	1	0	0	0	0	1	0
		Minibus	56	84	140	3	420	25	30	55	3	165	12	15	27	3	81
		Bus	67	88	155	3	465	18	25	43	3	129	18	12	30	3	90
		CNG	45	39	84	0.75	63	7	11	18	0.75	13.5	7	11	18	0.75	13.5
		Easy Bike	13	20	33	0.5	16.5	7	16	23	0.5	11.5	7	16	23	0.5	11.5
		Bicycle	11	17	28	0.5	14	3	3	6	0.5	3	9	3	12	0.5	6
		Pickup	50	78	128	1	128	0	6	6	1	6	0	6	6	1	6
		Microbus	45	39	84	3	252	10	12	22	3	66	10	12	22	3	66

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Motor-cycle	12	35	47	0.75	35.25	10	21	31	0.75	23.25	10	21	31	0.75	23.25
		Van	9	16	25	3	75	4	3	7	3	21	4	3	7	3	21
		Total	**563**	**740**	**1303**		**2445.75**	**90**	**140**	**230**		**475.25**	**83**	**107**	**190**		**350.25**
12	6 pm - 7 pm	Car	50	47	97	1	97	2	10	12	1	12	2	10	12	1	12
		Truck	68	99	167	3	501	0	5	5	3	15	0	5	5	3	15
		Utility/Mini truck	89	101	190	1	190	0	0	0	1	0	0	0	0	1	0
		Minibus	47	43	90	3	270	30	37	67	3	201	13	17	30	3	90
		Bus	38	31	69	3	207	19	24	43	3	129	5	7	12	3	36
		CNG	10	8	18	0.75	13.5	8	13	21	0.75	15.75	8	13	21	0.75	15.75
		Easy Bike	19	5	24	0.5	12	5	2	7	0.5	3.5	5	2	7	0.5	3.5
		Bicycle	2	0	2	0.5	1	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	27	42	69	1	69	0	2	2	1	2	0	2	2	1	2
		Microbus	48	39	87	3	261	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	6	5	11	0.75	8.25	21	12	33	0.75	24.75	21	12	33	0.75	24.75
		Van	10	21	31	3	93	0	0	0	3	0	0	0	0	3	0
		Total	**414**	**441**	**855**		**1722.75**	**93**	**119**	**212**		**469**	**62**	**82**	**144**		**265**

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
13	7 pm - 8 pm	Car	78	59	137	1	137	2	10	12	1	12	2	10	12	1	12
		Truck	58	63	121	3	363	4	5	9	3	27	4	5	9	3	27
		Utility/Mini truck	89	101	190	1	190	3	2	5	1	5	3	2	5	1	5
		Minibus	47	43	90	3	270	12	3	15	3	45	12	3	15	3	45
		Bus	38	31	69	3	207	7	8	15	3	45	7	8	15	3	45
		CNG	10	18	28	0.75	21	8	13	21	0.75	15.75	8	13	21	0.75	15.75
		Easy Bike	9	5	14	0.5	7	14	19	33	0.5	16.5	14	19	33	0.5	16.5
		Bicycle	2	3	5	0.5	2.5	0	3	3	0.5	1.5	0	3	3	0.5	1.5
		Pickup	27	42	69	1	69	6	2	8	1	8	6	2	8	1	8
		Microbus	48	39	87	3	261	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	4	1	5	0.75	3.75	28	20	48	0.75	36	30	17	47	0.75	35.25
		Van	10	21	31	3	93	8	13	21	3	63	8	13	21	3	63
		Total	**420**	**426**	**846**		**1624.25**	**100**	**112**	**212**		**340.75**	**102**	**109**	**211**		**340**
14	8 pm - 9 pm	Car	87	104	191	1	191	2	10	12	1	12	2	10	12	1	12
		Truck	165	132	297	3	891	0	5	5	3	15	0	5	5	3	15
		Utility/Mini truck	89	101	190	1	190	0	0	0	1	0	0	0	0	1	0
		Minibus	21	36	57	3	171	3	12	15	3	45	3	12	15	3	45

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Bus	38	31	69	3	207	19	24	43	3	129	19	20	39	3	117
		CNG	10	3	13	0.75	9.75	8	13	21	0.75	15.75	8	13	21	0.75	15.75
		Easy Bike	1	5	6	0.5	3	5	2	7	0.5	3.5	5	2	7	0.5	3.5
		Bicycle	0	2	2	0.5	1	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	27	42	69	1	69	0	2	2	1	2	0	2	2	1	2
		Microbus	48	39	87	3	261	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	7	5	12	0.75	9	13	17	30	0.75	22.5	13	17	30	0.75	22.5
		Van	10	21	31	3	93	3	1	4	3	12	3	1	4	3	12
		Total	**503**	**521**	**1024**		**2095.75**	**61**	**100**	**161**		**322.75**	**61**	**96**	**157**		**310.75**
15	9 pm - 10 pm	Car	89	121	210	1	210	2	10	12	1	12	2	10	12	1	12
		Truck	154	124	278	3	834	0	5	5	3	15	0	5	5	3	15
		Utility/Mini truck	89	101	190	1	190	12	6	18	1	18	12	6	18	1	18
		Minibus	47	43	90	3	270	3	5	8	3	24	3	5	8	3	24
		Bus	68	71	139	3	417	0	0	0	3	0	0	0	0	3	0
		CNG	10	8	18	0.75	13.5	8	13	21	0.75	15.75	8	13	21	0.75	15.75
		Easy Bike	9	5	14	0.5	7	5	2	7	0.5	3.5	5	2	7	0.5	3.5
		Bicycle	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	27	42	69	1	69	0	2	2	1	2	0	2	2	1	2

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Microbus	48	39	87	3	261	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	2	0	2	0.75	1.5	12	5	17	0.75	12.75	12	5	17	0.75	12.75
		Van	10	21	31	3	93	4	15	19	3	57	4	15	19	3	57
		Total	**553**	**575**	**1128**		**2366**	**54**	**77**	**131**		**226**	**54**	**77**	**131**		**226**
16	10 pm - 11 pm	Car	105	93	198	1	198	2	10	12	1	12	2	10	12	1	12
		Truck	127	124	251	3	753	0	5	5	3	15	0	5	5	3	15
		Utility/Mini truck	89	101	190	1	190	2	2	4	1	4	2	2	4	1	4
		Minibus	47	43	90	3	270	15	4	19	3	57	15	4	19	3	57
		Bus	88	94	182	3	546	5	8	13	3	39	5	8	13	3	39
		CNG	10	8	18	0.75	13.5	8	13	21	0.75	15.75	8	13	21	0.75	15.75
		Easy Bike	1	2	3	0.5	1.5	5	2	7	0.5	3.5	5	2	7	0.5	3.5
		Bicycle	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	27	42	69	1	69	0	2	2	1	2	0	2	2	1	2
		Microbus	48	39	87	3	261	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	2	7	9	0.75	6.75	4	0	4	0.75	3	4	0	4	0.75	3
		Van	10	2	12	3	36	0	2	2	3	6	0	2	2	3	6
		Total	**554**	**555**	**1109**		**2344.75**	**49**	**62**	**111**		**223.25**	**49**	**62**	**111**		**223.25**

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
17	11 pm - 12 am	Car	98	123	221	1	221	4	3	7	1	7	4	3	7	1	7
		Truck	204	234	438	3	1314	12	6	18	3	54	12	6	18	3	54
		Utility/Mini truck	97	112	209	1	209	8	16	24	1	24	8	16	24	1	24
		Minibus	36	21	57	3	171	0	1	1	3	3	0	1	1	3	3
		Bus	79	95	174	3	522	0	0	0	3	0	0	0	0	3	0
		CNG	10	8	18	0.75	13.5	2	0	2	0.75	1.5	2	0	2	0.75	1.5
		Easy Bike	0	1	1	0.5	0.5	0	0	0	0.5	0	0	0	0	0.5	0
		Bicycle	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	12	3	15	1	15	6	2	8	1	8	6	2	8	1	8
		Microbus	24	17	41	3	123	0	0	0	3	0	0	0	0	3	0
		Motor-cycle	5	8	13	0.75	9.75	1	1	2	0.75	1.5	1	1	2	0.75	1.5
		Van	0	3	3	3	9	0	0	0	3	0	0	0	0	3	0
		Total	**565**	**625**	**1190**		**2607.75**	**33**	**29**	**62**		**99**	**33**	**29**	**62**		**99**
18	12 am - 1 am	Car	105	117	222	1	222	2	10	12	1	12	2	10	12	1	12
		Truck	289	257	546	3	1638	34	21	55	3	165	34	21	55	3	165
		Utility/Mini truck	157	163	320	1	320	38	16	54	1	54	38	16	54	1	54
		Minibus	54	43	97	3	291	0	2	2	3	6	0	2	2	3	6

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Bus	88	65	153	3	459	0	0	0	3	0	0	0	0	3	0
		CNG	10	8	18	0.75	13.5	0	2	2	0.75	1.5	0	2	2	0.75	1.5
		Easy Bike	0	1	1	0.5	0.5	0	1	1	0.5	0.5	0	1	1	0.5	0.5
		Bicycle	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	32	42	74	1	74	2	2	4	1	4	2	2	4	1	4
		Microbus	48	39	87	3	261	0	0	0	3	0	0	0	0	3	0
		Motor-cycle	4	6	10	0.75	7.5	0	0	0	0.75	0	0	0	0	0.75	0
		Van	4	3	7	3	21	2	0	2	3	6	2	0	2	3	6
		Total	**791**	**744**	**1535**		**3307.5**	**78**	**54**	**132**		**249**	**78**	**54**	**132**		**249**
19	1 am - 2 am	Car	85	115	200	1	200	31	39	70	1	70	31	39	70	1	70
		Truck	149	176	325	3	975	48	26	74	3	222	34	26	60	3	180
		Utility/Mini truck	168	153	321	1	321	52	16	68	1	68	39	16	55	1	55
		Minibus	23	43	66	3	198	9	3	12	3	36	9	3	12	3	36
		Bus	64	69	133	3	399	0	0	0	3	0	0	0	0	3	0
		CNG	10	4	14	0.75	10.5	5	7	12	0.75	9	5	7	12	0.75	9
		Easy Bike	0	5	5	0.5	2.5	0	2	2	0.5	1	0	2	2	0.5	1
		Bicycle	0	1	1	0.5	0.5	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	57	42	99	1	99	8	2	10	1	10	0	2	2	1	2
		Microbus	48	59	107	3	321	0	0	0	3	0	0	0	0	3	0

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Motor-cycle	3	4	7	0.75	5.25	0	0	0	0.75	0	0	0	0	0.75	0
		Van	7	15	22	3	66	4	0	4	3	12	4	0	4	3	12
		Total	**614**	**686**	**1300**		**2597.75**	**157**	**95**	**252**		**428**	**122**	**95**	**217**		**365**
20	3 am - 4 am	Car	51	42	93	1	93	2	1	3	1	3	2	1	3	1	3
		Truck	164	153	317	3	951	12	5	17	3	51	12	5	17	3	51
		Utility/Mini truck	170	128	298	1	298	0	0	0	1	0	0	0	0	1	0
		Minibus	16	13	29	3	87	0	0	0	3	0	0	0	0	3	0
		Bus	89	134	223	3	669	0	0	0	3	0	0	0	0	3	0
		CNG	3	0	3	0.75	2.25	0	1	1	0.75	0.75	0	1	1	0.75	0.75
		Easy Bike	1	0	1	0.5	0.5	0	0	0	0.5	0	0	0	0	0.5	0
		Bicycle	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	78	45	123	1	123	0	0	0	1	0	0	0	0	1	0
		Microbus	12	3	15	3	45	0	1	1	3	3	0	1	1	3	3
		Motor-cycle	6	0	6	0.75	4.5	0	0	0	0.75	0	0	0	0	0.75	0
		Van	0	0	0	3	0	1	0	1	3	3	1	0	1	3	3
		Total	**590**	**518**	**1108**		**2273.25**	**15**	**8**	**23**		**60.75**	**15**	**8**	**23**		**60.75**

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
21	4 am - 5 am	Car	39	47	86	1	86	1	4	5	1	5	1	4	5	1	5
		Truck	176	162	338	3	1014	14	5	19	3	57	14	5	19	3	57
		Utility/Mini truck	114	93	207	1	207	20	17	37	1	37	20	17	37	1	37
		Minibus	12	35	47	3	141	0	0	0	3	0	0	0	0	3	0
		Bus	90	68	158	3	474	0	0	0	3	0	0	0	0	3	0
		CNG	3	1	4	0.75	3	0	4	4	0.75	3	0	4	4	0.75	3
		Easy Bike	1	0	1	0.5	0.5	1	0	1	0.5	0.5	1	0	1	0.5	0.5
		Bicycle	0	1	1	0.5	0.5	0	0	0	0.5	0	0	0	0	0.5	0
		Pickup	47	36	83	1	83	0	2	2	1	2	0	2	2	1	2
		Microbus	14	6	20	3	60	0	0	0	3	0	0	0	0	3	0
		Motor-cycle	3	0	3	0.75	2.25	0	3	3	0.75	2.25	0	3	3	0.75	2.25
		Van	5	1	6	3	18	0	5	5	3	15	0	5	5	3	15
		Total	**504**	**450**	**954**		**2089.25**	**36**	**40**	**76**		**121.75**	**36**	**40**	**76**		**121.75**
22	5 am - 6 am	Car	50	68	118	1	118	5	1	6	1	6	5	1	6	1	6
		Truck	156	214	370	3	1110	12	2	14	3	42	12	2	14	3	42
		Utility/Mini truck	170	193	363	1	363	5	4	9	1	9	5	4	9	1	9
		Minibus	23	15	38	3	114	3	2	5	3	15	3	2	5	3	15

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Bus	74	32	106	3	318	0	1	1	3	3	0	1	1	3	3
		CNG	10	8	18	0.75	13.5	8	5	13	0.75	9.75	8	5	13	0.75	9.75
		Easy Bike	9	5	14	0.5	7	4	1	5	0.5	2.5	4	1	5	0.5	2.5
		Bicycle	3	1	4	0.5	2	6	8	14	0.5	7	6	8	14	0.5	7
		Pickup	27	32	59	1	59	0	0	0	1	0	0	0	0	1	0
		Microbus	48	59	107	3	321	3	1	4	3	12	3	1	4	3	12
		Motor-cycle	5	8	13	0.75	9.75	7	2	9	0.75	6.75	7	2	9	0.75	6.75
		Van	10	21	31	3	93	4	1	5	3	15	4	1	5	3	15
		Total	**585**	**656**	**1241**		**2528.25**	**57**	**28**	**85**		**128**	**57**	**28**	**85**		**128**
23	6 am - 7 am	Car	32	62	94	1	94	2	6	8	1	8	2	6	8	1	8
		Truck	84	99	183	3	549	7	5	12	3	36	7	5	12	3	36
		Utility/Mini truck	102	135	237	1	237	2	18	20	1	20	2	18	20	1	20
		Minibus	32	43	75	3	225	8	3	11	3	33	8	3	11	3	33
		Bus	48	31	79	3	237	1	0	1	3	3	1	0	1	3	3
		CNG	14	23	37	0.75	27.75	28	13	41	0.75	30.75	12	13	25	0.75	18.75
		Easy Bike	19	15	34	0.5	17	16	12	28	0.5	14	16	12	28	0.5	14
		Bicycle	7	2	9	0.5	4.5	10	13	23	0.5	11.5	10	13	23	0.5	11.5
		Pickup	27	42	69	1	69	3	1	4	1	4	3	1	4	1	4

Sl. No.	Time	Vehicles Type	No. of Vehicles from Dhaka to Chittagong	No. of Vehicles from Chittagong to Dhaka	Total No. of Vehicles	PCU Value	Total PCU	No. of Vehicles from access road to Project Site	No. of Vehicles from Project Site to access road	Total number of Vehicles	PCU Value	Total PCU	No. of Vehicles from proposed access road to highway	No. of Vehicles from highway to proposed access road	Total number of Vehicles	PCU Value	Total PCU
		Microbus	56	39	95	3	285	8	14	22	3	66	8	14	22	3	66
		Motor-cycle	32	27	59	0.75	44.25	21	13	34	0.75	25.5	21	13	34	0.75	25.5
		Van	12	21	33	3	99	5	7	12	3	36	5	7	12	3	36
		Total	**465**	**539**	**1004**		**1888.5**	**111**	**105**	**216**		**287.75**	**95**	**105**	**200**		**275.75**
	Total		**5870**	**5997**	**11867**			**1213**	**1217**	**2430**			**1019**	**1038**	**2387**		

According to the Road Geometric Design Manual, 2000 (Table 2.1 – Road Cross Section Standards) of Roads and Highways Department (RHD), Dhaka - Chattaogram Highway is considered to be National Highways of 2nd Category with 4 lanes. The Design Year Traffic Volume is 2100-4500 PCU/hour for this highway. Above table shows that, at the time of 12 am – 1 am (peak hour) the traffic volume is found to be 3307.5 PCU/ peak hour which is between than the design year traffic volume range.

According to the Road Geometric Design Manual, 2000 (Table 2.1 – Road Cross Section Standards) of Roads and Highways Department (RHD), the existing Access Road from highway to the Project site is considered to be Feeder of "C" category (Union Road) with 1 lane. The Design Year Traffic Volume is <400 PCU/hour for this road. Above table shows that, at the time of 9 am – 10 am (peak hour) the traffic volume is found to be 617.25 PCU/ peak hour which is higher than the design year traffic volume. USML planning to construct an entry point from the project northern boundary that will connect the highway, which is also shown in Figure 4.21 (location 3). The traffic study of new access road to highway is shown in table 4.18, and at the time of 10 am – 11 am (peak hour) the traffic volume is found to be 392.25 PCU/ peak hour which is lower than the design year traffic volume.

4.10 Geology

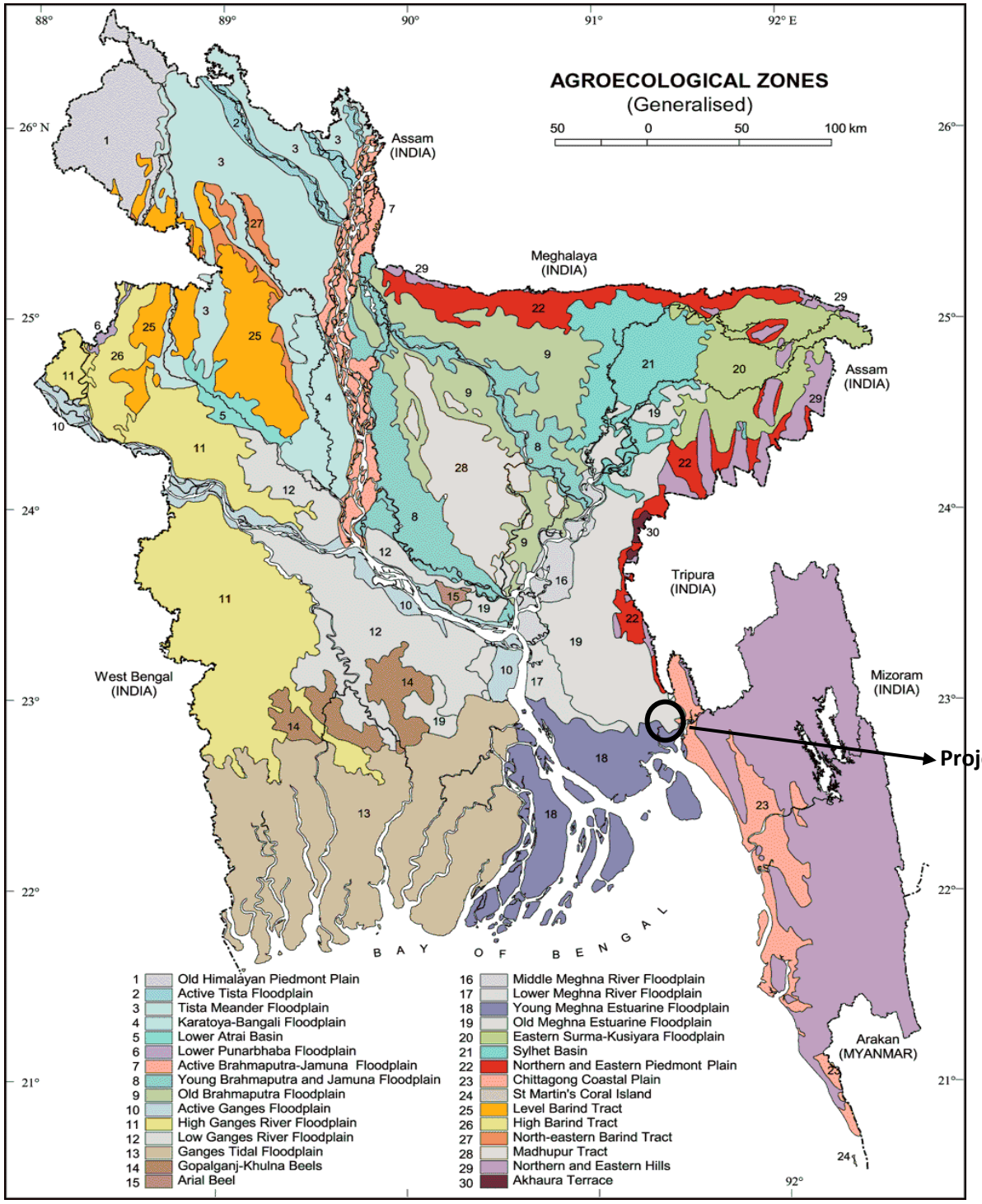
The geological evolution of Bangladesh is related to the uplift of the Himalayan mountains and outbuilding of deltaic landmass by major river systems having their origin in the uplifted Himalayas. This geology is mostly characterized by the rapid subsidence and filling of a basin in which a huge thickness of deltaic sediments was deposited as a mega delta built out and progressed towards the south. The delta building is still continuing into the present Bay of Bengal and a broad fluvial front of the Ganges-Brahmaputra-Meghna River system gradually follows it from behind.

4.10.1 Soil

Most of the area of Bangladesh is a vast, low-lying alluvial plain, sloping gently to the south and southeast. According to Bangladesh Agricultural research council's Agro-Ecological Zoning map (**Figure 4.22**) the project area falls in ***"Old Meghna Estuarine Floodplain"***.

this region occupies a large area, mainly low-lying land between the south of the Surma-Kushiyara floodplain and the northern edge of the young Meghna estuarine floodplain. Silt loam soils predominate on highlands and silty clay to clay on lowlands. Organic matter content of the soils are moderate. Topsoil is moderately acidic, but subsoils neutral in reaction. General fertility level is medium.

According to **Figure 4.23 (a)**, silty clay loam was found in the project area, had a porosity level of 31%-40% [**Figure 4.23 (b)**] and medium level of organic matter of soil found in the project area [**Figure 4.23(c)**]. Soil pH of the project area was in a level of strongly acidic condition [**Figure 4.23 (d)**].



(Islam et al, 2020)

Figure 4.22: Agro-ecological zones Map of Bangladesh

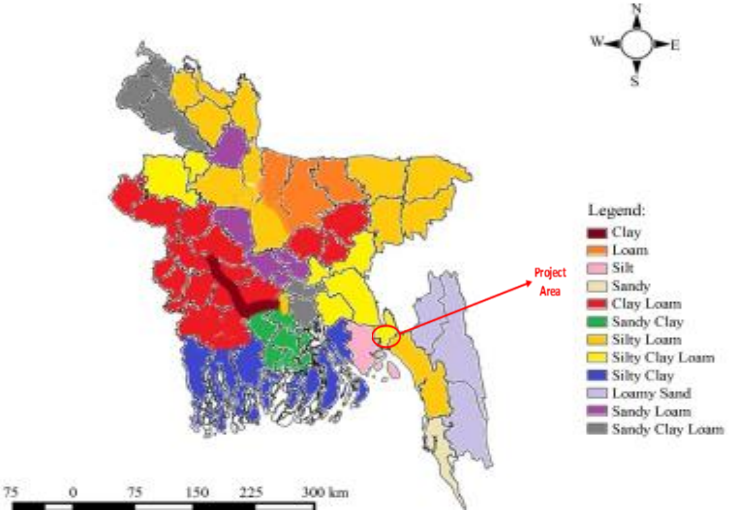


Figure 4.23 (a): Categorizes of soil texture in Bangladesh

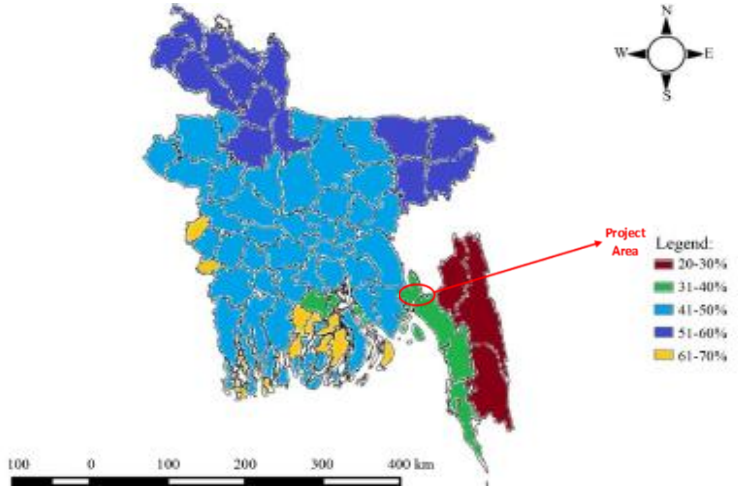


Figure 4.23 (b): Level of soil porosity in Bangladesh

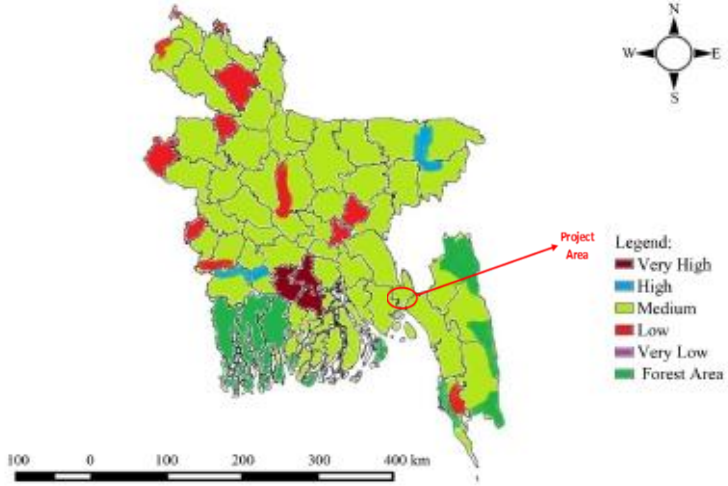


Figure 4.23 (c): Organic matter status in the soil of Bangladesh

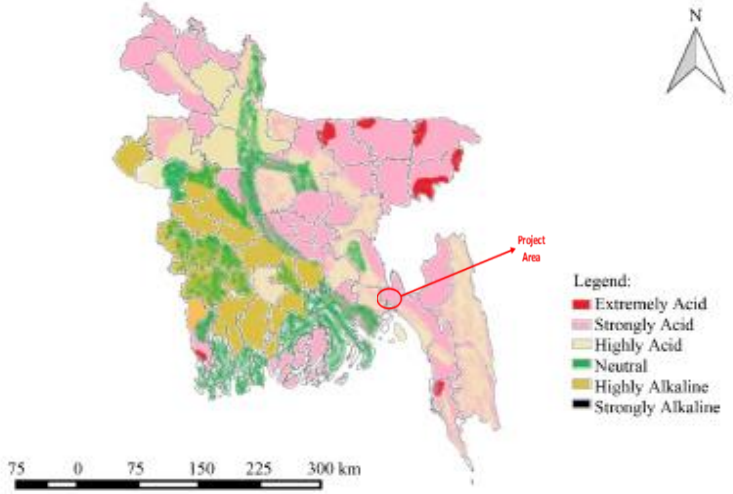


Figure 4.23 (d): Soil pH status in Bangladesh

(Islam et al., 2017)

4.11 Climate Change and Natural Disaster

Bangladesh is one of the most vulnerable countries, who is facing problems on climate change due to global warming. Low-lying coastal regions like Bangladesh are vulnerable to sea level rise and increased occurrence of intense, extreme weather conditions such as the cyclones from 2007 and 2009.

4.11.1 Seismicity

Earthquakes are closely related to plate tectonics. Bangladesh is located in a tectonically active region close to the plate boundaries of the Indian plate and the Eurasian plate. The plate boundaries lie to the north and east of Bangladesh. The collision of the north-east moving (around 4 cm or more annually) Indian Plate with the Eurasian plate **(Figure 4.24)** is the cause of frequent earthquakes in the region comprising North East India, Nepal, Bhutan, Bangladesh and Myanmar.

Tectonically Bangladesh is divided broadly into three divisions: (i) Stable Shelf (in the northwest) (ii) Bengal Foredeep (in the Central) and (iii) Chattogram-Tripura Folded Belt (in the east). In addition, there is a SW-NE trending 25 km wide hinge zone separating the Bengal Foredeep from the Stable Shelf.

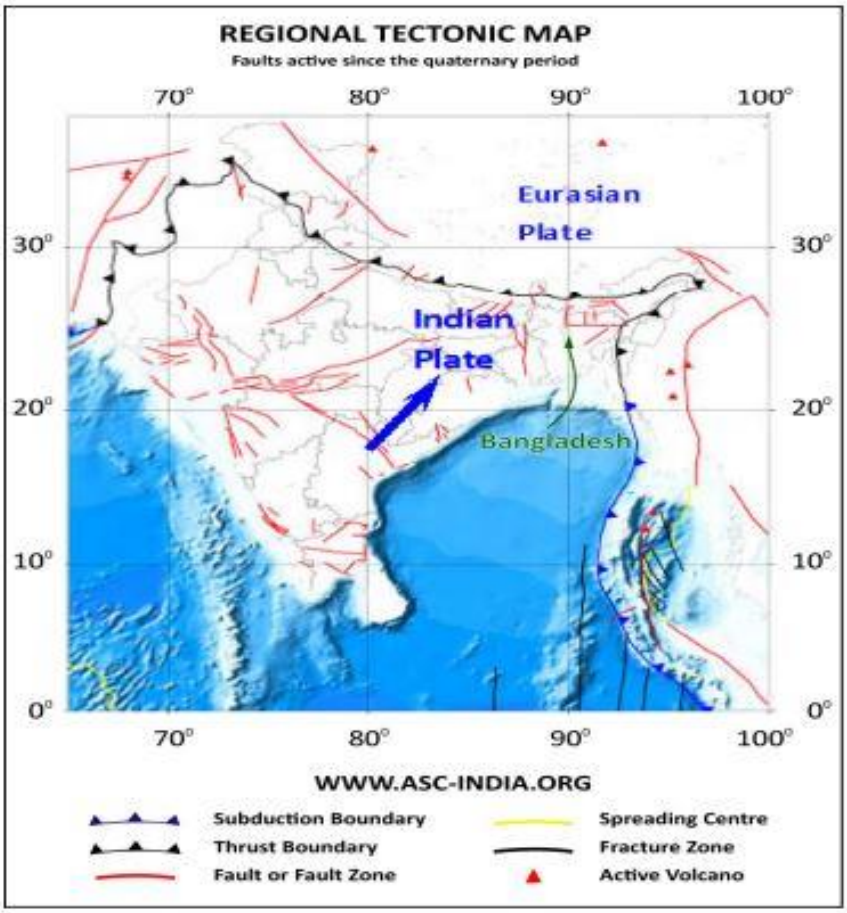
- The Stable Pre-Cambrian Shelf in the northwest consists of relatively thin sedimentary strata over bedrock. In Madhyapara area of Dinajpur the basement is only 130 m deep from the ground surface. The basement plunges gently from Madhyapara towards the southeast up to the Hinge Zone. Seismic contours on top of limestone in Bogra show regional dip of 2-3^{o} besides revealing a number of NE-SW trending faults.

- In the hinge zone, the depth of the limestone increases from 4000m to 9000m within a narrow zone of 25-km. Hinge Zone is connected with Bengal Foredeep by deep basement faults that probably started with the breakup of Gondwanaland. The SW-NE trending Hinge Zone turns to the east near Indian border in Jamalpur and seems to be connected with the Dauki Fault, probably by a series of east-west trending faults. Bengal Foredeep occupies the vast area between Hinge Line and Arakan Yoma Folded System in the east. The Bengal Foredeep consists of some Troughs and some relatively high lands.

- Eastern part of the country is represented by the Chattogram-Tripura Folded Belt. The folded belt in the east consists of narrow, elongated N-S trending folds in Sylhet and Chattogram Divisions of Bangladesh, Tripura, southern Assam and Mizoram states in India and also Myanmar territory. The elevation of these elongated anticlinal folds in Bangladesh ranges from 100-1,000m. Some of the structures are faulted and thrusted and the intensity of folding increases gradually from west to east.

The project area falls in seismic zone two according to the [**Figure 4.25**] Revised Seismic Zonation of Bangladesh (2017) and BNBC 2020. According to Revised Seismic Zonation of Bangladesh (2017) and BNBC 2020, the country is divided into four seismic zones with different expected levels of intensity of ground motion. Each zone has a seismic zone coefficient (Z) which represents the maximum

considered peak ground acceleration (PGA) on very stiff soil/rock (site class SA) in units of g (acceleration due to gravity). The zone 2 consists of Lower Central and Northwestern part including Noakhali, Dhaka, Pabna, Dinajpur, as well as Southwestern corner including Sundarbans, where seismic intensity is ***Moderate*** and seismic zone coefficient (Z) is 0.20 [**Table 4.19**].



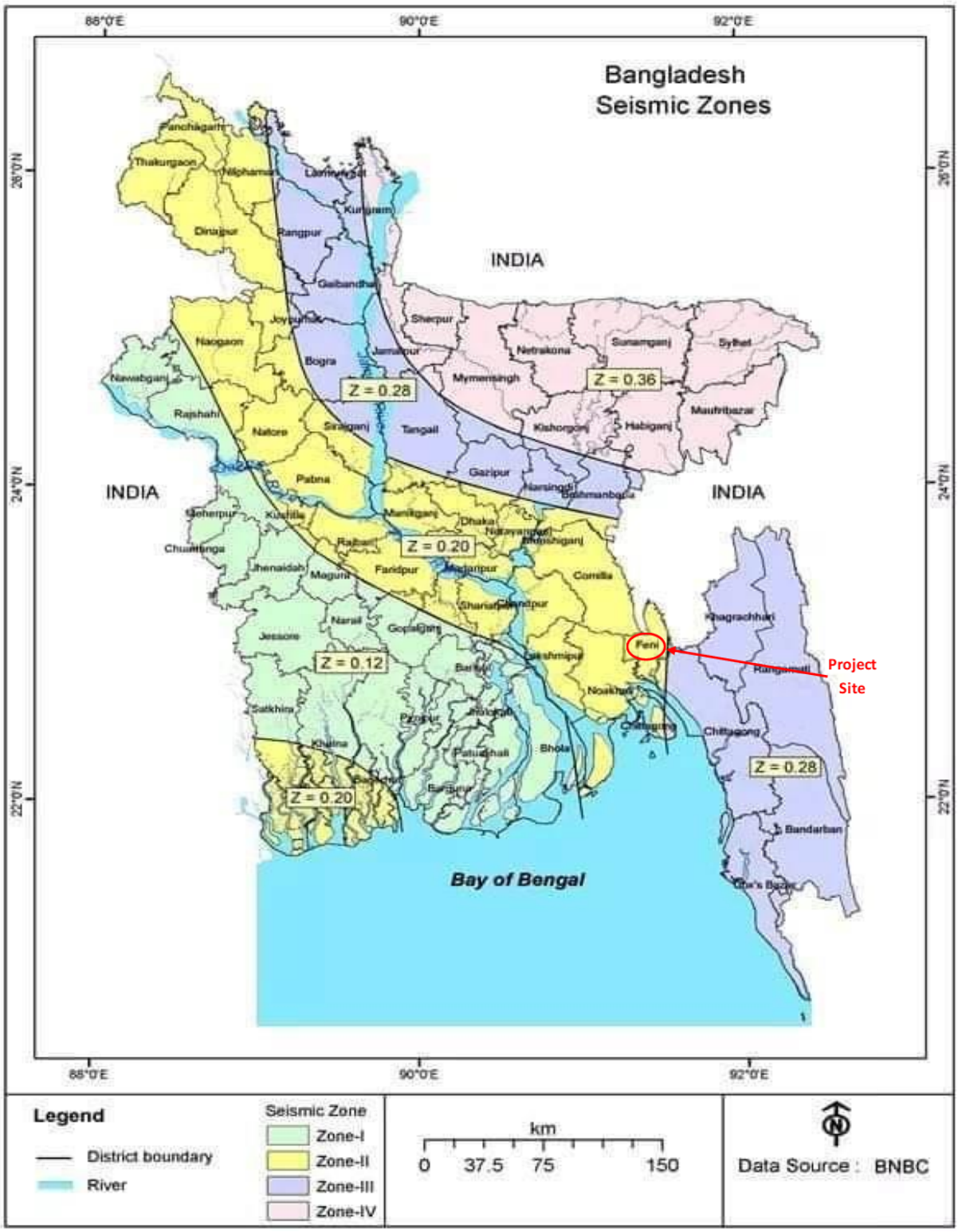
(BNBC, 2020)

Figure 4.24: Movement of Indian plate relative to Eurasian plate

Table 4.19: Seismic Zonation of Bangladesh, 2017

Seismic Zone	Location	Seismic Intensity	Seismic Zone Coefficient, Z
1	Southwestern part including Barisal, Khulna, Jessore, Rajshahi	Low	0.12
2	Lower Central and Northwestern part including Noakhali, Dhaka, Pabna, Dinajpur, as well as Southwestern corner including Sundarbans	Moderate	0.20
3	Upper Central and Northwestern part including Brahmanbaria, Sirajganj, Rangpur	Severe	0.28
4	Northeastern part including Sylhet, Mymensingh, Kurigram	Very Severe	0.36

(BNBC, 2020)



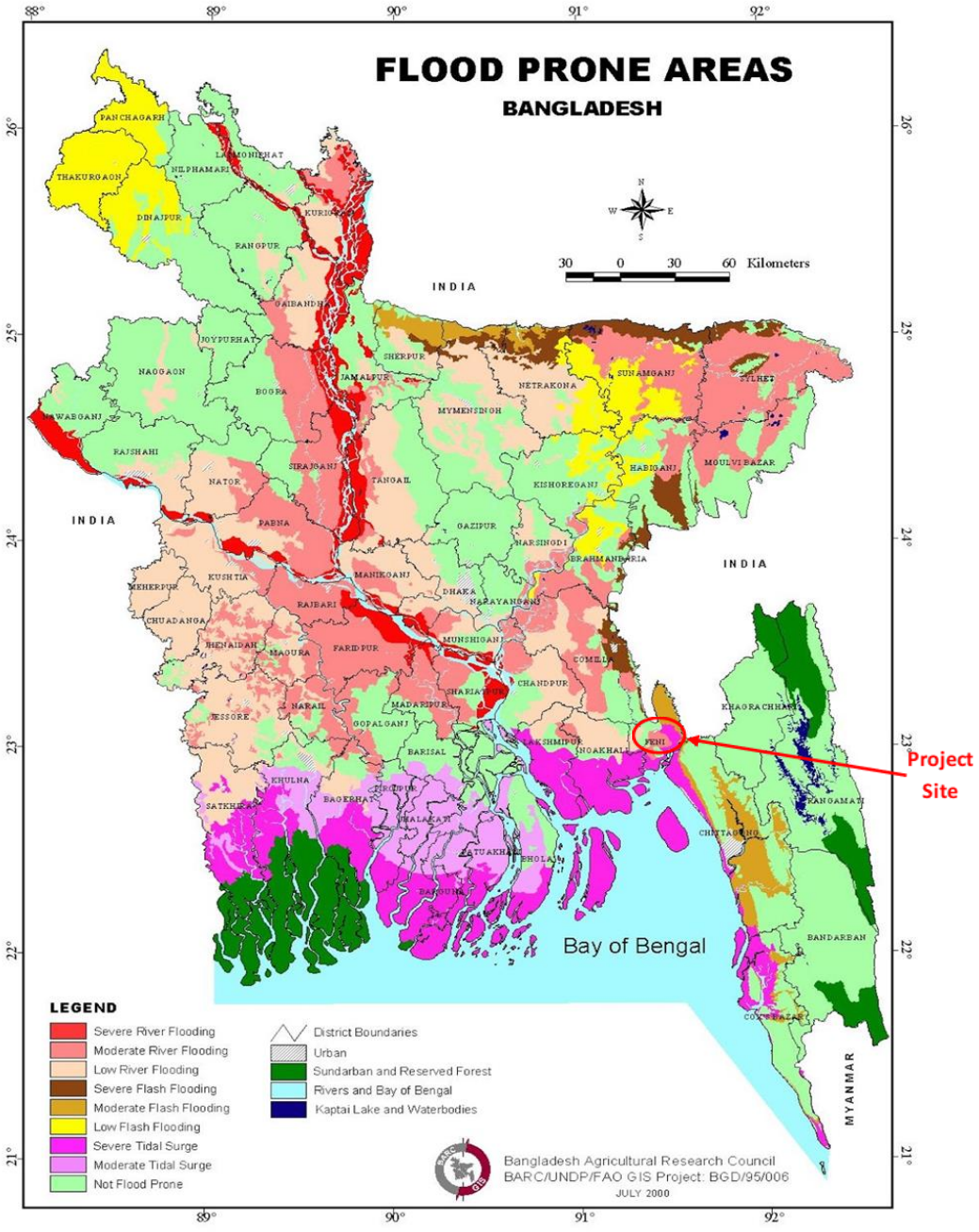
(BNBC, 2020)

Figure 4.25: Earthquake Zoning Map of Bangladesh

4.11.2 Floods

Bangladesh is a land of rivers. It is prone to flooding due to being situated on the Brahmaputra River Delta (also known as the Ganges Delta) and the many distributaries flowing into the Bay of Bengal. Each year in Bangladesh about 26,000 square kilometers (10,000 Sq meter) (around 18% of the

country) is flooded, killing over 5,000 people and destroying more than seven million homes. The project area is moderate river flooding area as the map of Flood Prone Areas of Bangladesh shown in **Figure 4.26**.



Bangladesh Agricultural Research Council (BARC)

Figure 4.26: Flood Prone Areas of Bangladesh

According to Flood Hazard index map of Bangladesh, the project site is located at low flooding risk area shown in **Figure 4.27**.

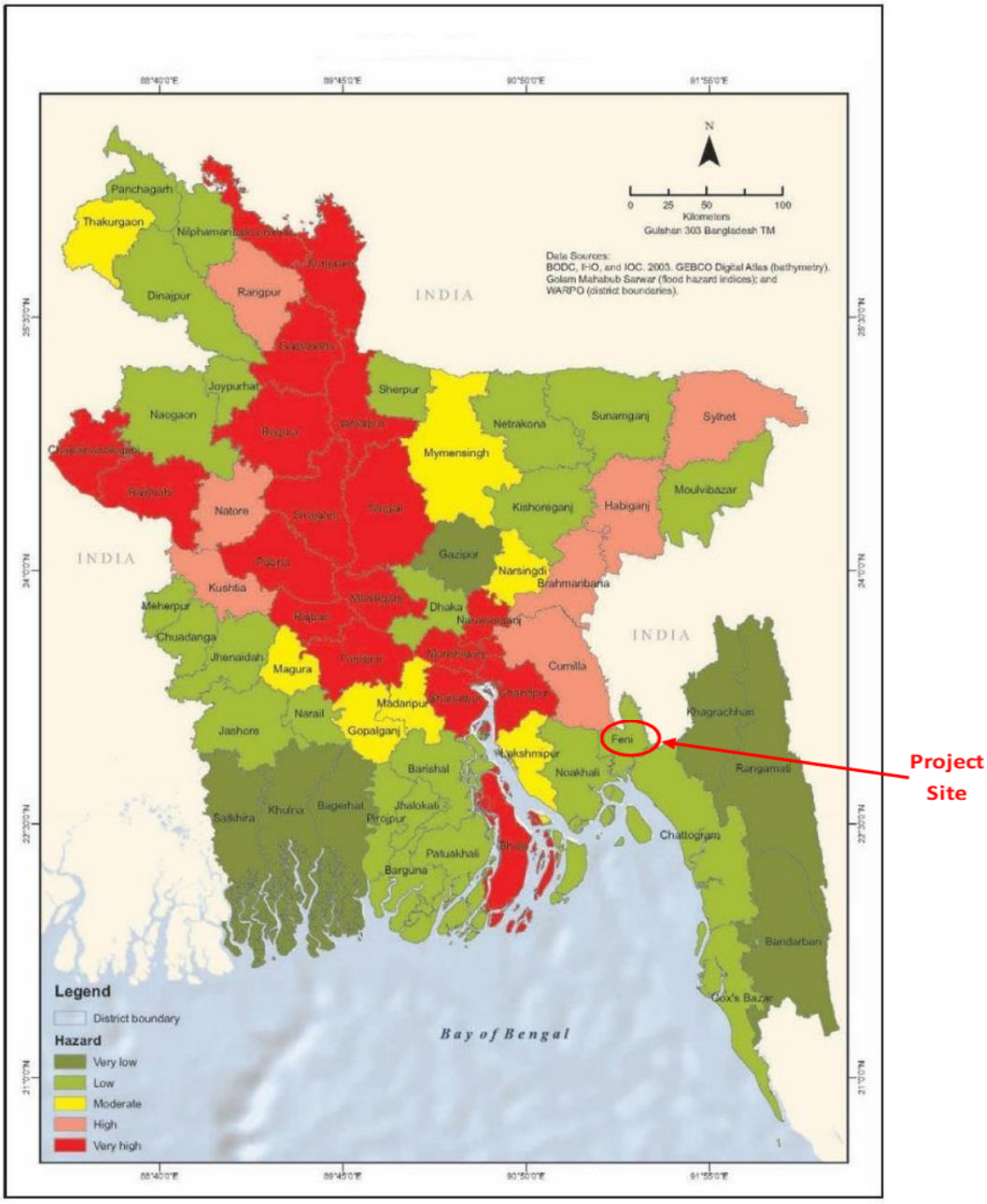
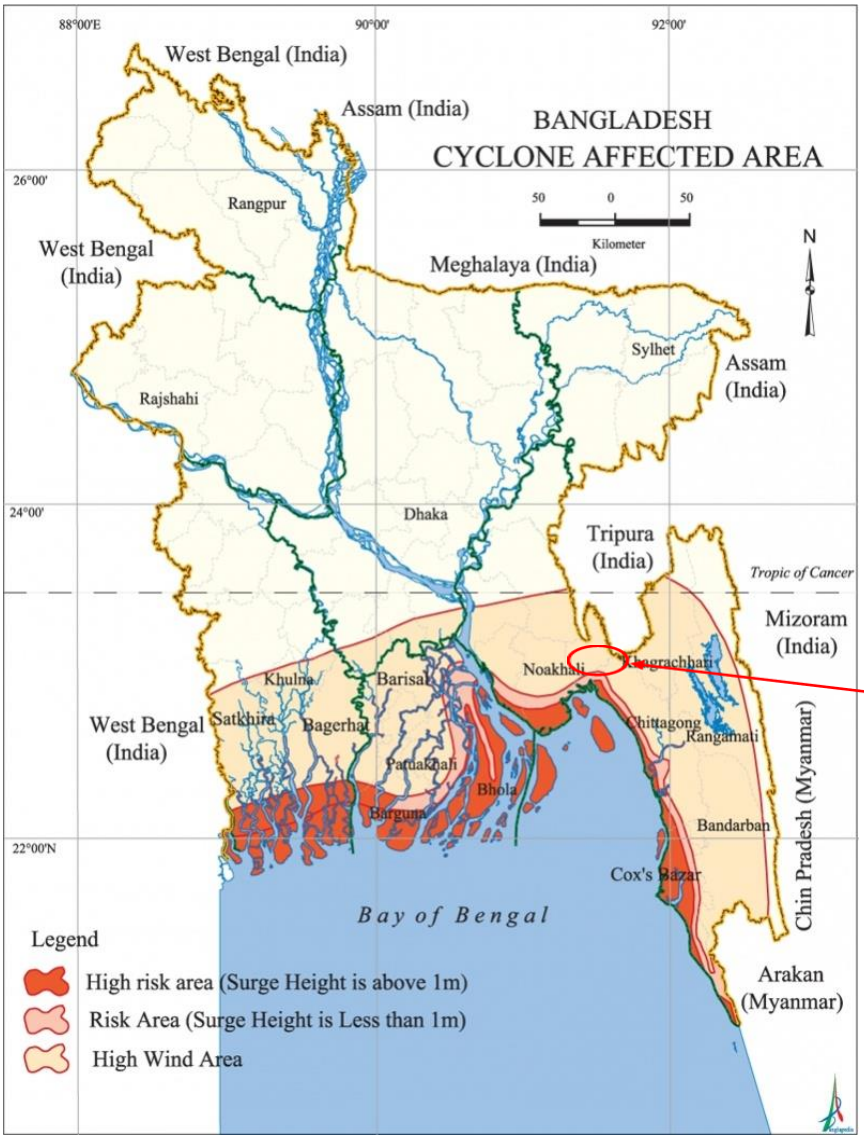


Figure 4.27: Flash Flood Hazard Index Map

4.11.3 Cyclones

Bangladesh is one of the most cyclone prone areas on the earth. Devastating cyclones hit the coastal zones almost every year and are usually accompanied by high-speed winds, sometimes reaching 250 km/hr. or more and with 3 m to 10m high waves, causing extensive damage to life, property and livestock. These cyclones usually occur in two seasons, April-May and October-November – i.e., before and after the monsoon season. As per Cyclone Affected Area Map of Bangladesh shown in **Figure 4.28**, the project site is High wind zone area.



(SPARRSO)

Figure 4.28: Cyclone Affected Area Map of Bangladesh

4.12 Ecological Diversity (Flora & Fauna)

4.12.1 General Consideration

Forests, pasture lands, rivers, surface water and other water bodies, etc. are the most important natural ecosystems. They are the foundation on which conservation of biological diversity depends. Biological diversity, which refers to genetic variation as well as to the diversity of human populations and ecosystems, is a resource that belongs not only to regions and to nations but also to all of humankind. Although it is a renewable resource, it can be irreversibly destroyed.

Both extensive resource use over large areas and selective, intensive use of every favorable site can severely damage an ecosystem. Small-scale operations preservation of remaining natural areas and resource use in harmony with nature are important if the resources of a region are to be managed in

an ecologically appropriate manner, proper monitoring is needed in order to obtain reliable information about significant changes in an ecosystem.

4.12.2 Flora

A comprehensive survey was conducted at the vicinity of the project area during the study period. The baseline ecological survey was conducted 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, and
- Data analysis and interpretation.

4.12.2.1 Terrestrial Flora

Detail lists of Terrestrial Flora found during our field visit is presented in **Table 4.22**.

Table 4.20: Terrestrial Flora around the Study Area

SL No.	Local Name	Scientific name	English Name	Family
1.	Aam	*Mangifera indica*	Mango	Anacardiaceae
2.	Kathal	*Artocarpus heterophyllus*	Jackfruit	Moraceae
3.	Lotagach	*Cissampelos pareira*	Creeper plant	Menispermaceae
4.	Hatisur	*Heliotropium indicum*	Indian heliotrope	Asteraceae
5.	Muthaghas	*Kyllinga microcephala Steud.*	Nut grass	Cyperaceae
6.	Kola	*Musa Sepientum*	Banana	Musaceae
7.	Narikel	*Cocos nucifera*	Coconut	Arecaceae
8.	Pepe	*Carica papaya*	Papaya	Caricaceae
9.	chofeda	*Manilkara zapota*	Sapodilla	Sapotaceae
10.	Lichu	*Lichi chinensis*	Lichi	Sapindaceae
11.	Piara	*Psidium guajava*	Guava	Myrtaceae
12.	Pittraj	*Aphanamixis polystachya*	pithraj tree	Mahogany
13.	Bot	*Ficus benghalansis*	Banyan tree	Moraceae
14.	Chal Kumra	*Benincasa hispida*	Wax gourd	Cucurbitaceae
15.	Shimul	*Bombax ceiba*	Cotton Tree	Bombacaceae
16.	Gom	*Triticum aestivum L.*	Wheat	Poaceae
17.	Botua shak	*Chenopodium album L.*	Green Amaranth	Chenopodiaceae
18.	Rice	*Oryza sativa*	Rice	Poaceae
19.	Kashful	*Saccharum spontaneum*	Kans grass	Poaceae

SL No.	Local Name	Scientific name	English Name	Family
20.	Boroi	*Zizyphus mauritiana*	Indian jujube	Rhamnaceae
21.	petari	*Abutilon indicum*	Country mallow	Malvaceae
22.	Bel	*Aegle marmelos*	Stone apple	Rutaceae
23.	Tentul	*Tarmariandus indica*	Tamarind	Fabaceae
24.	Hijal	*Barringtonia acutangula*	Mango-pine	Lecythidaceae
25.	Joba	*Hibiscus rosa-sinensis*	Hibiscus	Malvaceae
26.	Bahera	*Terminalia bellirica*	Beach almond	Combretaceae
27.	Neem	*Azadirachta indica*	Neem tree	Meliaceae
28.	Shajna	*Moringa oleifera*	Drumstick tree	Moringaceae
29.	Eucalyptus	*Eucalyptus obliqua*	Eucalyptus	Myrtaceae
30.	Potol	*Trichosanthes dioica*	Pointed gourd	Cucurbitaceae
31.	Ghash	*Dactyloctenium aegyptium*	beach wiregrass	Poaceae
32.	Kumro	*Cucurbita pepo*	Pumpkin	Cucurbitaceae
33.	Lebu	*Citrus limon*	Lemon	Rutaceae

(Field survey of AECL team)

Saccharum Spontaneum

Oryza sativa

Psidium guajava

Musa Sepientum

Aphanamixis polystachya

Eucalyptus obliqua

Hibiscus rosa-sinensis

Cucurbita pepo

Citrus limon

Barringtonia acutangula

Zizyphus mauritiana

Manilkara zapota

Tarmariandus indica

Mangifera indica

Abutilon indicum

Azadirachta indica

Kyllinga microcephala Steud

Cissampelos pareira

Figure 4.29: Terrestrial Flora around the project area

4.12.2.2 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 seen around the study area are listed in **Table 4.21** below. Photographs of aquatic flora around the project area are shown in **Figure 4.30**.

Table 4.21: List of Aquatic Flora around the project area

SL No.	Local name	Scientific Name	English Name	Family
1.	Kolmi shak	*Ipomoea aquatica*	Water spinach	Morning-glories
2.	Kachuripana	*Eichhornia crassipes*	Water hyacinth	Pontederiaceae
3.	Topapana	*Pistia stratiotes*	Water lettuce	Araceae
4.	Khudipana	*Lemna perpusilla*	Duckweed	Arums
5.	Shapla	*Nymphaea nouchali*	Blue lotus	Nymphaeaceae
6.	Helencha	*Enhydra fluctuans*	English Marsh Herb/Water Cress	Asteraceae

Ipomoea aquatica

Eichhornia crassipes

Nymphaea nouchali

Enhydra fluctuans

Pistia stratiotes

Lemna perpusilla

Figure 4.30: Aquatic Flora around the project area

4.12.3 Fauna

4.12.3.1Terrestrial Fauna

The study was based on field survey methods where an several questions was asked for collecting data from different sampling locations. During collection of data, both primary and secondary sources were considered to interpret the results. No vulnerable or endangered species were found during the site visit around the project area. List of Fauna identified in and around the project area are mentioned below **Table 4.22.**

Table 4.22: List of Terrestrial Fauna Identified in and around the Project Area

Sl. No.	English name	Scientific name	Local Name	IUCN Bangladesh status	IUCN Global status
Amphibians					
1.	Skipper Frog	*Rana cynophlyctis*	Kotkoti Bang	NT	LC
2.	Bull Frog	*Rana tigrina*	Sona Bang, Kola Bang	NT	LC
3.	Common Toad	*Bufo melanosticus*	Kuno Bang, Kona Bang	LC	LC
Reptiles					
1.	House Lizard	*Hemidactylus brookii*	Goda Tiktiki	NT	LC
2.	Wall Lizard	*Hemidactylus frenatus*	Mosrin Tiktiki	NT	LC
3.	Olive Keelback Water Snake	*Atretium schistosum*	Maitta Shap	NT	LC
Birds					
1.	Common Myna	*Acridotheres tristis*	Bhat Shalik	NT	LC
2.	Jungle Myna	*Acridotheres fuscus*	Jhuti Shalik	NT	LC
3.	Black Drongo	*Dicurus macrocercus*	Kala Fingey	NT	LC
4.	Tailor Bird	*Orthotomus sutorious*	Tuntuni	NT	LC
5.	House Sparrow	*Passer domesticus*	Pati Chorui	NT	LC
6.	Common Kingfisher	*Alcedo atthis*	Machranga	NT	LC
7.	Cuckoos	*Cuculus micropterus*	Kokil	NT	LC
8.	House Crows	*Corvus splendens*	Pati Kak	NT	LC
9.	Magpie Robin	*Copsychus saularis*	Doel	NT	LC
10.	Rose-ringed Parakeet	*Psittacula krameri*	Shobuj Tia	NT	LC
11.	Barn Owl	*Tyto alba*	Lokkhi Pecha	NT	LC
12.	Brahminy Kite	*Haliaster Indus*	Shonkho Chil	NT	LC
13.	Eastern Spotted Dove	*Streptopelia chinensis*	Tila ghughu	NT	LC
Mammalian					
1.	House mouse	*Mus musculus*	Nengti Indur	NT	LC
2.	Indian Flying Fox	*Pteropus giganteus*	Baro Badur	NT	LC
3.	Large bandicoot	*Bandicota indica*	Dhari Indur	NT	LC

Sl. No.	English name	Scientific name	Local Name	IUCN Bangladesh status	IUCN Global status
4.	Field Mouse	*Mus booduga*	Metho Idur	NT	LC
**Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Not Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Not Added (N/A)*					

(Field survey of AECL team)

4.12.3.2 Aquatic Fauna

There are different types of fishes in the project area. Primary data were collected from fishermen through questionnaire interviews and also from the local fish markets. Some of the commonly available fishes in the project influence area are mentioned below in **Table 4.23**.

Table 4.23: List of Aquatic fauna (fish) in the project area

Sl. No.	Common English Name	Scientific Name	Local Name	Red List Category	
				IUCN Bangladesh status	IUCN Global status
Fish Fauna					
1.	Gangetic Hairfin Anchovy	*Setipinna Phasa*	Phasa	NT	LC
2.	River Shad	*Tenualosa Ilisha*	Ilish	NT	LC
3.	Goldspot Mullet	*Liza Parsia*	Kalla Bata	NT	LC
4.	Corsula Mullet	*Rhinomugil Corsula*	Bata	NT	LC
5.	Black Rohu	*Labeo Calbasu*	Kalibaus	NT	LC
6.	Freshwater Shark	*Wallago Attu*	Boal	NT	LC
7.	Bleeker's Mystus	*Mystus bleekeri*	Tengra	NT	LC
8.	Fine scale Razor belly	*Chela phulo*	Chela	NT	LC
9.	Cotio	*Osteobrama cotio*	Dhela	NT	LC
10.	Pabdah catfish	*Ompok pabda*	pabda	N/A	LC
11.	Chola Barb	*Puntius chola*	Chola Punti	NT	LC
12.	Mola carplet	*Amblypharyngodon*	mola	NT	LC
13.	Fresh Water Goby	*Glossogobius giuris*	Baila	NT	LC
14.	Silver Carp	*Hypophthalmichthys molitrix*	Silver Carp	N/A	-
15.	Indian river shad	*Gudusia chapra*	Chapila	N/A	-
**Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Not Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Not Added (N/A)*					

(Field survey of AECL Team)

Amphibian		Reptile
		
Rana cyanophlyctis	***Bufo melanostictus***	***Hemidactylus brooki***
Aves		
		
Corvus splendens	***Passer domesticus***	***Acridotheres tristis***
		
Streptopelia chinensis	***Alcedo atthis***	***Psittacula krameri***

Copsychus saularis

Orthotomus sutorious

Gallus gallus

Mammals

Mus musculus

Canis lupus familiaris

Bos taurus

Capra aegagrus hircus

Figure 4.31: Terrestrial Fauna around the project area

Wallago attu

Puntius chola

Tenualosa Ilisha

Rhinomugil Corsula

Gudusia chapra

Labeo calbasu

Glossogobius giuris

liza parsia

Amblypharyngodon

Figure 4.32: Aquatic Fauna around the project

4.13 Social Economic Condition

As part of the Environmental and Social Impact Assessment (EIA) of the proposed project, a social baseline study was carried out in areas surrounding the project site. This has been done on the basis of several surveys around the locality as well as Chhagalnaiya Upazila Profile. Bangladesh Bureau of Statistics (BBS), Bangladesh National Portal, concerned books and periodicals were also consulted.

4.13.1 Administrative Information

The project site is in the Muhuriganj village, Gopal Union Parishad, Chhagalnaiya Upazila of Feni District, Bangladesh. Feni has a total area of 928.34 km2. It has boundaries with Comilla District and Tripura state of India in the north, Chattogram District and Bay of Bengal in the south, Chattogram District and Tripura state of India in the east and Noakhali District in the west. Demographic Characteristics of Feni District is presented on **Table 4.24**.

Table 4.24: Demographic Characteristics of Feni District

Characteristics	Total number
Upazila	6
Union	43
Mouza	540
Village	564
Thana	6
Municipalities	5

(District Statistics 2011, Feni)

The project area is in Chhagalnaiya Upazila. Chhagalnaiya is one of the largest Upazila of Feni; occupies an area of 133.49 sq. km. located in between 22°54' and 23°07' north latitudes and in between 91°26' and 91°35' east longitudes. It is bounded by phulgazi upazila on the north, mirsharai and feni sadar upazilas on the south, Indian State of Tripura on the east, Feni Sadar Upazila on the west.

4.13.2 Population and Social Structure

The project location is at Chhagalnaiya Upazila, Feni. The Demographic characteristic of the Chhagalnaiya Upazila is presented in Table 4.25.

Table 4.25: Demographic Characteristics of the Chhagalnaiya Upazila

Characteristics	Chhagalnaiya
Total Area (Sq. km)	139.6
Total Household	36,744
Total population	187,156
Male	89,494

Characteristics	Chhagalnaiya
Female	97,662
Average Household	5.04
Literacy rate (%)	63.38
Sex ratio (M/F)	92
Population Density (Per Sq. km)	1341
Ward	9
Union	5
Mouza	46
Village	58
mahalla	11

(District Statistics 2011, Feni)

4.13.3 Religion

Table 4.26: Religion of the households Chhagalnaiya Upazila

Upazila	Total population	Muslim	Hindu	others
Chhagalnaiya	187,156	182, 215	4,895	45
%	100	97.35	2.61	0.04

(District Statistics 2011, Feni)

From the above table it could be understood that Chhagalnaiya is predominantly a Muslim populated area with 97.35 percent of Muslim population, while Hindus are the second most populated religion, with a presence of 2.61 percent.

4.13.4 Health and Medical facilities

There are 1 Upazila health complex, 4 family planning centre, 3 satellite clinic and 4 family welfare centers.

4.13.5 Source of Drinking Water

In Chhagalnaiya Upazila 90.8% of general households have got the facility of drinking tube well water, 4.1% tap water and the remaining 5.1% household gets water from other sources. (Population and Housing Census 2011; Community Report: Feni)

4.13.6 Sanitation

In the Upazila, 69% of general households use sanitary latrine, 30% non-sanitary latrine and 1% have no toilet facility. (Population and Housing Census 2011; Community Report: Feni).

4.13.7 Literacy

In Chhagalnaiya Upazila it is found that 63.4% population aged 7 years and over is literate. 65.3% male and 61.6 % female are literate. (Population and Housing Census 2011; Community Report: Feni).

4.13.8 Access to Electricity

All the 5 unions of the Upazila have bought under the Rural Electrification Program However, a total of 81.1% of the general households reported to have electricity connection. (Population and Housing Census 2011; Community Report: Feni).

4.13.9 Local employment and Economy

Majority people of Chhagalnaiya Upazila are involved in agricultural activity. Local employment in different sector of Chhagalnaiya Upazila is given in **Table 4.27**.

Table 4.27: Economy of Chhagalnaiya Upazila

Economy	Percentage (%)
Agriculture	32.27
Non-agricultural laborer	2.55
Commerce	14.61
Service	15.74
Transport and communication	4.42
Construction	1.49
Rent and remittance	14.28
Industry	0.68
Religious service	0.36
Others	13.60

(District Statistics 2011, Feni)

4.13.10 Archeological, Cultural Heritage and Religious Site

The famous archaeological heritage and relics are Bhuiyan Mosque, Shiluar Shil, Bansh Para Zamindar Bari and Kaiara Dighi. The distance between the project site and the archeological heritage site is shown in table 4.28.

Table 4.28: distance between the project site and the archeological heritage site

SL no.	Archeological and Cultural Heritage site	Distance from the Project Area (Km)
1	Bhuiyan Mosque	14.56
2	Shiluar Shil	10.13
3	Bansh Para Zamindar Bari	11.01
4	Kaiara Dighi	5.66

4.13.11 Indigenous people and others

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

4.14 Primary Social/Household Survey

4.14.1 Introduction

Socio-economic details of the project 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 43 HHs comprises of 165 people has been surveyed with average HH size 3.85 which is lower than the national average (4.35) according to BBS 2016, Bangladesh.

Table 4.29: General Profile of Surveyed Population

Category	Total
Number of total surveyed Households /Units	43
Number of total Population	165
Average HHs Size	3.85

Source: Field survey of AECL Team

4.14.2 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.

4.14.3 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 4.30: Distribution of HH population

SL No.	Number of household members	Total	
		HH	%
1	1 to 2	14	32.55
2	3 to 4	25	58.15
3	5 to 6	3	6.98
4	7 to 8	1	2.32
5	9 to 10	0	0
6	10+	0	0
	Total	**43**	**100**

Source: Field Survey of AECL Team

4.14.4 Age and Sex Distribution of project area Population

Age-sex distribution of the surveyed 43 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 4.31.

Table 4.31: Age Sex Distribution of Surveyed Population

SL	Age Group (Years)	Male		Female		Total	Overall
			%		%		%
1	01 to 05	0	0	2	2.74	2	1.21
2	06 to 15	16	17.39	11	15.07	27	16.36
3	16-30	25	27.17	20	27.40	45	27.27
4	31-60	46	50	36	49.31	82	49.70
5	61-65	2	2.17	2	2.74	4	2.42
6	Above 65	3	3.26	2	2.74	5	3.03
Total		**92**	**100**	**73**	**100**	**165**	**100**

Source: Field Survey of AECL Team

4.14.5 Sex Profile of Project Area Households

The percentage of male populations are greater than female in the project area. At project area total of 165 populations will be surveyed where 92 are male and 73 are female, which represents that percentage of female population in the project area is less compared to the male population.

4.14.6 Marital Status

Among the 165 surveyed population around the project area, 131 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.

4.14.7 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.

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

Education level of the surveyed population is presented in the table below. Among the surveyed 165 populations, 161 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 primary and secondary level education entrance is high in the area and considered the people above the age of 6 (161 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 4.32: Level of Education of Surveyed Population (6 Years and above)

SL	Education Level	Male (%)	Female (%)
1	Up to class five	21.83	19.13
2	Class six to ten	16.19	26.09
3	SSC or equivalent	19.01	10.43
4	HSC or equivalent	12.68	15.65
5	BA or equivalent	4.23	3.48
6	MA or equivalent	0	0
7	Illiterate	12.68	8.70
8	Can sign only	13.38	16.52
	Total	**100**	**100**

Source: Field Survey of AECL Team

4.14.9 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 4.33: Distribution of Surveyed People by occupation (15 years and above)

SL No.	Occupation	Male	Female	Total	%
1	Agriculture	32	14	46	27.88
2	Service holder	1	0	1	0.60
3	Housewife/Househusband	0	43	43	26.06
4	Business	12	0	12	7.27
5	Day labour	17	1	18	10.91
6	Driver	11	0	11	6.67
12	Student	17	12	29	17.57
13	Aged Person	1	3	4	2.42
14	Retired Person	1	0	1	0.60
	Total	**92**	**73**	**165**	**100**

Source: Field Survey of AECL Team

4.14.10 Drinking Water Facility

In project area surrounding, 80.6% of general households have got the facility of drinking tube well water, 7.0% tap water and the remaining 9.03% household gets water from other sources.

Table 4.34: Drinking Water Facility of surveyed HHS

SL	Drinking Water source	Total	
		No.	%
1	Tube well	36	83.7
2	Tap water	3	6.98
3	Other sources	4	9.30
	Total	**43**	**100**

Source: Field survey of AECL team

4.14.11 Sanitation

In the transmission line area, 55.8 % of general household use sanitary facility, 32.55% non-sanitary latrine and 11.6% have no toilet facility.

Table 4.35: Sanitation Facility of surveyed HHS

SL	Sanitation Facility	Total	
		No.	%
1	Proper sanitary latrine	24	55.8
2	Non- sanitary latrine	14	32.55
3	No toilet facility	5	11.6
	Total	43	100

Source: Field survey of AECL team

4.14.12 Access to Electricity

The entire Chhagalnaiya Upazila have brought under the Rural Electrification Program. However, a total of 79.6% of the survey households in project area reported to have electricity connection. (Source: Field survey of AECL team)

Chapter 5

5. IDENTIFICATIONS AND EVALUATION OF POTENTIAL IMPACTS

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 EIA, 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.

5.2 Scoping of Impacts

Identification of potential impacts due to the Pre-construction, construction and operation of the Project has been conducted using checklist/impact interaction matrix.

5.2.1 Checklist

Table 5.1 represents the checklists developed for pre-construction, construction and operation of the project. In this checklist, actions, which may affect at the various stages of the project activities, are listed and the degrees of Significant Environmental and Social Impacts (SESIs) are shown. Though the project is in an existing condition, impacts that generally believed to occur at the pre-construction, construction stages and operation stages.

The magnitude combines the impact characteristics of Extent, Duration and Impact Scale is a multiplicative factor of these three criteria set. Based on this understanding magnitude of impact is assessed as per the **Table 5.1.**

Table 5.1: Assessing Magnitude of Impact

Extent	Duration	Impact Scale	Magnitude
Local	Short term	No impact	None
Regional	Short term	No impact	None
National	Short term	No impact	None
Local	Medium term	No impact	None
Regional	Medium term	No impact	None
National	Medium term	No impact	None
Local	Long term	No impact	None
Regional	Long term	No impact	None

Extent	Duration	Impact Scale	Magnitude
National	Long term	No impact	None
Local	Short term	Small	Minor
Regional	Short term	Small	Minor
Local	Medium term	Small	Minor
Local	Short term	Medium	Minor
National	Short term	Small	Minor
Local	Long term	Small	Minor
Local	Short term	Large	Minor
Regional	Medium term	Small	Minor
Regional	Short term	Medium	Minor
Local	Medium term	Medium	Minor
National	Medium term	Small	Moderate
National	Short term	Medium	Moderate
Regional	Long term	Small	Moderate
Regional	Short term	Large	Moderate
Local	Long term	Medium	Moderate
Local	Medium term	Large	Moderate
Regional	Medium term	Medium	Moderate
National	Long term	Small	Moderate
National	Short term	Large	Moderate
Local	Long term	Large	Moderate
National	Medium term	Medium	Major
Regional	Long term	Medium	Major
Regional	Medium term	Large	Major
National	Long term	Medium	Major
National	Medium term	Large	Major
Regional	Long term	Large	Major
National	Long term	Large	Major

Table 5.2: Environmental and Social Impact Identification and Evaluation 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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
Pre-construction Phase																	
Land Acquisition and Resettlement																	The total 60 acres for this proposed mill area is owned by USML, so there is no land acquisition and resettlement issues. But the T/L footing area needs to be acquired.
Disruption of Earth Surface																	Cutting and filling method will be applied to maintain the ground level above flash flood water level within the USML boundary.
Impact on ecological habitats																	Due to land development work, there will be temporary impact on ecological habitat
Solid Waste Generation																	Due to land development work a small amount of vegetation and wooden debris will generate
Indigenous people																	No existence of indigenous people within 5km radial

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	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.
Land Use																	No impact on land use as the project mill area land is a vacant land. But due to T/L footing area vey minimum amount of agricultural land will be lost.
Impact on Soil quality																	Accidental spillage of different chemicals and hazardous substances may occur occasionally during

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	construction activity which may degrade soil quality
Impact on Surface Water																	Improper management of soil, sand and other fine materials and surface runoff from the site may negatively impact surface water quality
Impact on Ground Water																	Improper management of liquid and sanitary waste and accidental spillage of different chemicals and over extraction of ground water may impact negatively
Impact due to Solid Waste																	Generation of different kinds of solid waste, office waste from constructional work.
Hazardous Materials Managements																	Accidental spillage of liquid fuel, lubricants, other chemical and generation of e-waste may occur occasionally.
Traffic and Transportation																	Transportation of construction materials and personnel may create traffic congestion and occasional

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	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 labourers 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

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
Community Health, Safety and Security																	Possibility of occurring accidents due to lack of safety and security, increased traffic, 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.
Loss of livelihood																	As the project land is owned by USML and there is no agricultural land inside the project boundary, so there will be loss of livelihood
Impact on vulnerable group and gender issue																	Due to construction work a group of people such as very young, poor, pregnant women and older person can

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	become vulnerable to air pollution
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																	Emission from induction furnace, raw material handling may affect the ambient air quality.
Noise Hazard																	Noise may be generated from the sources like material transportation, rolling mill, casting machine, traffic etc.
Impact on Soil Quality																	Improper storage of raw material and disposal of hazardous waste may put negative impact on soil quality
Impact on Surface Water																	Poor management of sewage and the waste water from metal cooling process may

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	deteriorate surface water quality
Impact on Ground Water																	Over abstraction of ground water, accidental spillage of oil or Hazardous substances
Impact due to Solid waste																	Improper management of solid waste from steel mill
Impact due to Liquid waste generation																	Waste water from metal cooling process and sanitation will be generated
Hazardous Materials Managements																	Generation of used lubricating oil from the mill and improper handling of slag waste and other hazardous waste (i.e., fuel oil, chemical) may occur.
Traffic and Transportation																	Transportation of different materials and personnel may create traffic congestion
Impact on Terrestrial Habitat																	Terrestrial ecosystem may get disturbed due to project operation (i.e., air, noise, soil pollution, lighting etc.). Risk of bird collision 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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	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 work. malfunctioning of machinery and falling objects from height etc. 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

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
																	infectious diseases. Generation of noise and air pollution may cause health impact. Transmission line may pose potential hazards such as electrocution etc.
Social acceptability of workers to the host communities																	Acceptability problem of Local community may occur due to cultural difference with workers & officials
Loss of livelihood																	There will be no loss of livelihood in the project area but there will be negative impact on livelihood in the transmission line area. As there are some agricultural lands in the transmission route area.
Impact on vulnerable group and gender issue																	Negative impacts on vulnerable group due to pollution from mill operation and the gatherings of migrant workers can lead to the risk of gender oriented/sexually transmitted diseases.

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	Sm	Med	Lar	Neg	Min	Mod	Maj	Adv	Ben	
Employment Generation																	Major employment opportunity during operation phase
Social and Economic enhancement																	Benefit to local economy due to continuous steel production, employment, community development.

Notation

ST	Short Term (Only during particular activities or a phase of the project lifecycle)		Med	Medium	
MT	Medium Term (Spread across several phases of the project lifecycle)		Lar	Large	
LT	Long Term (Spread over the lifecycle of the project)		Non	None	
L	Local (around the project area within 5 km radius)		Min	Minor	
R	Regional (District level)		Mod	Moderate	
N	National		Maj	Major	
NI	No Impact		Adv	Adverse	
Sm	Small		Ben	Beneficial	

Chapter 6

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 steel mill 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.

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

During the pre-construction phase key activities include-

i. Cutting and filling of the main steel mill land;
ii. Vegetation clearance of the main mill land;
iii. Boundary work around the main mill area;
iv. Land acquisition for transmission line area after finalization of the route by BPDB.

Among the above-mentioned activity, the Company has already started to construct a temporary boundary around the main mill area. For the transmission line USML applying for the approval of the final route of the transmission line from the Power Grid Company of Bangladesh.

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 proposed mill and substation is 60 acres which is non-agricultural vacant land. The total 60 acres land for the proposed steel mill is owned by USML, so there is no land acquisition and requisition issues and no mitigation measures required for main mill land. But the transmission line tower footing area land is not owned by USML. A trio party agreement had been made among PGCB-BPDB & UNITEX for constructing a double-circuit transmission line to facilitate power transfer from the Korerhat 400/230kV grid substation to the Unitex 230/33kV substation. The final route of the transmission line is subject to approval from the Power Grid Company of Bangladesh. Once USML receive T/L route approval, they will proceed with the acquisition of the necessary land while adhering to all local rules and regulations.

Proposed Mitigation Measures

- ✓ All affected people should get compensation for the acquisition of proposed T/L footing land as per Acquisition and Requisition of Immovable Property Act 2017 (ARIPA) and Electricity Act 2018;
- ✓ The TL activities should be initiated after compensating properly to the affected people.
- ✓ Establishing a grievance redress mechanism prior to TL land acquisition and compensation;
- ✓ Prioritization employment of local people at different phases of the project;
- ✓ Prior notification before land development of T/L area so that crop harvesting does not get impacted.

6.2.2 Disruption of Earth Surface

During the land development work cutting and filling method will be initiated within the project boundary. Due to land development work, particulate matter in the air may increase. 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.

Proposed Mitigation Measures

- ✓ Regular sprinkling of water will be done on open surface and dust grounds.
- ✓ Project should be designed considering key criteria of landscape;
- ✓ Altered green area can be turned into its previous visual quality to an extent possible by plantation of local trees.

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 and mitigation measures should be taken to conserve the aquatic ecology of the canal.

According to the field survey, 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 and are locally available everywhere around the project area. Any endangered, vulnerable or threatened faunal species were not found during the field visit around the main mill area.

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;
- ✓ Proper boundary work should be implemented. 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 terrestrial fauna and habitat. 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. Bright lights should be avoided and LED lights should be installed;
- ✓ Lights of the construction area should install downwardly to avoid disturbance to the faunal species and birds.

6.2.4 Solid Waste

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 by consulting with Local Union Prishad Chairman;
- ✓ 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 (i.e., plastic) will be minimized where practicable.

6.2.5 Indigenous People

There are no indigenous people in and around the vicinity of the project area. So, there is no impact anticipated 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, the following activities related to levelling of site, installation of Furnaces, Rolling Mill, continuous casting mill, fume treatment plant, DG sets, tower footing, installation of towers, construction of mill and office buildings and other associated facilities, etc. are the main works that will be done.

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;
- ✓ Construction material and sand storage may cause air pollution;
- ✓ Poorly Paved Service Road inside project boundary;
- ✓ Exhaust Emission from DG sets, machineries and vehicles.

❖ **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 local plants;
- ✓ 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;
- ✓ The construction activity will be carried out during day time only (from 7.00 am to 7.00 pm);
- ✓ 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;
- ✓ All vehicles should have updated fitness certificate;
- ✓ Regular maintenance of vehicles should be conducted; and
- ✓ Solid waste burning in the project site is strictly prohibited.

6.3.2 Impacts on Acoustic Environment

The proposed steel mill will be located in an area with a rural character which is near the locality. 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, Graders, bulldozers, dump trucks, rock breaker, cranes 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:

- ✓ The major sources of noise during the construction phase are vehicular traffic, construction instruments i.e., Concrete mixers, vibrators, Excavators, Cranes etc.;
- ✓ Construction activities including construction of mill, operation of earthmoving and excavation equipment, construction of office buildings, substation and transmission footing;
- ✓ Operation of DG sets;
- ✓ Piling work during construction activity will generate noise.

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);
- ✓ 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;
- ✓ 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;
- ✓ Project boundary wall should be constructed more than man height which will dampen the noise level.

6.3.3 Change in Land use pattern

No impact on land use pattern of main mill area as the land is a non-agricultural vacant land but the proposed transmission line route land is an agricultural land. Due to construction of transmission tower footing very little amount of agricultural land will be lost.

Proposed Mitigation Measures

- ✓ Compensation will be paid to the land owners for the land permanently acquired for the T/L area.
- ✓ 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 during finalization of the TL route;
- ✓ 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;
- ✓ 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;
- ✓ 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.

6.3.5 Impact on Surface Water

The proposed project may affect natural drainage, surface water quality if not managed the construction works properly. There could be siltation in water system or drainage from uncovered piles of soil. During construction phase waste water from constructional work may reach the surrounding water body through surface runoff which may degrade the surface water quality. Blockage of natural drainage system may occur due to siltation from surface runoff.

As the Muhuri and Feni River is just 0.87 km and 1.7 km away from the project site respectively, so except during river flooding there will not be any negative impact on river water due to project activity.

The project authority is planning to install 16 septic tanks for treating and disposing sanitary waste water from the project site during construction phase. The capacity of each septic tank is 5.8m^3 and their dimension is 3.04 mX1.5mX 1.27m. Sludge will be disposed once in a year. Detail drawing and design of the proposed septic tank is provided in figure 6.1.

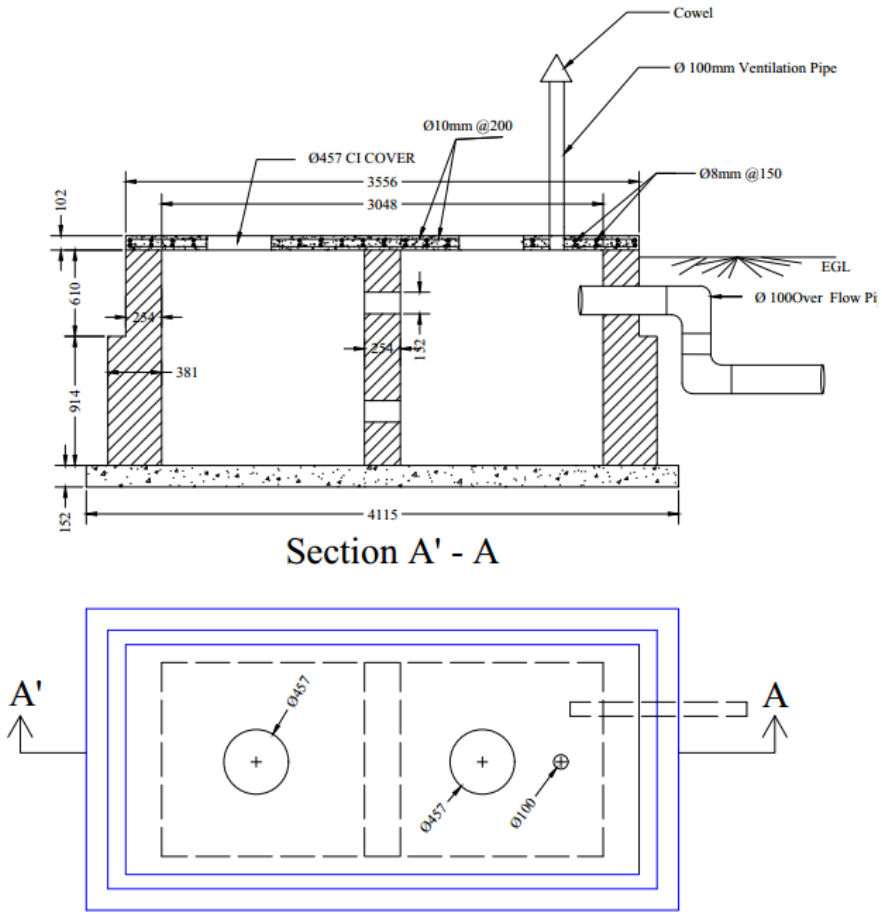


Figure 6.1: Proposed Project Septic Tank Layout

Proposed Mitigation Measures

- ✓ 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;
- ✓ Temporary silt trap should be provided at project boundary;
- ✓ 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;
- ✓ Containment of sanitary waste should be adequately disposed of to avoid surface and ground water contamination;
- ✓ There will be 16 septic tanks each having 1.42 m^3 capacity;
- ✓ 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 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.

USML has already installed a tube well in the project boundary near the temporary office shed. During construction phase, for drinking and sanitation purpose they will use the ground water and for construction work they will dig a bore well.

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;
- ✓ 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 several labourers will be engaged in different constructional work. kitchen waste and sewage waste will be generated within the project site. If these are not handled properly then it may impact the surrounding environment negatively.

Proposed Mitigation Measures

- ✓ Segregate all wastes, wherever practical according to the waste management plan;
- ✓ Some temporary bins with color coding indicating degradable and non-degradable waste might be installed at 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 proponent should be committed to ensure construction materials left over at the end of construction will be sold or donated or recycled/reused to the other 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;
- ✓ 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;
- ✓ Waste movement registrar should be maintained;
- ✓ Hazardous waste will not be mixed with other solid waste generated.

6.3.8 Traffic and Transportation

During construction phase the project proponent may use the adjacent road from Dhaka- Chattogram highway to the project site for transportation of construction material, machineries and other equipment. But it may create heavy traffic in this road and the design year traffic value is also higher than the saturation level, shown in section 4.9. That is why USML is planning to construct a 25m width bituminous road for transportation of raw materials, End products and other equipment. This new proposed road will connect the project site with Dhaka -Chattogram highway. This new road will be constructed from the northern side of the project boundary and will be used by the USML authority only.

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:

- ✓ USML'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 for all vehicles by USML;
- ✓ Avoid transportation of materials and machinery during the peak traffic periods;
- ✓ Stick to agreed traffic routes, 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;

- ✓ Speed limits, Proper signage, visibility and traffic awareness and pedestrian safety should be followed by the drivers.

6.3.9 Impact on Terrestrial Habitat

According to the field survey, 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 steel mill area. There will be no habitat loss due to this project implementation.

Activities during construction phase such as excavation, heavy earthwork, machineries installation, construction of associated facilities may generate some negative impact on project area terrestrial habitats i.e., fugitive emission and deposition on vegetation may lower the rate of photosynthesis, fauna could be adversely affected through construction-related activities (noise, dust, light pollution, and habitat loss).

Excessive noise might be generated from different construction activities at the Project site. Moreover, human activities for construction works and vehicular movement may also create disturbance to the fauna. In addition, small fauna including common toad, bullfrogs, lizards, common tailorbirds may get disturbed.

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;
- ✓ Water sprinkling for dust suppression;
- ✓ The construction site should be fenced or bounded by a boundary wall;
- ✓ Awareness should be built to the workers in favor of conserving fauna;
- ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Bright lights should be avoided and LED lights should be installed;
- ✓ Lights of the construction area should install downwardly to avoid disturbance to the faunal species and birds;
- ✓ Noisy construction works to be limited to day time hours (from 7.00 am to 7.00 pm);
- ✓ 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 an isolated zone;
- ✓ Where applicable and possible exceptionally noisy machines to be fitted with noise reduction devices.

6.3.10 Impact on Aquatic Habitat

As the Muhuri and Feni River is just 0.87 km and 1.7 km away from the project site respectively, so except during river flooding there will not be any negative impact on river water due to project activity. There is a canal inside the project area.

Source of impacts include:

- ✓ 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.

Proposed Mitigation Measures

- ✓ Wastewater from construction site should not be disposed-off in natural water bodies without proper treatment;
- ✓ Suggested waste management and disposal 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, debris and fuel should be stored on paved surfaces under covered areas.

6.3.11 Impact due to Hazardous waste

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.

- **E- Waste**

A variety of E-wastes will be generated during the construction of the main mill 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.

Proposed Mitigation Measures

- ✓ All hazardous materials will be provided in a secondary containment;
- ✓ The oil storage of the project (fresh and used) should be done on hard standing floor and roofing with a secondary containment facility of 110% bigger than the allowable maximum storage capacity;
- ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types;
- ✓ Skilled labors should be appointed for unloading the work;
- ✓ An appropriate storage site should be provided for disassembled spare parts (e.g. motors and spare parts) that contain oil or other types of fluids;

- ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types;
- ✓ Spent lubricating oil and other old parts of machinery will be sold only to the DoE approved vendors;
- ✓ 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;
- ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring;
- ✓ Electrical waste should be recycled;
- ✓ All metals, scrap, e-waste and other recyclable materials shall be recycled to secondary dealers and records shall be maintained. Other solid wastes will be disposed to the designated municipal solid waste dumping site.

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. Moreover, other infectious or contagious disease like COVID can cause adverse situation at the site.

Proposed Mitigation Measures

- ✓ USML to provide first aid facilities to the labourers and all project personnel whilst working on the project;
- ✓ The USML should provide treatment facilities and pay compensation according to Bangladesh Labor Law 2006 if any accident occurs;
- ✓ All workers will be properly informed, consulted and trained on health and safety issues;
- ✓ A permit to enter project site will be established to ensure entry of only authorized persons
- ✓ Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate ear plugs, safety shoes, safety eyewear, and hard hats (figure 6.2);
- ✓ 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;
- ✓ 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;
- ✓ Supervision of works shall be done regularly to ensure that safety conditions are met;
- ✓ An understanding has to be built with a local hospital for the emergency incident related to the worker's health;
- ✓ In addition, necessary steps to be taken for arrangement of ambulance service in the project area to support any emergency medical aid and shifting to the hospital/ medical Centre.

Figure 6.2: 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 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 authority will install 16 septic tanks onsite of 5.8 m^3 capacity each. The sewage waste is also transferred at a regular interval. Sewage water is discharged at city sewerage line after treating in septic tank. During construction phase for drinking and sanitation purposes project proponents will use ground water.

Proposed Mitigation Measures

- ✓ Proper sanitation system should be provided and at the same time, regular, proper and safe disposal of human waste should be ensured;
- ✓ 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;
- ✓ Adequate number (1:15) of toilets and bathrooms should be made for the workers and staffs.
- ✓ Separate Male and female toilets should be available;
- ✓ Safe drinking water should be available which should meet national and WHO drinking water standards.

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.

Proposed Mitigation Measures

- ✓ The Proponent 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 USML authority;
- ✓ Leave for illness, maternity, vacation or holiday should also be maintained by the proponent which should be ensured by the USML authority;
- ✓ Child labor and forced labor should strictly be prohibited;
- ✓ Discrimination between male and female labors should be prohibited;
- ✓ Establish internal (worker's) grievance mechanism which should be accessible to all project employees/ workers as well as those hired by the proponents.

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;
- ✓ The Proponent will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the USML authority;
- ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 12;
- ✓ The Proponent 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;
- ✓ All wastes should be properly handled and disposed to avoid any outbreak of disease.

6.3.17 Loss of Livelihood

The project is going to be set on USML's own land. No settlements or agricultural land is inside the project site. so, there won't be any loss of livelihood due to construction of the project.

6.3.18 Impact on Vulnerable Groups and Gender Issues

Populations found to be particularly vulnerable to environmental pollution include the poor, the elderly, the very young, those already in poor health, and/or indigenous populations. Susceptibility of unconventional relations between the migrant laborers and local vulnerable women may lead to the risk of gender oriented/sexually transmitted diseases like HIV/ AIDS and STI. Gender related facilities for the women in general, will include pregnant women, lactating mothers, elderly and disabled people who will be working in the project area. Necessary facilities for the women and men including disabled and elderly people will need to be provided. Moreover, during construction, when air pollution levels increase in an area, vulnerable individuals like the elderly, the sick, and the very young might experience health problems like- heart or lung diseases, asthma and bronchitis, increased susceptibility to respiratory and cardiac symptoms. Based on the discussion above the impact on Vulnerable Groups and Gender Issues is assessed to be Minor.

Proposed Mitigation Measures

- ✓ The needs of women and vulnerable groups (VGs) should be identified properly and special attention should be given to them;
- ✓ Employment and income of subsistence to improve VGs' status/livelihoods;
- ✓ Potential VG members should be engaged as unskilled laborers during the construction period;
- ✓ Provision should be kept for social and economic development support;
- ✓ Creating income generating opportunities for the vulnerable population;
- ✓ No discrimination of wages for male and female laborers/workers for similar work;
- ✓ Provisions of time-to-time mandatory training and awareness buildings for the workforce to as precautionary measures for anti-social activities those includes sexual harassment and gender-based violence, women trafficking communal diseases etc.

6.3.19 Employment Generation

One of the main positive impacts during the construction phase will be the availability of employment opportunities especially to casual workers 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 local residents for both technical and non-technical positions.

6.3.20 Increase in local business

There will be development of Local Infrastructure during construction phase. Local business will also be improved. Business opportunities such as tea-stalls, eating joins 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 a large number of 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.

6.4 Impact during Operation Phase

The environmental impacts during operation phase may arise from: Air Emission, Noise generation, Waste water discharge, Solid and hazardous waste generation, etc. All these emissions, discharges & disposals are associated with direct environmental impacts and indirect /secondary impacts in the form of negative impact on the project workers and on the surrounding population. The source of emission will be mainly in form of fugitive emission and point source. Waste water will be generated from production process.

6.4.1 Impact on Air quality

The major sources of air pollution from the operation of the proposed steel mill are emission from Furnace, DG sets, stack, handling and transportation of raw materials, traffics, etc. The fugitive dust can have adverse impact on air quality inside the project boundary and its immediate surroundings.

The proposed steel mill can generate major pollutants of potential concern are oxides of nitrogen (NO_X), oxides of Sulphur (SO_X) and SPM. There will be no gaseous emission from the proposed transmission line area.

- **Nitrogen Oxides (NO_x) Emissions from the Proposed Steel Mill**

Burning of fossil fuels at high temperature generally produces two forms of nitrogen oxides-nitric oxide (NO) and nitrogen dioxides (NO_2); commonly referred to as nitrogen oxides (NO_x). In steel mill 50% NO_x generated from EAF furnace. Once the NOx enters the atmosphere, it reacts with oxygen in the air and oxidizes to NO_2 with passage of time. Certain members of this group of pollutants, especially nitrogen dioxide (NO_2), are known to be highly toxic to various animals as well as to humans. Humans exposed to high concentrations suffer lung irritation and potentially lung damage. Increased respiratory disease has been associated with lower-level exposures.

- **Sulphur Oxides (SO_x) Emissions from the Proposed Steel Mill**

  In most cases, sintering process is responsible for approximately 90% of SO_2 emissions from the Steel mill production. As a result, sintering is the largest contributor to air pollution during the BF/BOF steel manufacturing process. But, steel manufacturing via electric arc furnace (EAF) produces substantially lower quantities of criteria air pollutants due to the elimination of sintering, coking, and BF processes as well as use of electricity instead of fossil fuels for the most energy-intensive step within steel manufacturing. Short-term exposures of asthmatic individuals to elevated levels of SO2 while exercising at a moderate level may result in breathing difficulties, accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. It can also contribute in acid rain effects.

- **Suspended Particles Emissions from the Proposed Steel Mill**

  Major source of dust particles in steel production is from blast furnace. As blast furnace generate 65% of suspended particles. But in the proposed steel mill project, they will be used EAF for steel manufacturing process, which will produce substantially lower quantities of SP as the use of electricity instead of fossil fuels. Apart from this dust will be generated from raw material handling and from Fume Treatment plant. The dust particle emission rate from the FTP will be quite low. Exposure to such particles can affect both your lungs and your heart.

- **Carbon Monoxide (CO) Emission**

  Carbon monoxide (CO) is generated when incomplete combustion takes place. The main source of CO in the steel production is from iron ore preparation. But the proposed project will use scrap as a raw material and iron ore preparation is absent in the proposed process. So, the emission rate of CO will be low

❖ **Suggested Mitigation Measures**

The proposed steel mill will be constructed with a modern design and sophisticated machinery setting. The NOx, SO_x and suspended particle emission from the steel mill will be kept at a minimum. So, all raw emission data from the exhaust will be well within the acceptable limit of Bangladesh and IFC/WHO. The proponent will install an FTP to treat the fume gas before releasing it to the atmosphere. Flue Gas Emissions from the EAF and ladle furnace will be directed through the Fume Treatment Plant (FTP) before release it in the environment. Details of the FTP proposed by USML is discussed in section 3.8.1.

The proposed steel mill will contribute very negligible amount of air emission to the surrounding pollution comparing to the air existing emission source in the study area. For the well dispersion of the hot air from the FTP, the project authority will construct 30m high stack from the ground level. The stack heights have been designed to facilitate undisturbed and free dispersion of the emitted air pollutants. Exhaust gas sample extraction facilities shall be installed for emission monitoring on each stack.

❖ **Air Modeling**

An effect on ambient air quality has been assessed based on preliminary air quality modeling results. An advanced air emission dispersion modeling has been conducted for determining the ground concentration of

pollutants from the stack emission. In the study, the NO_x, SOx and SPM emissions from the stack exhaust system were modeled to obtain maximum possible downward ground concentration. USEPA approved AERMOD view version 10.0.1 model was used to estimate emission concentration from the plant. AERMOD view is a Gaussian plume model that incorporates source-related factors, meteorological factors, receptors, terrain and building downwash factors to estimate pollutant concentration from continuous point source emission.

The use of site-specific meteorological data has been collected from the Lakes Environmental, Canada, who has provided 1 Year of MM5-Preprocessed site-specific Meteorological data for the period of Jan 01, 2022 to Dec 31, 2022 at Latitude: 22°56'46.03"N, Longitude: 91°30'56.06"E, Time Zone: UTC +6. These data contain hourly value of wind speed & direction, wind velocity, surface roughness, Bowen ratio, albedo, temperature & reference height, precipitation rate, relative humidity, surface pressure and cloud cover over the period mentioned above. The data then have been analyzed and processed through MET processing model AERMET View which uses Samson format to process the data and create surface met data file & profile met data file computable to the AERMOD 10.0.1 view dispersion model. This surface met data file & profile met data file were then used in AERMOD view as Met input data for calculation. The parameters and corresponding values are summarized in the **Table 6.1** below:

Table 6.1: Summary of the exhaust specifications and model input data

Parameters	Values
Stack height	30 m
Stack inside diameter	4.5 m (Exhaust pipe diameter)
Stack Location	22°56'46.03"N, 91°30'56.06"E
Number of stacks	1
Stack exit velocity	10 m/s
Exhaust temperature	20^0C
Emission rate of Dust	3.06 m^3/s
NOx emission rate as NO_2	6.64 m^3/s
SO_x emission rate as SO_2	5.11 m^3/s
Ambient Temperature	30 ^{0}C

The model assumes the stack tip downwash with receptors on flat terrain and no flagpole receptor heights. The NOx, SO_x and SPM concentration contour has been analyzed with 1000 m interval with a radius of 10000m from the point source. Emission contour map showing the NOx, SO_x and SPM concentration for 24-hour average and Annual average at 10km radius of the project location are shown in **Figure 6.3** - **Figure 6.8**.

❖ **Stack Emission Analysis**

NO_2 concentration:

The NO_2 concentration contour of 24 hour and annual average of stacks have been analyzed. The maximum of 24 hours concentration of NO_x has been predicted 4.0- 2.0 µg/m^3 at a radius of 1-2 km west,

whereas the concentrations is within 1.0-0.1 µg/m^3 at other sides from 3km to 10 km around the project site. The maximum annual concentration of NOx has been detected as 0.4-0.2 µg/m^3 at around 1-2 km west to the project site. The concentrations have been detected within 0.10-.020 µg/m^3 on either side beyond this radius up to 10 km.

The Bangladesh standard set for 24 hours concentration for NOx is 80 µg/m^3 and the maximum 24 hours concentration of NOx has been detected below 5 µg/m^3. The maximum yearly concentration of NOx has been detected (below 0.1 µg/m^3) well below the IFC/WHO (40 µg/m^3) and Bangladesh standard (40 µg/m^3) at all sides at any radius around the project.

SO_2 concentration:

The SO_2 concentration contour of 24 hour and annual average of stacks have been analyzed. The maximum of 24 hours concentration of SO_2 (2 µg/m^3) has been predicted at a radius of 1-2 km west, whereas the concentrations are within 1.0-0.10 µg/m^3 at the other sides of the project up to 10 km radius to the project site. The maximum annual concentration of SO_2 has been detected as 0.30-0.10 µg/m^3 at around 4 km west and 1 km north and south to the project site. The concentration has been found below 0.07 – 0.02 µg/m^3 on either side of the project beyond this radius up to 10 km radius.

There is no IFC/WHO and Bangladesh annual standard set for SO_2 for ambient air quality. The maximum annual concentration of SO_2 has been detected as 0.30-0.10 µg/m^3 around the 10km radius of the project. The 24-hour concentration of SO_2 have been found (2 µg/m^3) below the 24-hour standard of IFC/WHO standard (20 µg/m^3), 24-hour (80 µg/m^3) Bangladesh standard.

SPM concentration:

The SPM concentration contour of 24 hour and annual average of stacks have been analyzed. The maximum of 24 hours concentration of SPM (1.0 µg/m^3) has been predicted at a radius of 2.5km west, whereas the concentrations are within 0.8-0.10 µg/m^3 at the other sides of the project up to 10 km radius to the project site. The maximum annual concentration of SPM has been detected as 0.10-0.05 µg/m^3 at around 6 km west to the project site. The concentration has been found below 0.02 µg/m^3 on either side of the project beyond this radius up to 10 km radius.

There is IFC/WHO and Bangladesh annual standard set for SPM for ambient air quality. The maximum annual concentration of SPM has been detected as 0.10-0.05 µg/m^3 around the 10km radius of the project, which is below the both IFC/WHO standard (50 µg/m^3) and Bangladesh standard (35 µg/m^3). The 24-hour maximum concentration of SPM have been found (0.10 µg/m^3) below the 24-hour standard of IFC/WHO standard (75 µg/m^3) and 24-hour (65 µg/m^3) Bangladesh standard.

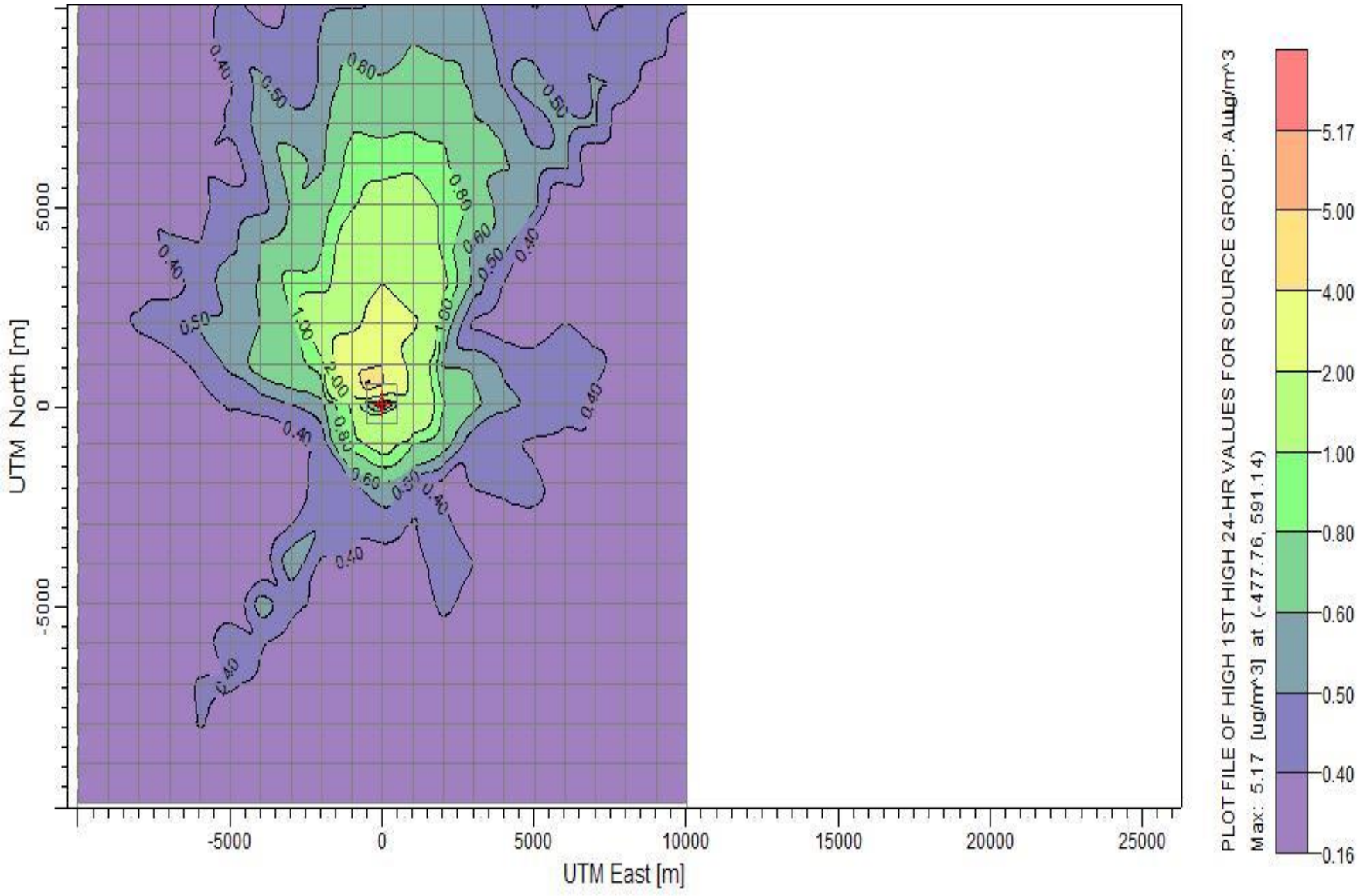


Figure 6.3: Emission contour map showing the NO_x concentration (24-hour average) at 10km radius of the project location

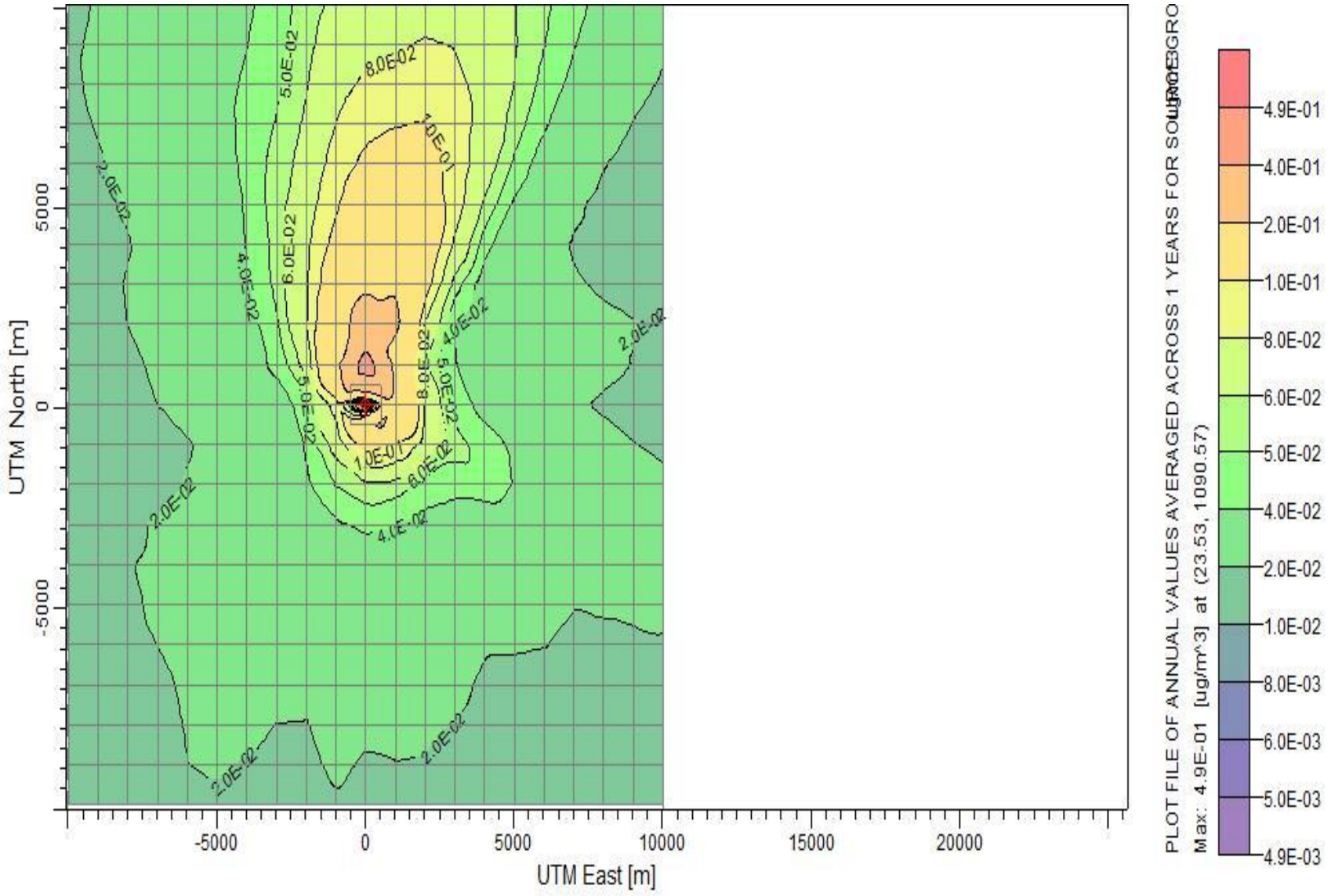


Figure 6.4: Emission contour map showing the NO_x concentration (Annual average) at 10km radius of the project location

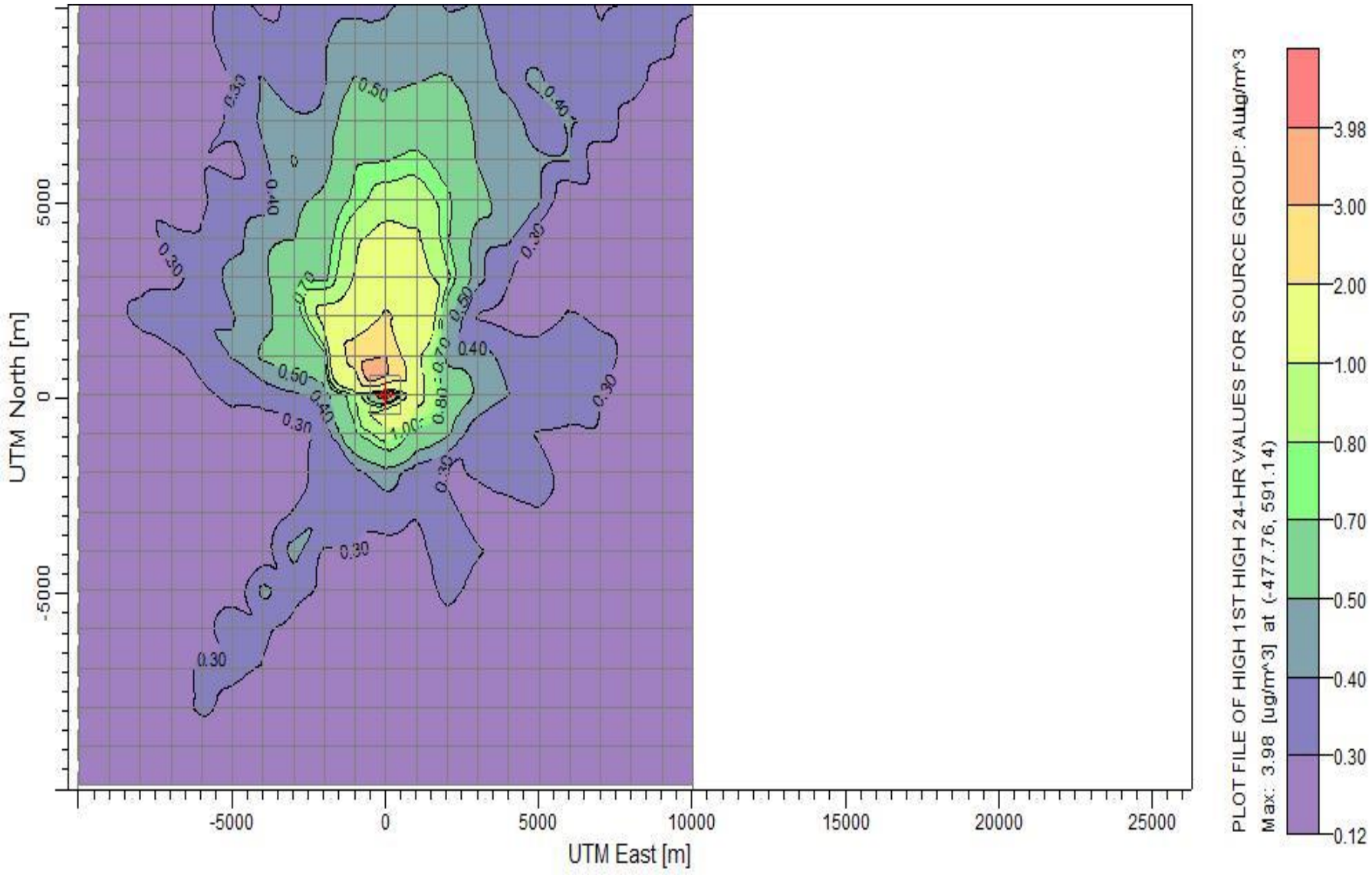


Figure 6.5: Emission contour map showing the SO_x concentration (24-hour average) at 10km radius of the project location

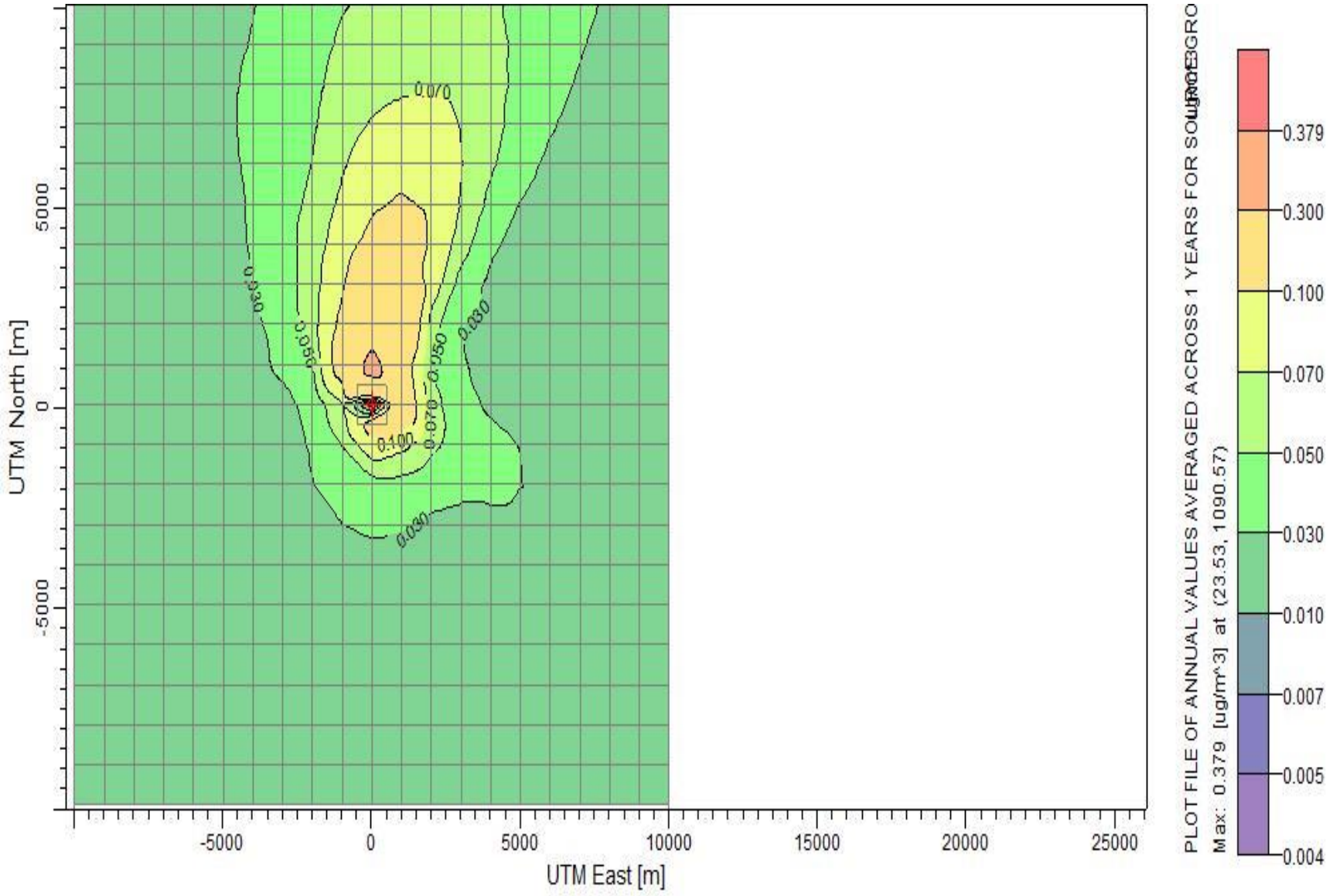


Figure 6.6: Emission contour map showing the SO_x concentration (Annual average) at 10km radius of the project location

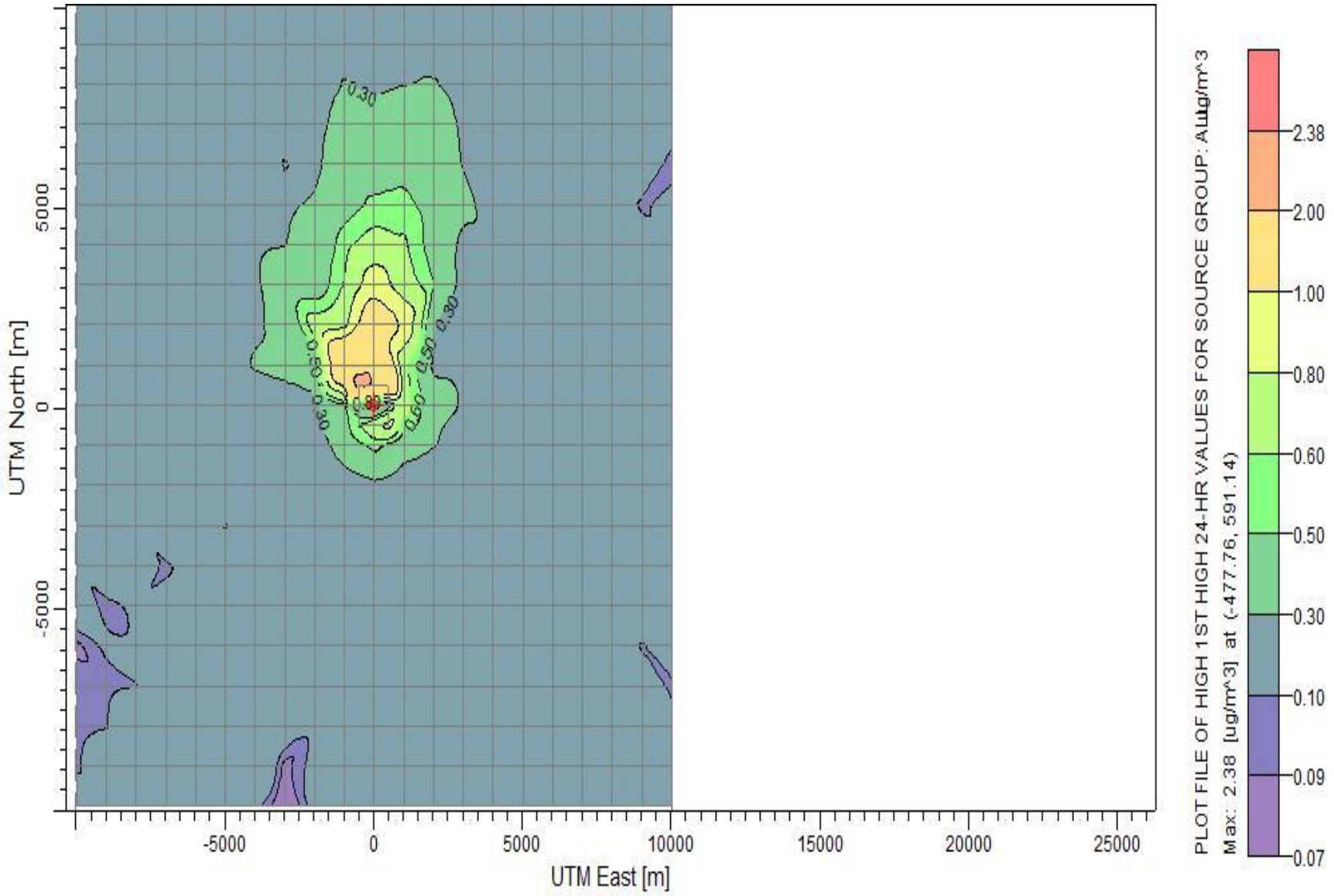


Figure 6.7: Emission contour map showing the TSP concentration (24-hour average) at 10km radius of the project location

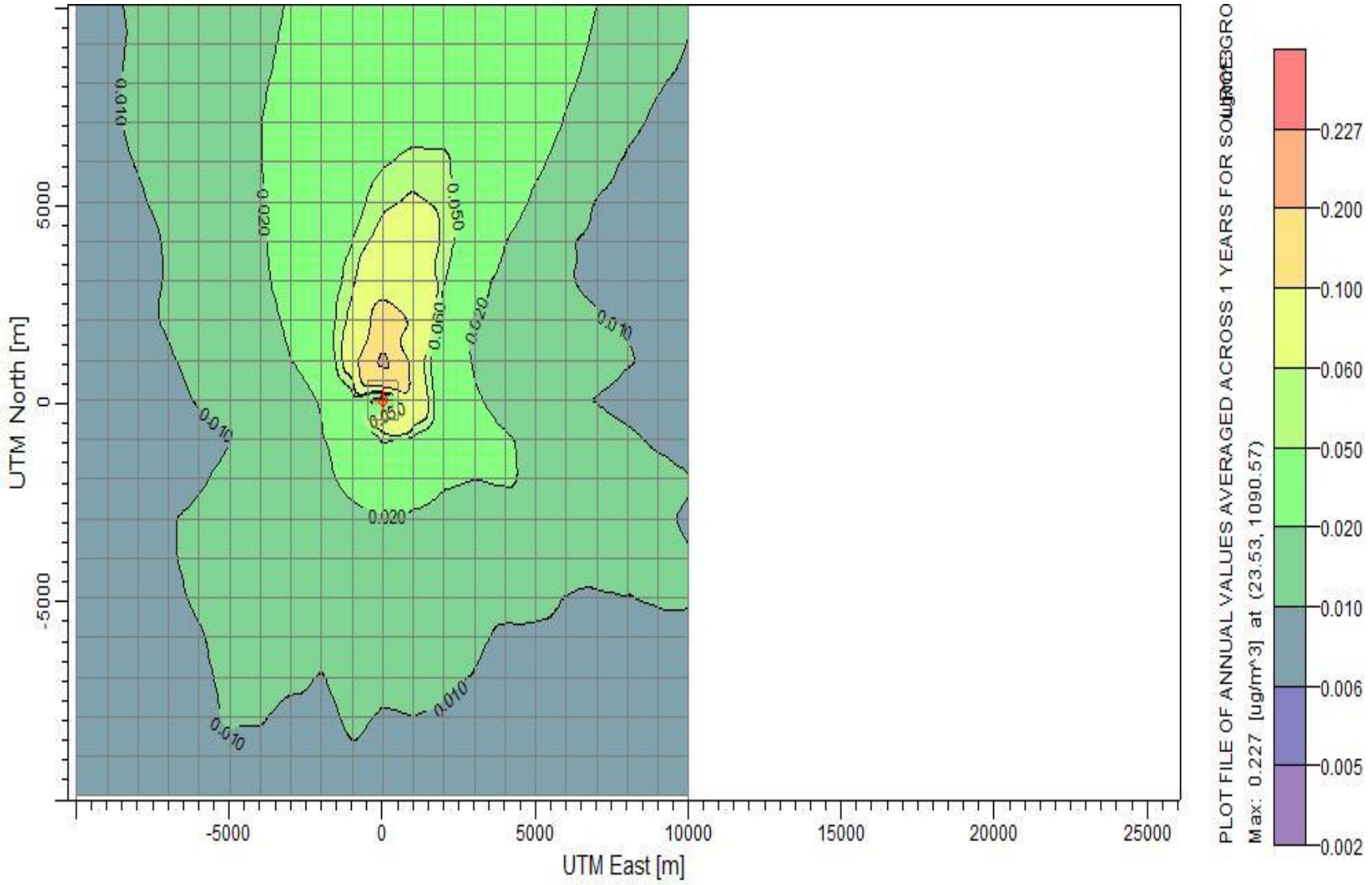


Figure 6.8: Emission contour map showing the TSP concentration (Annual average) at 10km radius of the project location

Table 6.2: Air pollutants concentration at various distances from the stack from Modelling

Direction	Distance	Value concentration (24-hour average)			Direction	Distance	Value concentration (Annual average)		
		NOx	SOx	SPM			NOx	SOx	SPM
North	1-2 km	0.6-1.0 µg/m^3	0.5-1.0 µg/m^3	0.3-0.8 µg/m^3	North	1-2 km	0.05-0.1 µg/m^3	0.03-0.2µg/m^3	0.02 µg/m^3
	3-4 km	0.4-0.6 µg/m^3	0.3-0.4 µg/m^3	0.1-0.3 µg/m^3		3-4 km	0.02-0.05 µg/m^3	0.01-0.03 µg/m^3	0.01 µg/m^3
	> 5 km	0.16-0.4 µg/m^3	0.12-0.3 µg/m^3	0.1 µg/m^3		> 5 km	0.01-0.02 µg/m^3	0.010 µg/m^3	0.006-0.01 µg/m^3
South	1-2 km	0.8-1.0 µg/m^3	0.8-1.0 µg/m^3	0.3-0.8 µg/m^3	South	1-2 km	0.08-0.1 µg/m^3	0.07-0.1 µg/m^3	0.02-0.06 µg/m^3
	3-4 km	0.5- 0.8 µg/m^3	0.4-0.8 µg/m^3	0.1-0.3 µg/m^3		3-4 km	0.02-0.08 µg/m^3	0.01-0.07 µg/m^3	0.01-0.02 µg/m^3
	> 5 km	0.16-0.5 µg/m^3	0.12-0.4 µg/m^3	0.1 µg/m^3		> 5 km	0.02 µg/m^3	0.010 µg/m^3	0.01 µg/m^3
East	1-2 km	0.6-1.0 µg/m^3	0.5-1.0 µg/m^3	0.3-0.8 µg/m^3	East	1-2 km	0.06-0.1 µg/m^3	0.05-0.1 µg/m^3	0.02-0.06 µg/m^3
	3-4 km	0.16-0.6µg/m^3	0.12-0.5 µg/m^3	0.1 µg/m^3		3-4 km	0.02-0.06 µg/m^3	0.01-0.05 µg/m^3	0.01.02- µg/m^3
	> 5 km	0.16 µg/m^3	0.12 µg/m^3	0.1 µg/m^3		> 5 km	0.02 µg/m^3	0.01 µg/m^3	0.006-0.01 µg/m^3
West	1-2 km	2.0- 4.0 µg/m^3	2.0-3.0 µg/m^3	1.0-2.0 µg/m^3	West	1-2 km	0.2-0.4 µg/m^3	0.1- 0.3 µg/m^3	0.1- 0.3 µg/m^3
	3-4 km	1.0-2.0 µg/m^3	1.0 µg/m^3	0.6-1.0 µg/m^3		3-4 km	0.1-0.2 µg/m^3	0.1 µg/m^3	0.1 µg/m^3
	> 5 km	0.5- 1.0 µg/m^3	0.3- 0.8 µg/m^3	0.3- 0.6 µg/m^3		> 5 km	0.06-0.1 µg/m^3	0.03- 0.1 µg/m^3	0.05-0.1 µg/m^3
Bangladesh standard for 24 hours concentration		80 µg/m^3	80 µg/m^3	65 µg/m^3	Bangladesh standard for annual concentration for		40 µg/m^3	NF	35 µg/m^3
IFC/WHO standard for 24hours concentration		NF	20 µg/m^3	75 µg/m^3	IFC/WHO standard for annual concentration		40 µg/m^3	NF	50 µg/m^3

In table 6.3, Primary data from table 4.15 is used to compare the total pollution in the proposed project area with the Bangladesh standards. The maximum 24 hours concentration of NOx, Sox and SPM has been detected as 4.0 µg/m3, 3.0 µg/m3 and 2.0 µg/m3 respectively in a pocket at a radius up to 1-2 km north to the project.

Table 6.3: Comparison Ambient air quality guideline for NOx, SOx and SPM

Pollutants	Average Period	Ambient concentration	Maximum Concentration from steel mill	Total	BNAAQS* (µg/m3)
NOx	24-hours	11.1**	4.0	15.1	80
SOx	24-hours	6.2**	3.0	9.2	80
SPM	24-hours	88.1 **	2.0	90.1	150

**Bangladesh National Ambient Air Quality Standard for 24 Hours*

***Maximum 24 Hours average of NO_x, Sox and SPM concentration during primary data collection (table 4.15)*

Other Proposed Mitigation Measures

- ✓ In order to collect the entire emissions to be generated from electric arc and ladle furnaces, side hoods will be installed, which will remain in position for suction of emissions even during the charging of raw materials in the furnaces;
- ✓ Water sprinkling system will be provided for suppression of dust being generated from raw material handling areas, and movement of trucks. This sprinkling system would be strengthened to take care of additional emissions to be generated during handling of raw material and movement of trucks proposed project coming into being;
- ✓ Empty the dust tray on regular basis when the steel mill is running;
- ✓ There is proposal to install bag filter house containing PTFE (Poly Tetra Fluoro Ethylene) membrane bag filters to achieve emission standard by DoE. Clean and change the filter bag regularly, however the FTP has an automatic filter bag cleaning sensor;
- ✓ Check seals and valves for leaks regularly. Make sure all the seals and gaskets in your system are functioning properly. If any damaged notice, then repairing needed and get your system serviced immediately;
- ✓ Clean the canopy hood, exhaust fan and duct pipe on a monthly basis;
- ✓ The air precooling system which is equipped with an air-cooling tower should be periodically checked;
- ✓ All pressure vessels, pressure retaining pipelines and parts are designed, manufactured and inspected strictly;
- ✓ Install Energy efficient furnace which require less heat time;
- ✓ Stack height of minimum 15 meters will be adopted for backup generators;
- ✓ Generators, and other equipment will be maintained in a good condition to ensure that emissions are kept to a minimum level;
- ✓ Idle equipment will be turned off;
- ✓ Stack emissions will be monitored on regular basis and monitoring record will be maintained;
- ✓ All vehicles of steel mill 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.

6.4.2 Noise Hazard

Once the proposed project becomes operational, there will be noise generation from the sources like material transportation, rolling mill, casting machine, furnace, the substation etc. Generator will be another noise source but since it will be operated on transient basis, the noise exposure is limited from this source.

Proposed Mitigation Measures

- ✓ All equipment and mechanical machineries shall have to be maintained in good working order;
- ✓ Ear plugs should be provided to the workers and it should be enforced to be used by the workers;
- ✓ Provision of separate cabins for workers/operators;
- ✓ Mechanical parts with high noise can be covered with acoustic hood, if possible;

- ✓ Thick doors will be provided and holes which may create sound pollution will be sealed with sound proof materials;
- ✓ The Project proponent will have to optimize the project layout in such way that the noise impact will be minimized;
- ✓ Project boundary wall should be more than man height;
- ✓ Areas that are particularly noisy should be segregated from quiet areas. The office space in a factory should be as far as possible segregated from the production area and preferably be located in a separate building;
- ✓ Green belts and landscaping shall act as noise buffer. 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 hazardous chemical, fuel & lubricant from storage facility or from transport vehicles may negatively impact;
- ✓ 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;
- ✓ 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 equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site;
- ✓ 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

Accidental spillage of chemical and waste water may also impact surface water quality negatively. There will be liquid waste generation from the cooling section of main mill area.

During operation phase, initially 2400m^3 water will be uptake once in the entire project life cycle and will run through the manufacturing process. In cooling systems, 126m^3/hr and 24m^3/hr water will be lost from evaporation and the blowdown respectively which will be make up by 150 m^3/hr water supply. The make-up water will be collected from khal, bore well and rain water storage tank, where 100m^3/hr from bore well or rain water harvesting tank and 50m^3/hr from the project boundary inside khal.

The 24m^3/hr blowdown waste water will be conveyed to the waste water treatment plant and the treated water will be reused in the slag treatment process. The detail of the WWTP is provided in section 3.8.4. Domestic wastewater from office areas, and worker areas is generated which should be treated through STP and then discharged. The detail of the STP is provided in section 6.4.7. No liquid waste from the mill area will be dumped in the project boundary inside khal.

There will be no liquid discharge from the transmission line.

Proposed Mitigation Measures

- ✓ Project authority will install WWTP to treat operational effluent;
- ✓ STP should be installed to treat sewage waste;
- ✓ 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.

6.4.5 Impact on Ground Water

Over utilization of ground water is the key factor for ground water depletion. The proponent will use borewell to uptake ground water for sanitation, drinking and project activity. The proponent is planning to install 3 rain water harvesting tanks to minimize the ground water use

There will be three underground rain water storage tank with the total capacity of 1250 m^3/day and the total surface area of the three tank is 56,000 m^2. Rain water will be collected from Roof of the Pre-engineered Building and conveyed to the storage tank through pipe line. Before using the rain water they will convey to a surge pond for sedimentation and then addictive will be added to prepare the water for colling tower, shown in Figure 3.8. Details of the proposed rain water harvesting tank is provided in Annexure 7.

During operation phase, initially 2400m^3 water will be uptake once in the entire project life cycle and will run through the manufacturing process. In cooling systems, 126m^3/hr and 24m^3/hr water will be lost from evaporation and the blowdown respectively which will be make up by 150 m^3/hr water supply. The make-up water will be collected from khal, bore well and rain water storage tank, where 100m^3/hr from bore well or rain water harvesting tank and 50m^3/hr from the project boundary inside khal. Before using the water, they will convey to a surge pond for sedimentation and then addictive will be added to prepare the water for colling tower, shown in Figure 3.8.

For sanitation and drinking water purposes they will use ground water during operation phase and the total requirement will be 174 m^3/day.

Proposed Mitigation Measures

- ✓ Minimize the extraction 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 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 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, scraps can lead to littering in the project and surrounding areas. Sanitary waste will also be produced.

- **Office waste**

The operation of the steel mill 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.

Proposed Mitigation Measures

- ✓ All solid waste will be segregated properly as per the waste management plan;
- ✓ Some temporary bins with color coding indicating degradable and non-degradable waste might be installed at work places to prevent scattered throwing of wastes according to the waste management plan;
- ✓ The Project proponent should undertake waste segregation at source to separate hazardous from non-hazardous waste;

- ✓ 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 must dispose the wastes regularly at an approved municipal solid waste disposal site in consultation with Union Parishad Chairman. to ensure that waste does not build up on site and result in aesthetic impacts or odors;
- ✓ Difficult to dispose wastes (plastic and hazardous waste) will be minimized and where practicable and avoided such as plastic wastes;
- ✓ 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 Impact due to Liquid Waste

The project proponent is planning to set up a waste water treatment plant inside the project boundary. The working capacity of the WWTP will be 2400m^3/hr and the treatment process is described is section 3.8.4. Cooling water will be used in closed loop and recirculated and a portion of cooling water will go to WWTP for treatment due to blowdown. After treating the water in WWTP, it will be will be reused in Slag cooling process by spraying and no water will be discharged from plant premises. There will be no liquid discharge from the slag treatment plant.

Domestic wastewater from office areas, and worker areas is generated which should be treated through STP and then discharged. The outlet water from WWTP and STP should meet the guideline value prior to discharge.

During operation phase, domestic wastewater from office areas, and worker areas is generated which should be treated through STP and then discharged. The outlet water from STP should meet the guideline value prior to discharge. The provision of reusing the treated waste should be considered in the design. The treated water can also be supplied to the nearest agricultural lands for irrigation. Following the below treatment procedure, the effluent characteristics of the STP and WWTP will meet both IFC EHS guideline along with Bangladesh standard mentioned in **Table 6.4** and **Table 6.6** respectively.

Bactogreen Biological Treatment: The proposed treatment process for sewage waste water will comprise of the following steps. The compact sewage waste water treatment system consists of following parts:

a. Collection tank
b. Biological tank with bio bearing media
c. Settling tank
d. Recirculation pump
e. UV Disinfection
f. Sludge dewatering

1. Physical Treatment (Collection Tank)

The physical pretreatment involves a screening, oil & grease trap, Equalization. The wastewater stream will pass through oil & grease trap and bar screen of 2mm size that will remove any solid particles and floating in excess of 2 mm. This screen will have manual cleaning system.
Then the wastewater flow equalization tank where wastewater will be allowed to stay in equalization tank for around 10-12 hours depending on the nature of wastewater by gravity. In this tank wastewater will be homogenized by using air flow by air blower or submersible mixer and temperature will also be minimized. Then the wastewater will be pumped to the Bactogreen biological treatment.

2. Biological Tank

The wastewater is lead into the bio tank by pump (from Collection or septic tank). Recirculation pump is fitted for recirculating the waste water by Nozzle spray system distributing the waste water over biomedia. Upper part of biomedia works as trickling filter and Lower part works as contact filter. From biotank waste water continues to settling tank also equipped with biomedia (contact filter) and finally discharge through outlet.

3. Settling tank

Wastewater from Biological tank will be flowed to the lamella type clarifier in which solid particles will be settled down and separately collected in a sludge tank. The clarified water from the top of the clarifier will be collected in the UV disinfection water tank. Suspended solid, iron and COD will be removed in this stage.

4. UV Disinfection

After biological treatment the clear water disinfected by UV light. It is a very effective disinfectant. Treated water after the disinfected could be discharged or reused for secondary purpose.

5. Sludge Management System

Sludge from the lamella settler will be taken to the sludge tank, will be thickened further in the sludge tank and the thickened sludge will be pumped the filter press for the dewatering of sludge to make it in the form of cake.

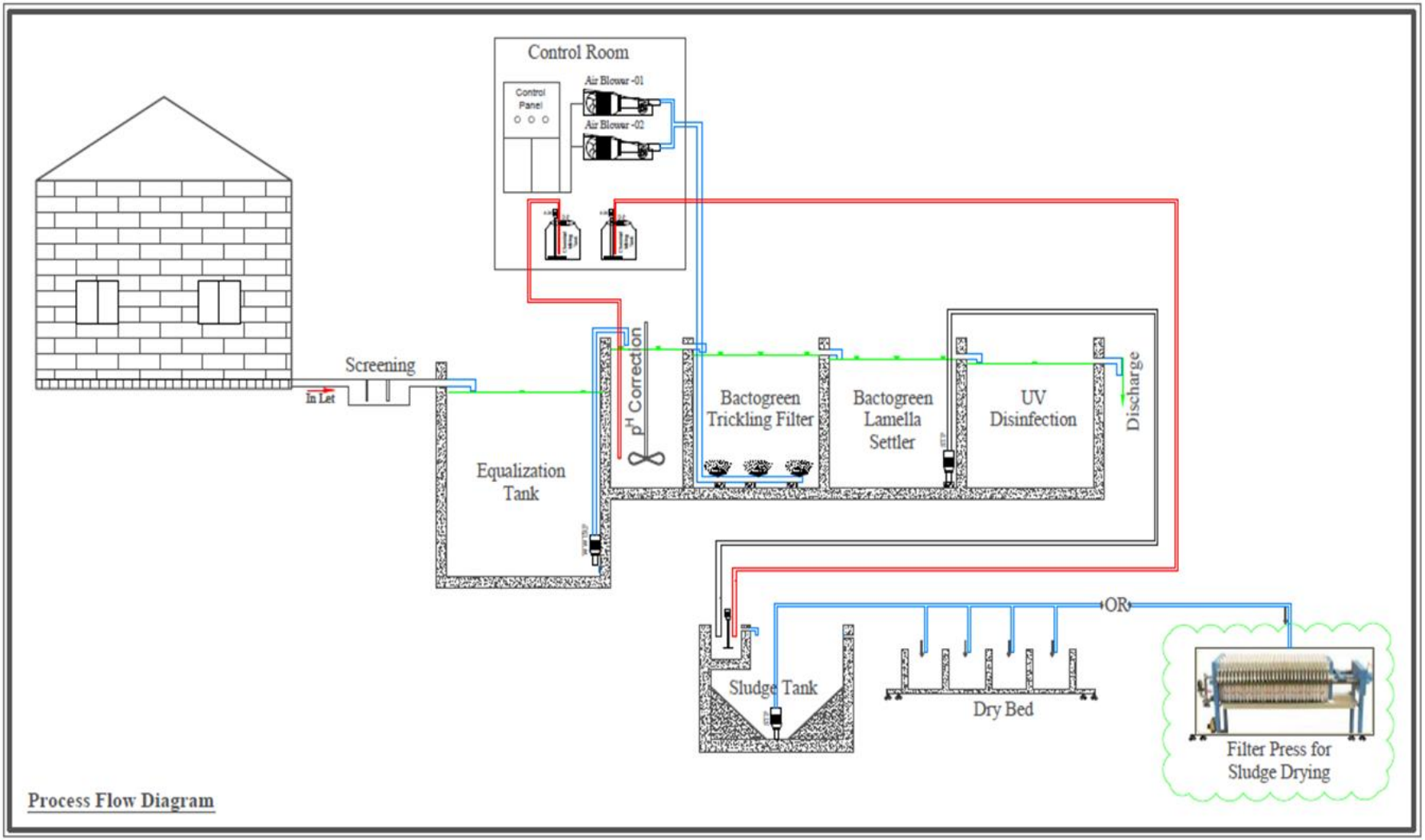


Figure 6.9: Conceptual Schematic Process Flow Diagram of STP

Table 6.4: Standards of STP Treated Waste Water Before Discharge

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	-	50 mg/l
Total Coliform Bacteria	1000	400 MPN/100 ml

Table 6.5: Standards of WWTP Treated Waste Water Before Discharge

Parameters	Standard for Liquid waste discharge in Inland surface water as per ECR, 2023
pH	6-9
COD	200 mg/l
Oil and Grease	10 mg/l
Total Suspended Solid	-
Temperature	-
Sulfides	1 mg/l

Proposed Mitigation Measures

- ✓ Waste water from project activity should not be dumped to the nearest water body without proper treatment;
- ✓ Waste water from the cooling process should be treated in a WWTP before reused or discharged;
- ✓ STP should be installed for treating the sewage waste water; The effluent characteristics of the STP and WWTP should meet both IFC EHS guideline along with Bangladesh standard;
- ✓ Regular monitoring of treated waste water before reuse or discharged.

6.4.8 Impact due to Hazardous waste

Hazardous material can cause different types of accidents while transporting to or from the project site. They may cause damage during inadequate storage, transportation 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. Types of hazardous waste will be generated from the proposed steel mill is:

I. **Slag waste:** Slag is a byproduct generated during the production of steel in electric arc furnaces. Steel slag is the main waste product in the steelmaking process. Proposed project planned to implement a slag treatment plant with a capacity of 20 MT/hr in the project boundary area. Details of slag treatment plant is discussed in section 3.8.3.

II. **Dust from FTP:** The coarser dust sucked from the EAF outlet and from the filter bag is hazardous. The project authority will collect the dust from silo through a screw conveyor and will transport by a truck.

III. **E- Waste:** A variety of E-wastes will be generated during the operation of the main mill and transmission line area. Proper handling and Management of E-Waste is required to avoid any damage to human health, local environment including land, water and air.

Proposed Mitigation Measures

- ✓ All hazardous materials will be kept on 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;
- ✓ Treated Slag waste will be used for producing slag chip which can be used in construction work and will be sold to the vendors;
- ✓ 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 laborers 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;
- ✓ Waste scrap will be used as raw material of Billet production;
- ✓ Coarse dust from FTP will be sold to authorized vendor for production of fly ash bricks.

6.4.9 Traffic and Transportation

Increase in vehicular traffic in the area is likely to be experience during operation phase of the mill 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 mill 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);
- ✓ Stick to agreed traffic routes;
- ✓ 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.

6.4.10 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.

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 to treat the sewage waste purification. The capacity of the STP should be increased according to the BNBC 2020 Guideline;
- ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site.
- ✓ Drinking water should meets national/local or WHO drinking water standards;
- ✓ There should be arrangement of adequate potable water for all.

6.4.11 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 proponent will adopt and implement human resources policies and procedures as per the ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006;
- ✓ The Company will not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements;
- ✓ Project proponent 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 authority;
- ✓ Child labor and forced labor should strictly be prohibited;
- ✓ Discrimination between male and female labor should be avoided;
- ✓ The proponent 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 USML.

6.4.12 Occupational Health and Safety

The workers who work inside the project area will face occupational health hazards due to different operational processes. Safe and good occupational health status of the employees and workers is important for the persons working in the project area. Workers near the furnace and those involved in operation of rolling mills are at high risk of exposure of high temperatures around 1400 ^{o}C-1550 ^{o}C. Also, transfer of raw material, billets and handling of final product can cause physical exertion on workers during long working hours.

Exposure to noise, dust, heat and gases like CO are occupational hazards identified in steel mill. Silicosis, Bronchitis and Noise induced hearing loss are the diseases that could occur due to prolonged exposure. Workers involved in raw material handling section, dusty environment, near furnaces, and are exposed to high dust levels. Workers working near or close to the furnaces are exposed to heat stress, burns etc. Over a long period of time such exposure is likely to result in respiratory problems and occupational health problems.

Proposed Mitigation Measures

- ✓ The project proponent will provide all kinds of treatment facilities and pay compensation according to ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006;
- ✓ 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;
- ✓ Job rotation schemes shall be practiced for over-exposed persons, particularly for heat stress;
- ✓ Proper illumination shall be maintained at each and every nook and corner of the work place;
- ✓ Proper protective measures (insulated gloves, insulated shoes, etc.) should be taken to avoid direct contact with 30V or higher voltage to ensure personal safety;
- ✓ 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;
- ✓ Ventilation systems have been provided to control work area temperatures and humidity;
- ✓ 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 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.

6.4.13 Community Health and Safety

Possible sources of impacts to community health and safety are dust, noise emissions, possibility of occurring accidents and local people may come to contact of hazardous material related to the project. Influx of 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 might also affect easy access of the inhabitants to the local market and houses close to the road and nearby areas temporarily. The flow of concerned skilled foreign technicians might bring sexually transmitted diseases, e.g., HIV/AIDS. Improper management of solid waste, sanitation system may lead to different contagious diseases in local people.

Proposed transmission line may pose potential hazards such as electrocution 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). However, in spite of 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 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;
- ✓ 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 mill;
- ✓ 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;
- ✓ Train all workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS;
- ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 12.

6.4.14 Impact on Terrestrial Habitat

During the operation phase, Improper management of hazardous waste, fume and dust emission, noise pollution may adversely affect the fauna of that area, they may get affected or infected due to accidental spillage, disposal of hazardous waste and project other activities.

In proposed transmission line area, there is a high chance of bird collision and electrocution. Power line structures (towers) provide perching, roosting, and nesting substrates for some avian species especially for birds of prey (raptors). Due to their large wingspans, the raptors may simultaneously come in contact with two energized parts or one energized and one neutral/grounded part of the transmission lines/their towers, potentially resulting in electrocution.

The project proponent will use fume treatment plant so no hazardous emission will generate during mill operation and USML will install a slag treatment plant and a safe slag disposal area. So, the negative impact on terrestrial habitat by the project activity will be less.

Proposed Mitigation Measures

- ✓ 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;
- ✓ Site should be kept clean;
- ✓ Lights of the mill 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 to ameliorate fugitive emission & noise from steel mill;
- ✓ Awareness should be built to the workers in favor of conserving faunal species;
- ✓ 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.

6.4.15 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.

No waste water or treated water will be dumped in the nearest water body. Water will be continuously recycled and reused through the steel manufacturing process and when the manufacturing process is on a temporary break, the water will be stored in a reservoir for further use.

Proposed Mitigation Measures

- ✓ 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.

6.4.16 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.

6.4.17 loss of livelihood

A group of people such as farmers and fishermen can get negatively affected due to project implementation but as there is no agricultural land inside the project boundary and no liquid waste from the mill operation will be discharged in the nearest surface water body.

However, the transmission route area land is not owned by USML and there are a few agricultural lands is situated in the tower footing area. So, it can cause a loss of livelihood of the farmers who have land in that area.

Proposed Mitigation Measure

- ✓ Land price should be considered according to the current market price rate during compensation;
- ✓ 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;
- ✓ The project activities should be initiated after compensating properly to the affected people;
- ✓ Establishing a grievance redress mechanism;
- ✓ Prioritization employment of local people at different phases of the project;
- ✓ Notify in advance so that crop harvesting does not get impacted due to land development.

6.4.18 Impact on Vulnerable Group and Gender Issue

A group of vulnerable people such as poor, the elderly, the very young, those already in poor health, and/or indigenous populations can get negatively affected by air and noise pollution, hazardous waste, liquid waste from the project operation. Susceptibility of unconventional relations between the migrant Workers and local vulnerable women may lead to the risk of gender oriented/sexually transmitted diseases like HIV/ AIDS and STI. Gender related facilities for the women in general, will include pregnant women, lactating mothers, elderly and disabled people who will be working in the project area. Necessary facilities for the women and men including disabled and elderly people will need to be provided.

The women around the project area are engaging themselves in household roles such as household cooking, cleaning, fetching water, feeding children, helping in children's studies and looking after the in-laws (particularly those living in extended families). Women across the project areas also make a significant contribution to the household economy. The authority should be careful so that no negative impacts affect the vulnerable group.

Proposed Mitigation Measure

- ✓ Ensure air and noise emission, waste water discharge are within guideline value and do not cause harm to vulnerable group;
- ✓ The needs of women and vulnerable groups (VGs) should be identified properly and special attention should be given to them;
- ✓ Train all workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS;
- ✓ Employment and income of subsistence to improve VGs' status/livelihoods;
- ✓ Creating income generating opportunities for the vulnerable population.

6.4.19 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. A number of local people will be engaged in project related activities i.e., office staff, security personnel etc. 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;
- ✓ Priority given to local residents for both professional and nonprofessional positions.

6.4.20 Social and Economic enhancement around project area

The proposed project 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 joins 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. Improvement in the steel production in Bangladesh 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.

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 EIA and fully implemented, the prime function of the EIA 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.

7.2 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 chapter 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 & Locations	Frequency of Monitoring	Responsibility
Pre-Construction Phase					
Land Acquisition and Involuntary Resettlement	Within the project site	✓ All affected people should get compensation for the acquisition of proposed T/L footing land as per Acquisition and Requisition of Immovable Property Act 2017 (ARIPA) and Electricity Act 2018; ✓ The TL activities should be initiated after compensating properly to the affected people. ✓ Establishing a grievance redress mechanism prior to TL land acquisition and compensation; ✓ Prioritization employment of local people at different phases of the project; ✓ Prior notification before land development of T/L area so that crop harvesting does not get impacted.			USML
Disruption of Earth Surface	Within the project site	✓ Regular sprinkling of water will be done on open surface and dust grounds. ✓ Project should be designed considering key criteria of landscape; ✓ Altered green area can be turned into its previous visual quality to an extent possible by plantation of local trees.			USML
Impact on Ecological Habitat	Within the project site	✓ 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;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Altered green area can be turned into its original visual quality by plantation of trees; ✓ Proper boundary work should be implemented. 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 terrestrial fauna and habitat. 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. Bright lights should be avoided and LED lights should be installed; ✓ Lights of the construction area should install downwardly to avoid disturbance to the faunal species and birds.			
Solid Waste	Within the project site	✓ Organize disposal of all wastes generated during pre-construction phase in the designated disposal sites by consulting with Local Union Prishad Chairman; ✓ 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 (i.e., plastic) will be minimized where practicable.			USML
Indigenous People	Around the project site	✓ No impact associated.			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
Cultural Heritage	Around the project site	✓ No impact associated.			USML
Construction Phase					
Impact on Air Quality	Within project area	✓ 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 local plants; ✓ 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; ✓ The construction activity will be carried out during day time only (from 7.00 am to 7.00 pm); ✓ All diesel-powered equipment will be regularly maintained and idling time reduced to minimize emissions;	SO2, NOx, CO, SPM, PM_{10} and $PM_{2.5}$ at baseline monitoring locations	Once in 3 months	Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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; ✓ All vehicles should have updated fitness certificate; ✓ Regular maintenance of vehicles should be conducted; and ✓ Solid waste burning in the project site is strictly prohibited.			
Impacts on Acoustic Environment	Within project area	✓ 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;	Noise at baseline monitoring locations at day and night	Once in 3 months	Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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; ✓ Project boundary wall should be constructed more than man height which will dampen the noise level.			
Change in Land use pattern	In and around the project site	✓ Compensation will be paid to the land owners for the land permanently acquired for the T/L area. ✓ 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 during finalization of the TL route; ✓ Income loss can be mitigated by providing alternative job opportunities for PAPs.			Contractor
Impact on Soil Quality	Within project area	✓ Construct appropriate spill containment facilities for all fuel storage areas;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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 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.			
Impact on Surface Water	Near Project Site	✓ Stockpiling of spoil soil at a safe distance from the drainage system;	Temperature, pH, DO,	Once in 3 months	Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Strict supervision should be maintained to avoid blockage of natural drainage during the construction period; ✓ Temporary silt trap should be provided at project boundary; ✓ 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; ✓ Containment of sanitary waste should be adequately disposed of to avoid surface and ground water contamination; ✓ There will be 16 septic tanks each having 1.42 m^3 capacity; ✓ Septic tank should be cleaned once in a year and the septic waste will be disposed to the municipal waste dumping yard.	BOD_5, TDS, TSS, Pb, Cr and Nitrate at baseline monitoring locations		
Impact on Ground Water	Within project area	✓ 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;	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate,	Once in 6 months	Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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.	Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease at baseline monitoring locations		
Impact due to Solid Waste	Within project area	✓ Segregate all wastes, wherever practical according to the waste management plan; ✓ Some temporary bins with color coding indicating degradable and non-degradable waste might be installed at 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 proponent should be committed to ensure construction materials left over at the end of construction will be sold or donated or recycled/reused to the other construction companies, local community groups or institutions;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Difficult to dispose wastes (plastic and hazardous waste) will be minimized and where practicable and avoided such as plastic wastes; ✓ 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; ✓ Waste movement registrar should be maintained; ✓ Hazardous waste will not be mixed with other solid waste generated.			
Traffic and Transportation	In and around the project site	✓ USML'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 for all vehicles by USML; ✓ Avoid transportation of materials and machinery during the peak traffic periods; ✓ Stick to agreed traffic routes, 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; ✓ Speed limits, Proper signage, visibility and traffic awareness and pedestrian safety should be followed by the drivers.			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
Terrestrial Habitat	In and around the project site	✓ 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; ✓ Water sprinkling for dust suppression; ✓ The construction site should be fenced or bounded by a boundary wall; ✓ Awareness should be built to the workers in favor of conserving fauna; ✓ This lighting facility, may cause disturbance to the nocturnal wildlife in and around the site. Bright lights should be avoided and LED lights should be installed; ✓ Lights of the construction area should install downwardly to avoid disturbance to the faunal species and birds; ✓ Noisy construction works to be limited to day time hours (from 7.00 am to 7.00 pm); ✓ 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 an isolated zone; ✓ Where applicable and possible exceptionally noisy machines to be fitted with noise reduction devices.			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
Aquatic habitat	In and around the project site	✓ Wastewater from construction site should not be disposed-off in natural water bodies without proper treatment; ✓ Suggested waste management and disposal 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, debris and fuel should be stored on paved surfaces under covered areas.			Contractor
Impact due to Hazardous waste	Within the project site	✓ All hazardous materials will be provided in a secondary containment; ✓ The oil storage of the project (fresh and used) should be done on hard standing floor and roofing with a secondary containment facility of 110% bigger than the allowable maximum storage capacity; ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types; ✓ Skilled labors should be appointed for unloading the work;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ An appropriate storage site should be provided for disassembled spare parts (e.g. motors and spare parts) that contain oil or other types of fluids; ✓ Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types; ✓ Spent lubricating oil and other old parts of machinery will be sold only to the DoE approved vendors; ✓ 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; ✓ Regular inspections of machinery, equipment, storage areas are needed to ensure that poor maintenance is not responsible for a spillage occurring; ✓ Electrical waste should be recycled; ✓ All metals, scrap, e-waste and other recyclable materials shall be recycled to secondary dealers and records shall be maintained. Other solid wastes will be disposed to the designated municipal solid waste dumping site.			
Occupational Health and Safety	Within the project site	✓ USML to provide first aid facilities to the labourers and all project personnel whilst working on the project;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ The USML should provide treatment facilities and pay compensation according to Bangladesh Labor Law 2006 if any accident occurs; ✓ All workers will be properly informed, consulted and trained on health and safety issues; ✓ A permit to enter project site will be established to ensure entry of only authorized persons ✓ Personal Protective Equipment (PPE) shall be worn at all times on the Site. This shall include appropriate ear plugs, safety shoes, safety eyewear, and hard hats (figure 6.1); ✓ 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; ✓ 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; ✓ Supervision of works shall be done regularly to ensure that safety conditions are met; ✓ An understanding has to be built with a local hospital for the emergency incident related to the worker's health;			

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ In addition, necessary steps to be taken for arrangement of ambulance service in the project area to support any emergency medical aid and shifting to the hospital/ medical Centre.			
Sanitation Hazard and Drinking Water	Within the project site	✓ Proper sanitation system should be provided and at the same time, regular, proper and safe disposal of human waste should be ensured; ✓ 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; ✓ Adequate number (1:15) of toilets and bathrooms should be made for the workers and staffs. ✓ Separate Male and female toilets should be available; ✓ Safe drinking water should be available which should meet national and WHO drinking water standards.			Contractor
Labor and Working Condition	Within the project site	✓ The Proponent 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 USML authority; ✓ Leave for illness, maternity, vacation or holiday should also be maintained by the proponent which should be ensured by the USML authority;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Child labor and forced labor should strictly be prohibited; ✓ Discrimination between male and female labors should be prohibited; ✓ Establish internal (worker's) grievance mechanism which should be accessible to all project employees/ workers as well as those hired by the proponents.			
Social acceptability of Construction workers to the host communities	Within the project site	✓ 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.			Contractor
Community Health and Safety	Around the project site	✓ 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			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		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; ✓ The Proponent will also coordinate with local authorities to ensure that any conflicts will be immediately resolved which should be ensured by the USML authority; ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 12; ✓ The Proponent 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; ✓ All wastes should be properly handled and disposed to avoid any outbreak of disease.			
Loss of Livelihood	In and around the project site	✓ No impact associated			Contractor
Impact on Vulnerable Groups and Gender Issues	In and around the project site	✓ The needs of women and vulnerable groups (VGs) should be identified properly and special attention should be given to them; ✓ Employment and income of subsistence to improve VGs' status/livelihoods;			Contractor

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Potential VG members should be engaged as unskilled laborers during the construction period; ✓ Provision should be kept for social and economic development support; ✓ Creating income generating opportunities for the vulnerable population; ✓ No discrimination of wages for male and female laborers/workers for similar work; ✓ Provisions of time-to-time mandatory training and awareness buildings for the workforce to as precautionary measures for anti-social activities those includes sexual harassment and gender-based violence, women trafficking communal diseases etc.			
Employment Generation	In and around the project site	✓ Prioritization of employment of skilled and non-skilled workers from the local communities; ✓ Priority given to local residents for both technical and non-technical positions.			Contractor
Increase in local business	In and around 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; ✓ Encourage local people with small-scale business plans			Contractor
Operation Phase					
Air quality	Within the project site	✓ In order to collect the entire emissions to be generated from electric arc and ladle furnaces, side hoods will be	SO2, NOx, CO, SPM, PM_{10} and	Once in 3 months	USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		installed, which will remain in position for suction of emissions even during the charging of raw materials in the furnaces; ✓ Water sprinkling system will be provided for suppression of dust being generated from raw material handling areas, and movement of trucks. This sprinkling system would be strengthened to take care of additional emissions to be generated during handling of raw material and movement of trucks proposed project coming into being; ✓ Empty the dust tray on regular basis when the steel mill is running; ✓ There is proposal to install bag filter house containing PTFE (Poly Tetra Fluoro Ethylene) membrane bag filters to achieve emission standard by DoE. Clean and change the filter bag regularly, however the FTP has an automatic filter bag cleaning sensor; ✓ Check seals and valves for leaks regularly. Make sure all the seals and gaskets in your system are functioning properly. If any damaged notice, then repairing needed and get your system serviced immediately; ✓ Clean the canopy hood, exhaust fan and duct pipe on a monthly basis; ✓ Proponent should install Bag Filters with 30-meter stack and ID/FD fan to control the emission, and maintain the emission less than standard value shown in table 6.1;	$PM_{2.5}$ at baseline monitoring locations		

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ The air precooling system which is equipped with an air-cooling tower should be periodically checked; ✓ All pressure vessels, pressure retaining pipelines and parts are designed, manufactured and inspected strictly; ✓ Install Energy efficient furnace which require less heat time; ✓ Stack height of minimum 15 meters will be adopted for backup generators; ✓ Generators, and other equipment will be maintained in a good condition to ensure that emissions are kept to a minimum level; ✓ Idle equipment will be turned off; ✓ Stack emissions will be monitored on regular basis and monitoring record will be maintained; ✓ All vehicles of steel mill 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.			
Noise Hazard	Within the project site	✓ All equipment and mechanical machineries shall have to be maintained in good working order; ✓ Ear plugs should be provided to the workers and it should be enforced to be used by the workers; ✓ Provision of separate cabins for workers/operators;	Noise at baseline monitoring locations at day and night	Once in 3 months	USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Mechanical parts with high noise can be covered with acoustic hood, if possible; ✓ Thick doors will be provided and holes which may create sound pollution will be sealed with sound proof materials; ✓ The Project proponent will have to optimize the project layout in such way that the noise impact will be minimized; ✓ Project boundary wall should be more than man height; ✓ Areas that are particularly noisy should be segregated from quiet areas. The office space in a factory should be as far as possible segregated from the production area and preferably be located in a separate building; ✓ Green belts and landscaping shall act as noise buffer. 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.			
Impact on Soil Quality	Within the project site	✓ Spill control and management procedures at site; ✓ Hazardous waste should be carefully handled and disposed off following waste management plan; ✓ 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;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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 equipment i.e. safety goggles, gloves, PPE, disposal bags, containers, suction pump, boom skimmer etc. should be available at the site; ✓ 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.			
Impact on Surface Water	Around the project site	✓ Project authority will install WWTP to treat operational effluent; ✓ STP should be installed to treat sewage waste; ✓ 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;	Temperature, pH, DO, BOD_5, TDS, TSS, Pb, Cr and Nitrate at baseline monitoring locations	Once in 6 months	USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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.			
Impact on Ground Water	Within the project site	✓ Minimize the extraction 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 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.	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease at baseline monitoring locations	Once in 6 months	USML
Impact due to Solid Waste	Within the project site	✓ All solid waste will be segregated properly as per the waste management plan;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Some temporary bins with color coding indicating degradable and non-degradable waste might be installed at work places to prevent scattered throwing of wastes according to the waste management plan; ✓ The Project proponent should undertake waste segregation at source to separate hazardous from non-hazardous waste; ✓ 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 must dispose the wastes regularly at an approved municipal solid waste disposal site in consultation with Union Parishad Chairman. to ensure that waste does not build up on site and result in aesthetic impacts or odors; ✓ Difficult to dispose wastes (plastic and hazardous waste) will be minimized and where practicable and avoided such as plastic wastes; ✓ 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.			

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
Impact due to Liquid Waste	Within the project site	✓ Waste water from project activity should not be dumped to the nearest water body without proper treatment; ✓ Waste water from the cooling process should be treated in a WWTP before reused or discharged; ✓ STP should be installed for treating the sewage waste water; The effluent characteristics of the STP and WWTP should meet both IFC EHS guideline along with Bangladesh standard; ✓ Regular monitoring of treated waste water before reuse or discharged.			USML
Impact due to Hazardous Waste	Within the project site	✓ All hazardous materials will be kept on 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; ✓ Treated Slag waste will be used for producing slag chip which can be used in construction work and will be sold to the vendors;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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 laborers 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; ✓ Waste scrap will be used as raw material of Billet production; ✓ Coarse dust from FTP will be sold to authorized vendor for production of fly ash bricks.			
Traffic and Transportation	In and around the project site	✓ Management to provide for adequate internal parking, for all vehicles coming to the mill 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);			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Stick to agreed traffic routes; ✓ 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	✓ 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;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ A Sewage Treatment Plant (STP) should be installed and maintained to treat the sewage waste purification. The capacity of the STP should be increased according to the BNBC 2020 Guideline; ✓ The sludge cake from the STP should be disposed to the municipal solid waste dumping site. ✓ Drinking water should meets national/local or WHO drinking water standards; ✓ There should be arrangement of adequate potable water for all.			
Labor and Working Condition	Within the project site	✓ The proponent will adopt and implement human resources policies and procedures as per the ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006; ✓ The Company will not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements; ✓ Project proponent 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 authority; ✓ Child labor and forced labor should strictly be prohibited; ✓ Discrimination between male and female labor should be avoided;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ The proponent 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 USML.			
Occupational Health and Safety	Within the project site	✓ The project proponent will provide all kinds of treatment facilities and pay compensation according to ILO Core Labour Standards Convention and Bangladesh Labor Act, 2006; ✓ 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; ✓ Job rotation schemes shall be practiced for over-exposed persons, particularly for heat stress; ✓ Proper illumination shall be maintained at each and every nook and corner of the work place; ✓ Proper protective measures (insulated gloves, insulated shoes, etc.) should be taken to avoid direct contact with 30V or higher voltage to ensure personal safety;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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; ✓ Ventilation systems have been provided to control work area temperatures and humidity; ✓ 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			

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		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 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.			
Community Health and Safety	Around the project site	✓ 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 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;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ 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 mill; ✓ 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; ✓ Train all workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS; ✓ A grievance mechanism for community will be set up according to the details provided in Chapter 12.			
Impact on Terrestrial Habitat	In and around the project site	✓ 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; ✓ Site should be kept clean; ✓ Lights of the mill 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 to ameliorate fugitive emission & noise from steel mill;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Awareness should be built to the workers in favor of conserving faunal species; ✓ 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.			
Impact on Aquatic Habitat	In and around the project site	✓ 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.			USML
Social acceptability of workers to the host communities	In and around the project site	✓ 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.			USML
Loss of livelihood	In and around the project site	✓ Land price should be considered according to the current market price rate during compensation; ✓ All affected people should get compensation for the acquisition of proposed land as per Acquisition and			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		Requisition of Immovable Property Act 2017 (ARIPA) and Electricity Act 2018; ✓ The project activities should be initiated after compensating properly to the affected people; ✓ Establishing a grievance redress mechanism; ✓ Prioritization employment of local people at different phases of the project; ✓ Notify in advance so that crop harvesting does not get impacted due to land development.			
Impact on Vulnerable Group and Gender Issue	In and around the project site	✓ Ensure air and noise emission, waste water discharge are within guideline value and do not cause harm to vulnerable group; ✓ The needs of women and vulnerable groups (VGs) should be identified properly and special attention should be given to them; ✓ Train all workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS; ✓ Employment and income of subsistence to improve VGs' status/livelihoods; ✓ Creating income generating opportunities for the vulnerable population.			USML
Employment Generation	In and around the project site	✓ Encourage local and equitable employment; ✓ Salaries and other benefits based on qualification and experience;			USML

Issues/aspects	Location	Mitigation measures	Monitoring Parameters & Locations	Frequency of Monitoring	Responsibility
		✓ Priority given to local residents for both professional and nonprofessional positions.			
Social and Economic enhancement around project area	National & local	✓ 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.			USML

7.3 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).

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

7.3.1 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.

7.3.2 Hazardous Waste

(a) Segregation: Hazardous components should be segregated having regard to their eventual destinations and the compatibility of the component types. Slag waste should be disposed off at the designed location after treated.

(b) Storage: An appropriate hazardous waste storage should be provided for all hazardous waste including waste slag waste, 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.

7.4 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 available 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.

7.5 Occupational Health and Safety Plan

An Occupational Health and Safety (OHS) plan is 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.

7.5.1 Identification of Possible Risk

In the EIA, risk assessment has been carried out to identify the potential hazard associated with or inherent in the design process and to identify possible measures to avoid the hazard along with the safety plan for minimizing the risk. Incorporating these measures and safety plan in design, planning and operational procedure of the proposed steel mill, the potential hazard points can be eliminated. The identified hazards for the proposed steel mill are listed in **Table 7.2** and **Table 7.3**.

Table 7.2: Possible Risk/ Hazards in Construction Stage

Risk/ Hazard	Sources	Consequences	Safety measures
Stuck by	Falling/moving machineries, tools/ debris dropped from elevated location, vehicles	Health injury and loss of life	• Fall protection, use of Personal Protection Equipment's (PPEs).
Falls	Fall from elevated areas, high heights, etc.	Health injury and loss of life	• Fall protection, awareness, use of PPEs.
Electrocution	Cutting and welding, switchyard etc.	Health injury and loss of life	• Use of PPEs, proper training, awareness, keeping safe distance from hazardous points, maintaining safety of high switchyard etc.
Fire and Explosion	Generator and its ancillary components, flammable chemical, power transformer etc.	Health injury and loss of life	• Arrangement of firefighting equipment's with training to the staffs from workers to officers; • Staffs should be trained on emergency handling procedures; • Adoption of fire safety for each of the equipment's and machinery subject to fire hazard; • Safe handling and storage of flammable chemicals and fuels; • Regular inspection and monitoring of pressure parts and units; • Use of PPEs and Consciousness during working period.
Noise and Vibration	Noise and vibration from machinery, traffic etc.	Hearing complexity; vomiting to the pregnant women; scaring to wildlife, livestock, human being, etc.	• Compliance with the national Noise Control Rules and Regulations and IFC occupational health and safety standards; • Equipment to be used by competent operatives; • Provision of equipment with low noise and vibration outputs where possible; • Personal protective equipment's (PPEs) provided and used where necessary; • Consider suitable timing of the work to reduce disturbance; • Appropriate choice of modern equipment and machinery to reduce noise.

Risk/ Hazard	Sources	Consequences	Safety measures
Traffic Accident	Onsite and off site	Health injury, life loss, property damage, etc.	• Driver should strictly follow the traffic rules and regulations of the country; • Proper traffic marking on the road and effective signaling system should be implemented in and around the Project site; • Traffic safety should be ensured for long vehicle; • Provision and use of high visibility clothing; • Provision of walkways.
Unsafe Working Place	Lack of safe working condition, employee having contagious disease	Health injury, electrocution, organ disease outburst, loss of health, loss of life	• Keeping all safety & precaution measure in order, maintaining first aid & well-equipped primary health center & training on awareness; • Monthly health inspection, provision of medical leave for labor, awareness, etc.

Table 7.3: Possible Risk/ Hazard during Operation Stage

Risk/ hazard	Source	Consequences	Safety Measures
• Mechanical hazard • Fire hazard/explosion • Electrical hazard • Noise generation	• Mechanical failure • Lack of sound buffers	• Health injury • Fatalities • Property damage • Environmental damage	• Arrangement of firefighting equipment's with training to the staffs from workers to officers; • Staffs should be trained on emergency handling procedures; • Compliance with the national Noise Control Rules and Regulations and IFC occupational health and safety standards; • Use of PPEs, proper training, awareness, keeping safe distance from hazardous points, maintaining safety of high switchyard etc.
• Safety in conveyors	• Raw material section	• Health injury • Fatalities • Property damage	• Avoid sitting, standing, or walking on conveyors • All conveyor to be provided with proper guards. • Never perform maintenance while a conveyor is in operation. • Ensure correct operation of conveyor controls. • Avoid loose clothing, long hair, jewelry, and other loose items near conveyor

Risk/ hazard	Source	Consequences	Safety Measures
			• Emergency "shut-off" devices to be provided • Follow lock-out/tag-out procedures for maintenance • Only authorized/trained personnel to operate or maintain the conveyor.
• Fire due to resulting arc flash/arc blast • Other electric hazard due to unprotected cables • Slips and trips from unorganized/lose cables lying in the floor	• Short circuit in control room and switch gears • Faulty cables and wires • No safe connection to earth • Using cables with different voltage and current ratings • Unorganized cables	• Health injury from electric shock, fires etc. • Fatality from electrocution, fires etc. • Electric burns	• Give clearance for cutting/welding etc. after ensuring that there is no leakage of gas. • Staffs should be trained on emergency handling procedures; • Adoption of fire safety for each of the equipment's and machinery subject to fire hazard; • Safe handling and storage of flammable chemicals and fuels; • Regular inspection and monitoring of pressure parts and units.
• Molten Metal Explosion • Steam Explosion • Chemical Explosion from furnace	• Cooling water coming in contact with molten metal as Slag • Excessive moisture in Slag • Due to refractors • Accidental mixing of oxidants such as paints/varnishing & oily scrap	• Health injury from fires, explosion etc. • Burns • Fatality from explosion, fires etc.	• Checking the refractories moisture & strategies for pre • heating the furnace & the refractories. • Proper storage system to ensure against accidental use and outside the excessive heat area. • Segregation of scrap before use • Pre heating of raw materials • Pre heating of refractors

Risk/ hazard	Source	Consequences	Safety Measures
	• Chemicals/substances in scrap		
• Person hit by rolling hot material during looping and play • General safety	• Rolling Mill	• Health injury • Fatalities • Electric burns	• Proper guards to be provided to avoid material coming in the way of workmen. • Proper pathways to be provided for safe movement. • Use of appropriate PPE hand gloves, gum boots, Face shield, dust mask, goggles by persons working on stands and handling hot materials. • Proper leg/arms guards/safety goggles to be provided to workers of the rolling mill. • Use properly maintained tools & tackles. • Hand tools to be checked in every six months. • All the lifting tools and tackles to be checked every year. • Before starting any job proper safety isolation procedure to be ensured. • Compliance of special measures to be undertaken such as cooling of rolls in hot areas, use of supports, use of stoppers, closing of valves, housekeeping in the area, availability of fire hose/extinguishers. • Ensure the availability of firefighting equipment.
• Transformer Blast in substation • Inverter Battery Explosion	• Internal short-circuit • Overcharging of batteries	• Equipment damage • Health injury • Loss of life • Environmental degradation	• Regular inspection and monitoring of equipment; • Staffs should be trained on emergency handling procedures; • Transformer Protector (TP), a passive mechanical system, can be installed to prevent transformer explosion.

7.5.2 Provide 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. USML will ensure all personnel have the right PPE while perform the job.

7.5.2.1 Basic Personal Protective Equipment

At a minimum, basic PPE for all workers involved in project activities (whether they are employed by USML 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 USML 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.

7.5.2.2 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.

7.5.2.3 Selecting Personal Protective Equipment

PPE will be selected based on the following information:

- Hazard assessments;
- Material safety data sheet (MSDS);
- Legislative jurisdictional

7.5.2.4 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.
- Heat proof gloves should be used during working in the steel mill.

❖ **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, working near furnace, rolling machine) 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 contaminates 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.

7.5.3 Training

Professional trainings need to be given to the designated personnel for firefighting and other emergencies. The training would include the following:

Table 7.4: Type of training and training actions

SL No.	Type of Training	Training Actions
1	Actions to be taken in the event of a fire	• Use fire exit and educating workers and staffs of the nearest emergency evacuation zone; • Proper evacuation procedure in the event of a fire; • Training on locating emergency equipment and use of portable fire extinguishers to extinguish fires; • Training on whim to contact in case of an emergency.
2	Handling of flammable liquids	• Training on the safe handling and storage of volatile/flammable chemicals/oils; • Training on waste classification system and use of various color-coded bins for various waste disposals;

SL No.	Type of Training	Training Actions
		• Training on the use of PPEs.
3	Emergency Drills	• Regular monthly training on mock fire & earthquake drills; • Mock drill on emergency evacuation plan; • Training on how to use spill kit and slam dam etc.; • Regular monthly workshop on emergency response and preparedness plan.
4	First-aid and medical assistance	• Training on first-aid treatment for broken bones/fractures, burns, cuts/wounds, unconsciousness, breathlessness.

In case of an emergency fire breakout, the Mill 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

7.5.4 Fund Allocation and Health Checkup

The project authority should include a budget for implementing occupational health and safety training, buying personal protective equipment, first aid kits and other safety equipment during project operation. They should also provide bi-annual health checkup to the workers in project area and proponent should prepare an annual report of health status of workers. EHS manager should ensure the proper occupational health safety. A budget is shown in table 7.7.

7.6 Green Belt Development

Even after taking stringent measures for pollution control, in different stages, a significant number of pollutants is produced such as dust, particulate matters and noise during the operational phase. A sustainable and green solution for this problem could be minimized by developing a "Green Belt". 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 7.5**

Table 7.5: 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

Sl No.	Name of the Plant	Name in Bangla	Type	Function
9.	Australian Whistling Pine	ঝাউ	Tree	Reduces Particulate Matter
10.	Rangan	রঙ্গন	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 in the front vacant side of the project.

7.7 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.

As per the process flow of the proposed project, the liquid discharged from the cooling process of the steel mill will be continuously treated and will reuse in the steel manufacturing process during project operation. The slag waste from the EAF will be treated in slag treatment plant and will reuse as a raw material for road construction, land fill and other secondary uses. Extra treated Slag will be stored in a slag disposal site.

There will be 3 rain water harvesting tank with the total capacity of 1250 m^3/day. The reserve water will be used for cooling process in the steel mill and used water will be treated for reuse. To optimize the use of electricity, they will use LED lights. Other than this, the project already committed to make no liquid waste discharge in the surrounding water bodies without treated.

7.8 ESMP Implementation Team

For proper implementation of the ESMP, qualified manpower is absolutely essential. There should be a core group of people in the steel mill who should be well trained on environmental issues but all plant staff should be given basic training on environmental issues. The skills of staff should be upgraded periodically through need-based training program. ESMP teams during construction and operation phase are shown in **Figure 7.1 and Figure 7.2** respectively. The responsibility of the ESMP implementation team is presented in the **Table 7.6** below.

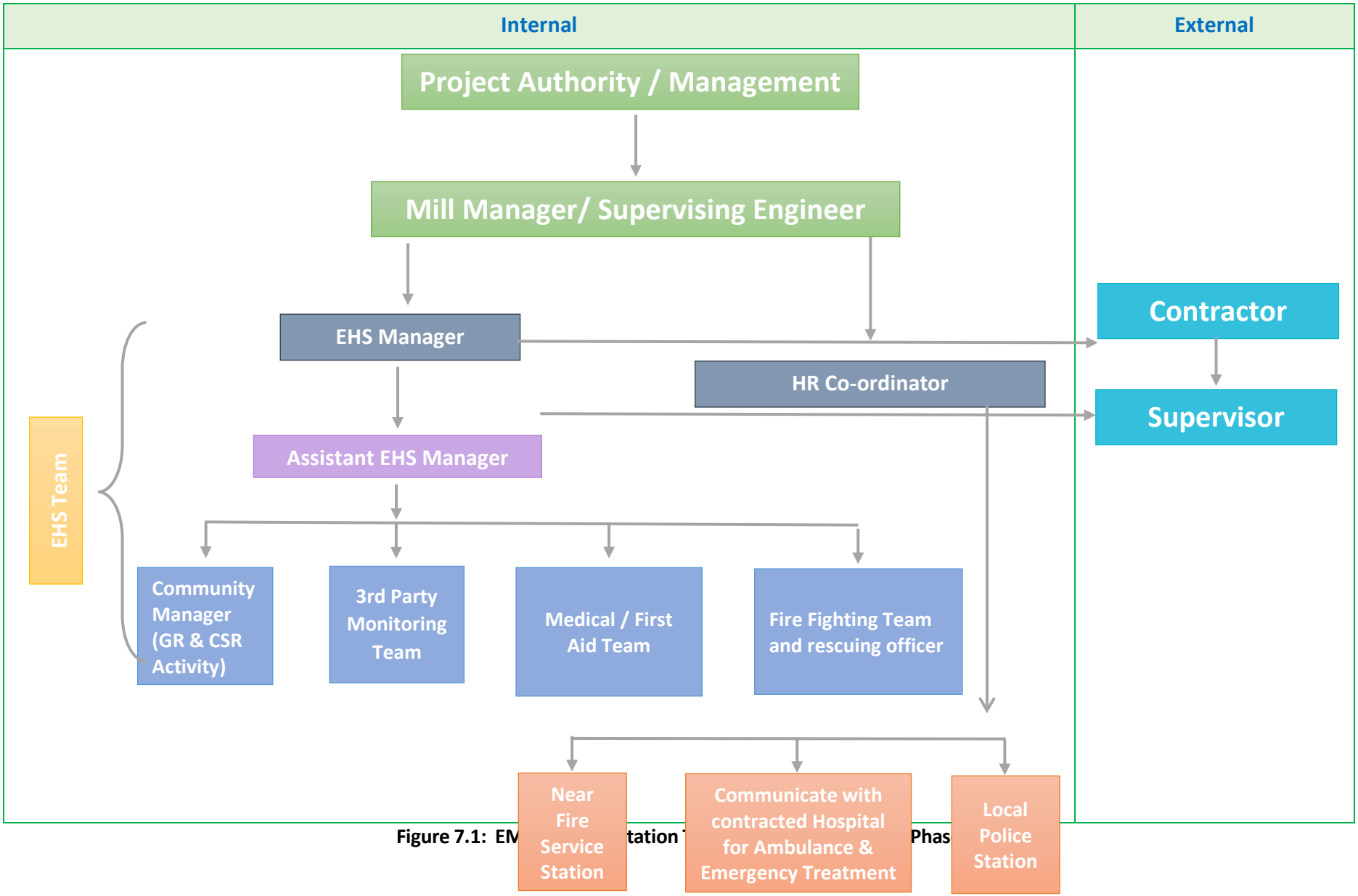


Figure 7.1: EM tation Phas

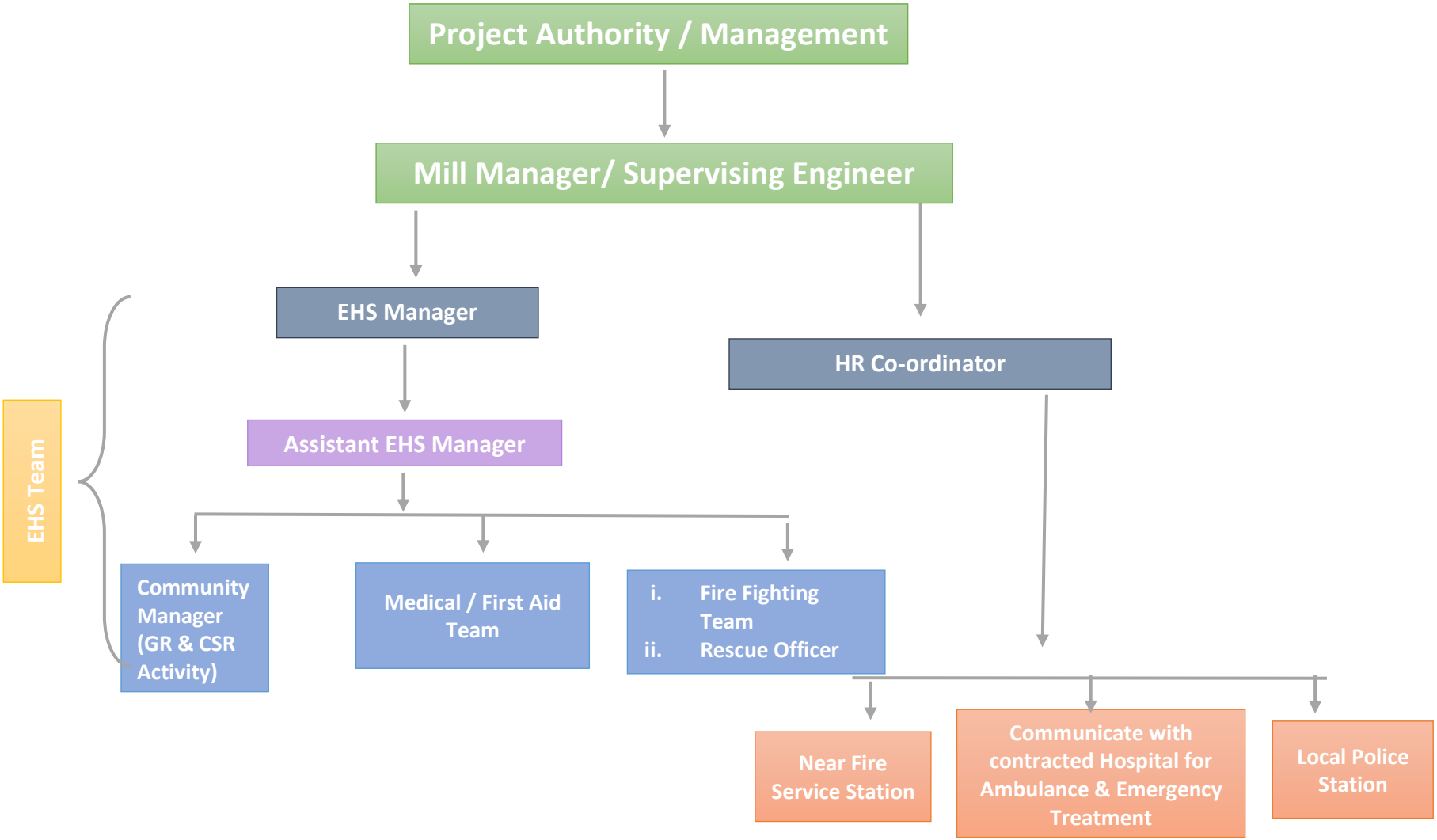


Figure 7.2: EMP Implementation Team during Operation Phase

Table 7.6: Responsibility of Team Members

Sl. No.	Person	Responsibility
1.	Project Authority (Director)	• Project Authority/ Management shall to ensure all the requirements are being complied accordingly. • Should take final decision in any kind of emergency.
2.	Mill Manager/Supervising Engineer	• will be responsible to implement 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.
3.	Environmental Health and Safety Manager (Team Leader)	• Inspect the facility to identify safety, health, and environmental risks; • Develop and implement inspection policies and procedures, and a schedule of routine inspections; • Develop 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.
4.	Assistant Environmental Health and Safety Manager	• 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; • Make reports on visual monitoring according to **Table 8.1** and **8.3** during construction and operation phase; • Review Monitoring Reports and send them to EHS Manager; • Ensure undertaking suggested monitoring and prepare monitoring reports during operation and construction phase.

Sl. No.	Person	Responsibility
5.	Grievance Redress (GR) & Corporate Social Responsibility (CSR) Manager	• 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.	Medical/First Aid Team	• 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;
7.	Fire Fighting Team	• 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.
8.	Rescue Officer	• 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.
9.	Human Resources (HR) Coordinator	• Reports to the project management & steel mill 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

Sl. No.	Person	Responsibility
		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.
10.	Supervisor	• Monitor workers' performance and safety issues related to them; • Ensure that workers are wearing proper PPEs during construction works; • Report to Assistant EHS Manager regarding any near miss or accidents take place.
11.	Security	• 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; • 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.

7.9 ESMP Monitoring and Review

The USML authority shall periodically review, monitor and audit the effectiveness of the ESMP, including all sub-plans. The audit program should adequately cover the scope, audit frequency and methods that are typically required for large infrastructure projects. 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.

7.9.1 Review of the ESMP

The review of the ESMP should consider the following:

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

The ESMP shall also be reviewed periodically by Unitex Steel Mill Limited (USML) 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 USML as follows:

- The full ESMP shall be reviewed at least annually;
- Relevant parts of the ESMP shall be reviewed following a reportable incident;
- 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.

7.10 Cost of ESMP implementation

Table 7.7: ESMP Implementation Cost

Item	Number	Duration	Total cost per year (Taka)
Environmental monitoring during Construction period	Refer Table 8.5	Yearly	17,05,000.00
Environmental monitoring during Operation period	Refer Table 8.6	Yearly	11,77,000.00
Occupational Health, Safety and Security implementation	Lump sum	Yearly	5,00,000.00
Community Health Safety and Security implementation	Lump sum	Yearly	5,00,000.00
Capacity Building and Training	04	Yearly	4,00,000.00
First Aid, Emergency medicine & Medical services	Lump sum	Yearly	1,00,000.00
Emergency Response Equipment	Refer Table 10.3	Once	55,32,000.00

Item	Number	Duration	Total cost per year (Taka)
Greenbelt development	Lump sum	Yearly	5,00,000.00
CSR Activity	Lump sum	Yearly	5,00,000.00
Environmental Compliance Audit	02	Yearly	6,00,000.00
Subtotal			**1,15,14,000.00**
Contingency budget (10% of subtotal cost)			**11,51,400.00**
Total cost			**1,26,65,400.00**

7.11 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 7.7.**

Chapter 8

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 EIA, 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 mill 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. The project proponent should be responsible for overall environmental monitoring during the construction phase of the project.

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	USML / Third party monitoring team
Site Security	Proper fencing, isolation of site from general access, marked passage for workers and visitors	Monthly	
Personal Protective Equipment	Ensure every single person involved in the construction activity wear proper PPE	Monthly	
Incident record & reporting	Documented record of all incident, accident and its remedial process.	Monthly	
Solid waste	Quantity of solid waste, segregation, disposal process and transfer	Monthly	
Grievance Redress Mechanism	Any significant complaint from neighbours and its remedial procedure	Monthly	
Safety orientation & training of workers	Frequency of training & orientation of workers for safety	Monthly	
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	Monthly	
Raw material storage	Monitoring unloading and transportation of raw material, quantity and storage capacity	Monthly	
Treated slag waste storage and disposal	Quantity of slag waste, segregation, disposal process and transfer	Monthly	
Chemical Storage and Management	Fuel tank and chemical storage operation, maintenance and leakage inspection	Monthly	
Site Drainage	Maintaining proper drainage	Monthly	

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, NOx, CO, SPM, PM_{10} and $PM_{2.5}$	Air Pollution (Control) Rules 2022 (Schedule-	Given in Table 4.14	Once in 3 months	USML/ Third party

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
		1) & IFC EHS Guideline, 2007			monitoring team
Noise level	Noise at different locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.16	Once in 3 months	
Surface water	Temperature, pH, DO, BOD_5, TDS, TSS, Pb, Cr and Nitrate	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and & IFC EHS Guideline, 2007	Given in Table 4.10	Once in 3 months	
Ground water	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007	Given in Table 4.12	Once in 6 months	
Drinking water	pH, TDS, Alkalinity, Hardness, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007	Drinking water tap	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 authority will be responsible for overall environmental monitoring during the operation phase of the project. The environment monitoring during the operation phase should primarily be focused on addressing the following issues:

- Air and noise emission from steel mill
- Solid waste generation
- Slag waste and fume generation
- Waste water generation from cooling system
- 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	Monitoring Frequency	Responsibility
Traffic volume	Incoming & outgoing traffic, traffic movement records	Quarterly	USML/ Third party monitoring team
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	Quarterly	
Incident record & reporting	Documented record of all incident, accident and its remedial process.	Quarterly	
Solid waste	Quantity of solid waste, segregation and disposal process	Quarterly	
Slag waste	Quantity of Slag waste, segregation and disposal process	Quarterly	
Grievance Redress Mechanism	Any significant complain from neighbours and its remedial procedure	Quarterly	
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 to the workers	Quarterly	
Chemical Storage and Management	Fuel tank and chemical storage operation, maintenance and leakage inspection	Quarterly	
Site Drainage	Maintaining proper drainage	Quarterly	
Water inventory	Make an inventory of water usage (groundwater and rainwater) and wastewater discharge	Quarterly	
Soil contamination	Visual inspection for contamination and oil spills. Visual inspection of secondary containment 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, NOx, CO, SPM, PM_{10} and $PM_{2.5}$	Air Pollution (Control) Rules 2022	Given in Table 4.14	Once in 3 months	USML/ Third party

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
		(Schedule-1) & IFC EHS Guideline, 2007			monitoring team
Stack Emission	SO2, NOx and SPM	Air Pollution (Control) Rules 2022 (Schedule-5)	2 locations one is near stack and another one near D.G set	Once in 3 months	
Noise level	Noise at different locations at day and night	Noise Pollution (Control) Rules 2006 (Schedule-1) & IFC EHS Guideline, 2007	Given in Table 4.16	Once in 3 months	
Surface water	Temperature, pH, DO, BOD_5, TDS, TSS, Pb, Cr and Nitrate	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Ka)(1)) and & IFC EHS Guideline, 2007	Given in Table 4.10	Once in 6 months	
Ground water	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007	Given in Table 4.12	Once in 6 months	

Issue	Parameters	Applicable Standards	Monitoring Locations	Monitoring Frequency	Responsibility
Drinking water	pH, TDS, Alkalinity, Hardness, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform	Environment Conservation Rules (ECR) 2023 (Schedule-2 (Kha)) and & IFC EHS Guideline, 2007	Drinking water tap	Once in 3 months	
Effluent	WWTP (Temperature, pH, COD, TSS, Oil & Grease, Sulfides)	ECR 2023 (Schedule-4), WB EHS guidelines for treated waste water from industry	outlet	Once in 3 months	
	STP (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	outlet	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 Phase

Item	Parameter	Unit cost (Taka)	Unit per year	Total cost per year (Taka)
Ambient Air Quality	SO2, NOx, CO, SPM, PM_{10} and $PM_{2.5}$	16000.00	32	512,000.00
Noise level	Noise at different locations at day and night	600.00	32	19,200.00
Surface water	Temperature, pH, DO, BOD_5, TDS, TSS	11,700.00	32	374,400.00

Item	Parameter	Unit cost (Taka)	Unit per year	Total cost per year (Taka)
Ground water	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease	18,300.00	2	36,600.00
Drinking water	pH, TDS, Alkalinity, Hardness, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform	10,700.00	4	42,800.00
Visual monitoring	Table 8.1	60,000.00	12	7,20,000.00
Total cost				**17,05,000.00**

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	SO2, NOx, CO, SPM, PM_{10} and $PM_{2.5}$	16000.00	32	512,000.00
Stack Emission	SO2, NOx and SPM	8,000.00	8	64,000.00
Noise level	Noise at different locations at day and night	600.00	32	19,200.00
Surface water	Temperature, pH, DO, BOD_5, TDS, TSS, Pb, Cr and Nitrate	11,700.00	16	1,87,200.00
Ground water	Temperature, pH, TDS, Alkalinity, Hardness, BOD, COD, Nitrate, Phosphate, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform, Oil & Grease	18,300.00	2	36,600.00
Drinking water	pH, TDS, Alkalinity, Hardness, Chlorine, Calcium, Sodium, Potassium, Total Coliform, Fecal Coliform	10,700.00	4	42,800.00
Effluent	WWTP (Temperature, pH, COD, TSS, Oil & Grease, Sulfides)	6,500.00	4	26,000.00
	STP (pH, BOD5 at 20°C, COD Total Nitrogen, Total Phosphorus, Oil and Grease, TSS, TC)	12,300.00	4	49,200.00
Visual monitoring	Table 8.3	60,000.00	04	2,40,000.00
Total Cost				**11,77,000.00**

Chapter 9

9 ALTERNATIVE ANALYSIS

9.1 Introduction

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 proposed project-

- ✓ Analysis 1: No Build Scenario.
- ✓ Analysis 2: Location Alternatives.
- ✓ Analysis 3: Technology Alternatives.

9.1.1 Analysis 1: 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 but in that case the demand for steel in Bangladesh would also not be possible to meet. The demand has increased sharply in recent years – currently 7.5 million MT which was merely 2.5 million MT in a decade ago. Steel Industry in Bangladesh is required to support the Modern civilization, Infrastructure engineering, economic growth. The aim of this project is to manufactured 1,000,000 MT steel products per year and supply the products to the national and international market.

Choosing this project at the proposed location will increase the steel production of Bangladesh and can fulfill the demand of infrastructure material in international market. This project will also support the employment opportunity in regional and national level. If chose no build scenario instead of steel mill establishment then no development and economic growth will be possible. The vacant land is owned by Unitex group for steel mill so the land cannot be used for other purposes.

So, choosing 'No Build Scenario' alternative is unacceptable and project implementation is required for national economic growth and development.

9.1.2 Analysis 2: Location Alternatives

The Steel mill is planning to be developed in an area of 60 Acres. The project land is owned by Unitex Steel Mills Limited and enough to set new industry with all equipment and machineries. The project is viable on following count: -

- Own land of the project proponent.
- No resettlement and rehabilitation issues in the main mill area.
- No forest land is involved.
- The site has easy access to port for raw material transportation.

- Water Requirement from adjacent canal, bore well and rain water harvesting.
- The Steel mill will be connected with Korerhat 400/230/132/33 KV Substation of PGCB by a new 230/33 KV Grid Substation of Unitex where electricity will be supplied from National Grid. Load sanction has already been approved from regulatory body.
- Manpower availability from nearby areas.
- Absence of cultural heritage and historical importance within 5 km radius.

Based on the above criterion, alternative of proposed project location is not acceptable.

9.1.3 Analysis 3: Technology Alternatives

The proposed project involves the introduction of Electric Arc Furnace, Ladle Refining Furnace, Scrap Processing Machine, Continuous Casting Machine, Rolling Mill, Air Separation Plant, Fume Treatment Plant, Water Treatment Plant, Slag Treatment plant. The machineries and technology list of proposed steel mills has been considered best on account of the following:

- Consistence in quality issues.
- Quick start up and high production rate.
- Electric arc Furnace is efficient as it significantly reduces carbon emissions in steel production and can be used to produce a large number of steel products.
- Proposed project has own fume treatment plant which is environmentally efficient.
- Water will be treated and reused by water treatment plant and no waste water will be discharged near the surface water body.
- Slag is a byproduct generated during the production of steel in electric arc furnaces, Slag will be treated and will use as a raw material for other purposes

Based on the above criterion, alternative of project technology is not required as the proposed project technology is quite efficient.

Chapter 10

10. EMERGENCY RESPONSE AND DISASTER MANAGEMENT PLAN

10.1 Emergency Response

The initial response to an incident is a critical step in the overall emergency response. Like all other projects and installations, the project must have adequate measures against accidents or incidents to meet the emergency. The purpose of having an Emergency Response Plan (ERP) is to:

- Assist personnel in determining the appropriate response to emergencies;
- Provide personnel with established procedures and guidelines;
- Notify the appropriate Company Emergency Response Team personnel and regulatory/ Govt. agencies;
- Manage public and media relations;
- 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,
- Furnace blast,
- Electrocution, and
- Medical emergency.

II. Natural Disasters

- Flood,
- Earthquake/ cyclone,
- Storm/ typhoon/ tornados, and
- Cloud burst lightning.

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 near-miss 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 fault finding. 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 hazardous waste, uncontrolled releases of raw hydrocarbon gas, natural calamities, fires burn and injuries. There should be trained emergency response teams, 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.

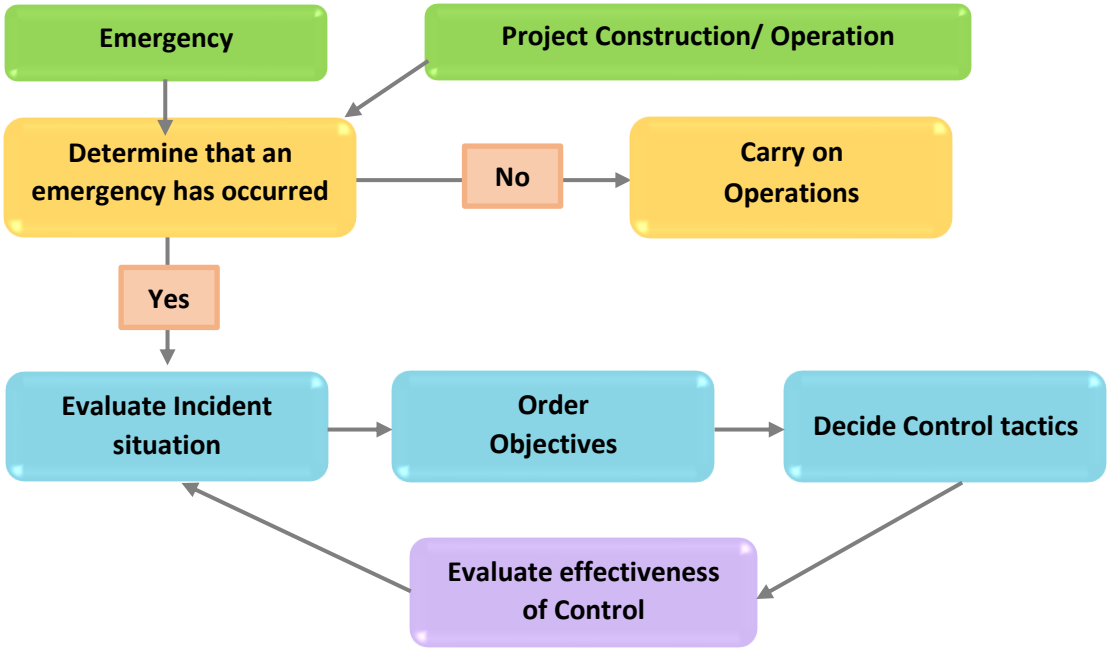


Figure 10.1: Illustrates an Example System Approach to Project Construction and Operation

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 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, civil disturbance/riot, terrorist events/threats and gas leak/explosion.

During any kind of emergency situation all the personnel related to USML will follow the communication matrix given below:

Table 10.1: Communication Matrix during Emergency

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

10.5 Emergency Evacuation Plan

The EHS Manager will formulate a plan for evacuation in the event of an emergency. He/she will make a layout plan, 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 10.2**.

Table 10.2: 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	Heat proof 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 10.3**.

Table 10.3: Cost of Institutional Capacity Building

SI No.	Item	Qty.	Price (BDT)
1	Fire hydrants	12	24,00,000.00
2	Fire Extinguishers	20	38,000.00
3	Portable foam suppression system	20	3,00,000.00
4	Supportive resources mentioned in **Table 10.2**	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 steel mill	10	5,00,000.00
11	First Aid, Emergency medicine & Medical services	-	1,00,000.00

SI No.	Item	Qty.	Price (BDT)
16	Emergency flash lights for Blackouts	10	1,00,000.00
Total =		**55,32,000.00**	

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 develop environment policy and display necessary documentation for ease in accessing information. Some of these documents include:

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

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 is 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 takes into account the conditions specific to Bangladesh. This code should be followed in designing the steel mill structures. The below mentioned plan should be implemented during the construction and operation of this proposed project.

- ✓ 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 Cyclones / Heavy Winds

The project site is located near high wind prone area and the following actions can be taken into account in case of heavy winds:

- ✓ Know about the severity / direction of the cyclone from news bulletins / meteorological dept.;
- ✓ Review the activities / operations planned and stop operations which may create an emergency situation due to cyclone / high winds;
- ✓ Ensure emergency equipment such as batteries / torches etc., are in availability;
- ✓ Ensure food supplies to the work force;
- ✓ Ensure readiness of emergency vehicles / medicines, medical center with staff etc.

10.5.4 Fire Hazard & Fire Evacuation Plan

❖ **Fire Hazard**

Fire hazards such as steam explosion, chemical explosion, electrical hazards, combustible dusts, sparks, voltage up/down etc. 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 mill equipment from fire. Fire protection systems are a combination of mechanical and electrical components and, like steel manufacturing equipment, need regular attention.

❖ **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	✗	✗	✗	✗	✓

10.5.5 Terrorist attack / Sabotage

Terrorism/ Sabotage is the unlawful use of force or violence by a person or group. These attacks can take many forms and could happen at any time in any place without warning. If an event of terrorism/ sabotage occurs, it is important to remain calm and follow instructions from emergency officials and emergency service personnel. Listen to radio or television for news and instructions. Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly. It is the responsibility of EHS Manager to check for injuries and give first aid and get help for seriously injured people and check the location of the emergency exits. The EHS Manager and mill Manager need to gather and record the information available regarding the Terrorist attack/ Sabotage in line with checklist attached as **Annexure 12.**

10.5.6 Bomb Threat

The bomb threat has been used by various groups who want to disrupt business. In all circumstances the first thing that must be done is to determine the nature of the threats to the organization. Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly. The EHS Manager is to gather and record the information available regarding the Bomb Threat in line with checklist see **Annexure 12.**

10.5.7 Kidnap and/or Extortion

Kidnap and/or extortion require some different methods to address them. In some case the information may need to be retained by a very small core team and the negotiations may take place over a protracted period of time. Affected personnel should follow the communication matrix mentioned in **Table 10.1** and act accordingly. The EHS Manager need to gather and record the information available regarding the kidnap/extortion situation in line with checklist see **Annexure 12.**

Due to the extreme sensitive nature of a kidnap and/or extortion negotiation it is imperative that the Project management makes immediate contact. The Project management will either take over the responsibility for the negotiations or will provide guidance to the EHS Manager.

Chapter 12

11 STAKEHOLDER CONSULTATION

11.1 Introduction

Stakeholder consultation forms an important part of the EIA 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 of the project.

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 EIA 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.

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—EIA 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 EIA 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 EIA 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:

- FGD with local communities including local businessman, local residential people and local labors.
- KII with relevant Government & Non-government officials including DoE, Department of Agricultural, BWBD Union Parishad members, UNO, NGOs etc.;

11.5 Stakeholder Concerns and Recommendations

FGDs and KII for this proposed project was conducted at 12th -13th September, 2023 and 8th October, 2023 respectively. 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 EIA, 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 13.**

Table 11.1: Summary of Consultation and Discussion with Community People

Issues	Issues Discussed by Community people	Comments of Community People
Employment	Creating more employment opportunity	During the implementation of the project, they requested that the authority should involve local people in constructional work and construction materials should be locally purchased

Issues	Issues Discussed by Community people	Comments of Community People
Waste Generation	Disposal of solid and hazardous waste	They requested the authority for proper disposal of waste and do not dump any waste water in surrounding water bodies so that it doesn't create any negative impact
Environment	Possibilities of air, noise, light & water pollution	They requested the authority to follow all laws and regulations of environment. Besides, they should use high technology in order to protect air, water and soil from pollution.
Compensation Demand	Possibilities of property loss by project activity	They requested that the Project authority should give compensation if any damage occurs to their house, crop or property due to project activity
Community development	Overall development of the Upazila	They think this project will change their life as well as the existing condition. They expect that the socio-economic condition of local people will flourish. People are in favor of the project and they ask to prioritize local people and employ them during different phases of the project.

Figure 11.1: Photographs of FGD around the project site

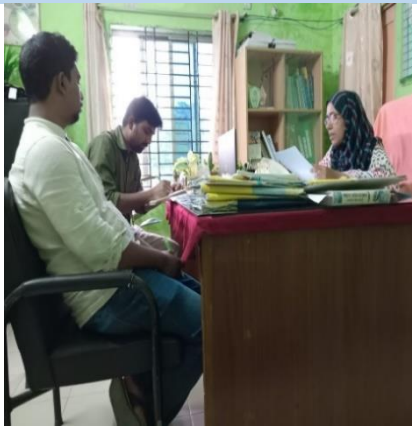
Table 11.2: Summary of KII with Govt. & Non-Govt. Officials

Authority	Name	Designation	Gender	Comments
Government Officials (Feni District)				
Department of Environment (DoE), Feni	Mst. Showkat Anakoli	Deputy Director	Female	• 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.
BWDB, Feni	Md. Mominul Islam	Deputy Chief Extension Officer	Male	• Do not dump any waste water from the mill to the adjacent water body; • Proper mitigation and management plan should be adopted so that natural aquatic ecosystem is not disturbed; • No waste water should be discharged to the nearest waterbody without proper treatment.
Department of Agricultural Extension, Feni	Md. Sofuel Hossain	Additional Deputy Director	Male	• Proper mitigation and management plan should be adopted so that natural ecosystem is not disturbed; • The project should not create water logging in the adjacent area; • Maintenance must be taken to ensure that no solid or hazardous waste should be disposed off in nearest agricultural field.
Department of Inspection for Factories and Establishment, Feni	Engr. Shorif Ahmed	Deputy Inspector General	Male	• We support this project as it will elevate the steel production and also mark an impact in the global market by importing the steels in foreign countries. • The project authority should maintain all the safety rules during steel productions and project implementations.
Government Officials (Chhagalnaiya Upazila)				
UNO Office Chhagalnaiya	Moumita das	UNO	Female	• We support this project because we need to develop the socio-economic condition and this project will help us to achieve that goal; • The authority must follow all laws and regulations of environment so that the biodiversity of River and Forest do not get harm.
Upazila parishad Chhagalnaiya	Nayam Kanti	Admin officer	Male	• Unitex authority should maintain proper inspection and equipment to protect air, water from pollution; • Employment opportunity should be given to the local people;

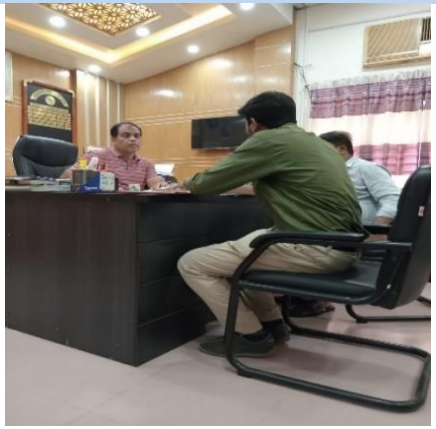
Authority	Name	Designation	Gender	Comments
				• Project authority should contribute for the welfare of surrounding community.
Land Office	Fakhrul Islam	A.C. Land	Male	• Proper safe disposal of solid and hazardous waste. • Project proponent should follow the environmental related rules and regulations.
LGED, Chhagalnaiya	Md. Sheikh Farid	Sub Asst. Engineer	Male	• The steel mill construction process should maintain the rules and regulation of BNBC.2020.
Elected Representatives (Gopal Union)				
Gopal Union Parishad	Mohammad Salim	U.P. Chairman	Male	• I believe this kind of project will create employment opportunity for local people. • This project should maintain all the environmental rules and regulation so no air, noise and water pollution could occur. • This project boundary should maintain at least 300m distance from project around residential houses and school.
Korerhat Union	Arif Hossain	U.P. secretary	Male	• We support this project because as it will improve the socio-economic condition of the project area and will create employment opportunity;
Doulatpur	Manik Chandra Shil	Primary School Head Master	Male	• Project proponent should be careful about the project activity which may create environmental pollution; • Should maintain all the rules and regulations and do not release any waste without treated.
NGOs of Gopal Union				
BRAC, Gopal Branch	Shaheda khatun	Field Officer	Female	• We always Support this kind of project. We are ready to provide any kind of support if needed; • The authority should give priority to the local people for different job opportunity; • The authority should provide compensation if any damage occurs due to project intervention;

Authority	Name	Designation	Gender	Comments
				• They should follow the environmental laws and regulations so that it does not impact on health of community people.
ASA, Gopal Branch	Md. Shofiul Islam	Branch Manager	Male	• We appreciate this project; • The authority should take enough measures and use high technology to keep the environment safe and sound; • Employment opportunity should be given to the local people.

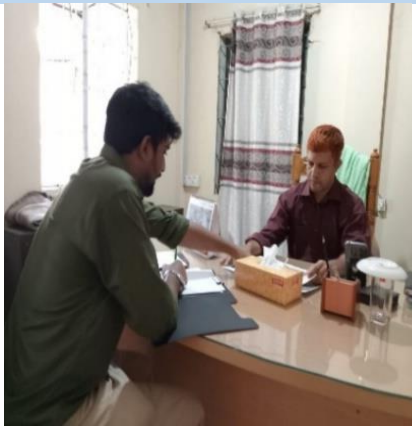
Government Officials, Feni district



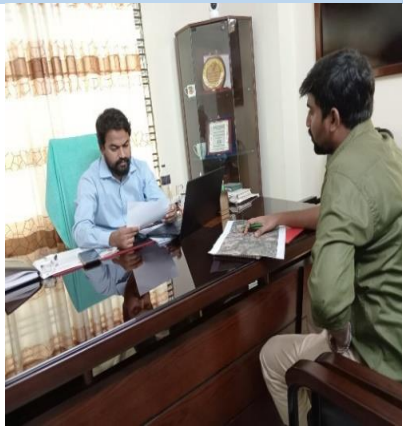
DoE office, Feni



BWBD, Feni



Department of Agricultural Extension, Feni



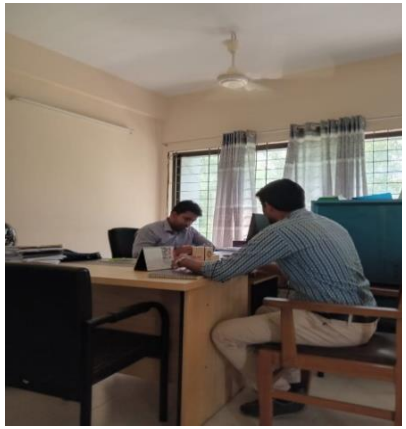
Department of Inspection for Factories and Establishment, Feni

Government Official, Chhagalnaiya Upazila

UNO Office Chhagalnaiya

Upazila parishad Chhagalnaiya

Land Office



LGED, Chhagalnaiya

Elected Representatives (Gopal Union)

U.P. Chairman

U.P. secretary

Primary School Head Master

NGOs Gopal Union

ASA

BRAC

Figure 11.2: Photographs of KII at different Government and Non. Govt. Office

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 EIA 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. For the proposed project, the complaints that may be anticipated during construction phase are mostly related to dust, noise 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 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 are 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 compensations 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.

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

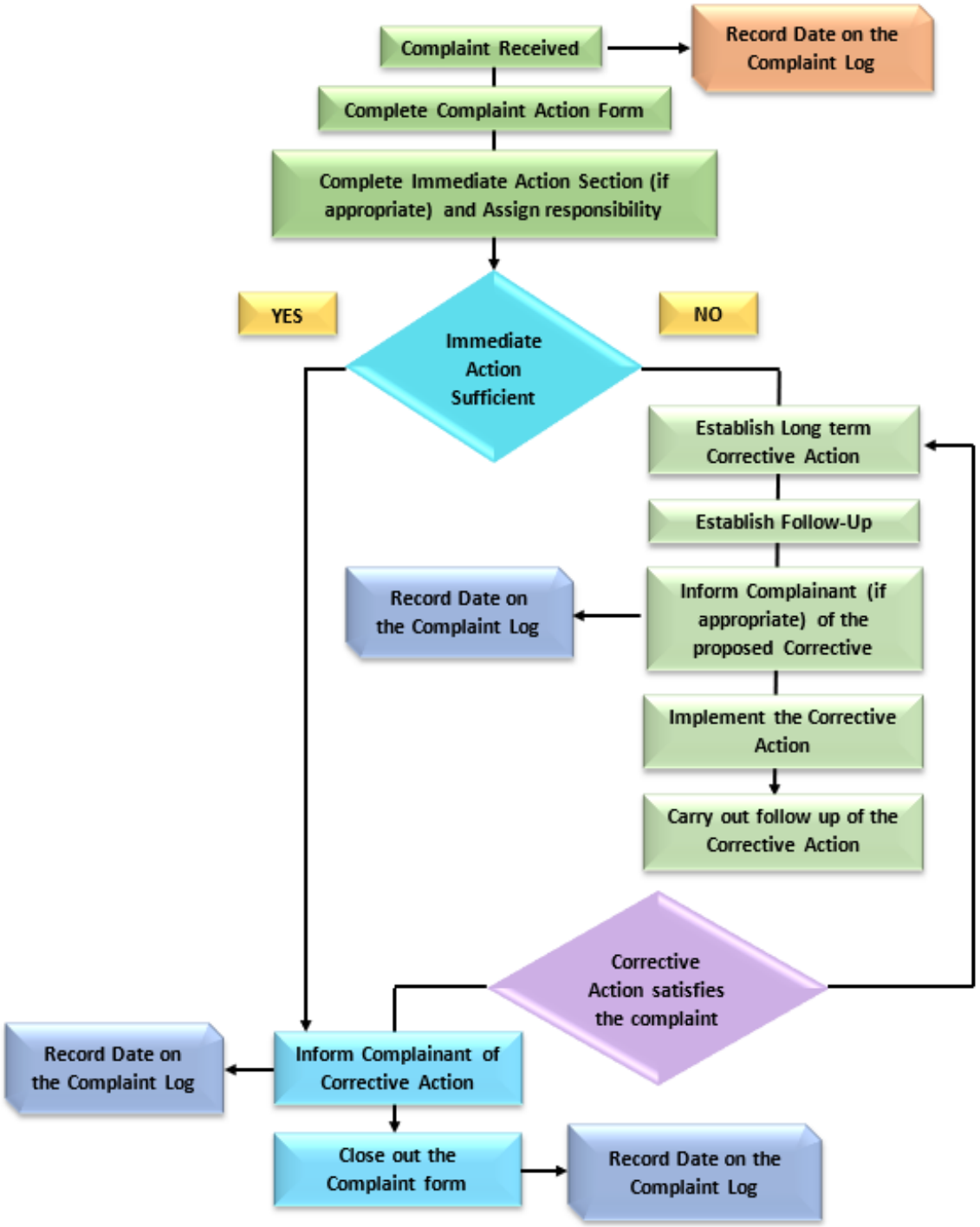


Figure 12.1: Flowchart of Complaints/Grievance procedure

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

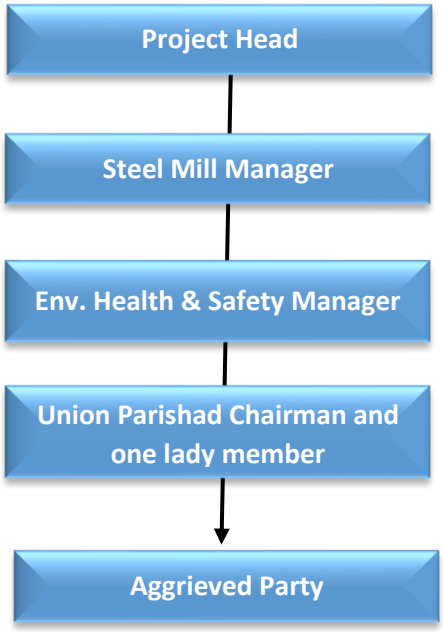


Figure 12.2: Member list of the Grievance committee

- ✓ GRC will maintain a Complaints Database, which will contain all the information on complaints or grievances received from the communities or other stakeholders. This would include: the type of complaint, location, time, actions to address these complaints, and final outcome;
- ✓ The procedures to be followed and adopted by the grievance redress should be transparent and simple to understand or uniform process for registering complaints provide project affected persons with free access to the procedures;
- ✓ The response time between activating the procedure and reaching a resolution should be as short as possible;
- ✓ An effective monitoring system will inform project management about the frequency and nature of grievances;
- ✓ GRC will arrange half yearly meetings where the activities and the outcomes/measures taken according to the Complaints Database are to be monitored and reviewed by third party consultant to ensure the required transparency;
- ✓ In addition to the above, if there are any grievances related to social or environmental management issues in the project area, the GRC will record these grievances and suggestions and pass it on to the relevant consultant for necessary action and follow-up;
- ✓ In case a dispute is not resolved by arbitrational tribunal, then if any of the party disagrees, the aggrieved party has the right to appeal to the ordinary courts of law;
- ✓ 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 years 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)	▪ By Phone ▪ 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?		
Signature:		**Date:**

12.2 During Construction

During construction phase there might be some complaints regarding constructional noise, dust pollution, hazardous waste etc. However, unforeseen issues may occur. To settle such issues effectively, an effective and transparent channel for lodging complaints and grievances should be established during construction period.

12.3 During Operation

During the operational phase of the project, the complaints that may be anticipated are mostly related air pollution, noise pollution, accidental issues, social issue etc. due to the project. 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 and transparent process. It should also be readily accessible to all sections of the community at no cost and without retribution.

Chapter 13

13 CONCLUSION AND RECOMMENDATIONS

13.1 Conclusions

The proposed project is a nationally important project to ensure economic growth and secure the future development of our country. The present EIA report finds that; though there are certain adverse environmental impacts associated with the project construction and operation phase, these are manageable if provided recommendations in the EMP are followed with due diligence.

The significant impacts during construction phase are Dust and noise due to the construction activities, dumping of construction wastes, accidental spillage, Water pollution due to constructional waste, Occupational health and safety hazards, supply of pure drinking water and sanitation facilities for workers, community health and safety, etc.

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; Access to workplace must be restricted for community people, to provide higher degree of safety and people working in the site must wear 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 USML; 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 project.

During operation phase the potential environmental and social impacts are associated with flue gas emission and noise generation due to mill operation, blowdown from cooling process, slag waste generation from EAF, fire accident risk, solid & hazardous waste generation, sewage waste, occupational health and safety etc. Electrocution, bird Collison, waste accumulation can be occurred from transmission line and substation area.

To control the gaseous emission in the air, mill proponent will implement a Fume Treatment plant to collect and purify the fume from EAF and ladle furnace before releasing it in the atmosphere. Hazardous slag waste will be converted into slag chips which can be used constructional material and will be sold to secondary dealer. Waste water from the cooling process and other sources should not be discharged in the adjacent water body, they will treat in the waste water treatment plant before reusing in slag treatment process. There will be no process water discharge from the plant. Moreover, proper handling and safe disposal of other hazardous waste (fuels, oils, lubricants) should be undertaken. Supply good quality drinking water and

adequate standard toilet facilities must be available at the project area. Solid waste will have to be disposed in safe disposal area. Regular sprinkling of water should be maintained. All the officials and trainees should be made aware of the local societal norms. STP of adequate capacity should be installed at the project site.

In transmission line area bird guards should be used for the protection of terrestrial habitats and proper safety boards should be maintained in the substation and transmission line area for the safety of the local people and workers.

Compared to the detrimental impact, the beneficial impacts of this project are many. Steel production in Bangladesh is of vital importance, supporting the country's infrastructures raw material needs, driving economic growth and offering opportunities for regional collaboration. If this project implemented it will increase the employment rate.

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. 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 authority should take these into consideration.

13.2 Recommendations

The proposed project should follow the mitigation measure and management plan mentioned in Table 7.1 and the following recommendations are observed properly-

- 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;
- Proper air pollution control system should be installed and its efficiency should be checked periodically. No Liquid waste from the steel mill should be dumped in the adjacent water body without proper treatment;
- Occupational Health safety should be maintained throughout the project implementation and operation activity and the handling of the mill machineries should be undertaken by the professional;
- Solid and Hazardous waste management is an important issue in this project. Some waste materials have secondary demand which can be sold but other wastes must be disposed properly;

- 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;
- All activities (pre-construction, construction and post-construction stage) should be implemented according to EMP and regular monitoring of the project activities as mentioned in the environment monitoring plan during different phases of the project should be done.

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16. The Environmental Conservation Rules (ECR). (2023). Schedule 8: Government of the People's Republic of Bangladesh Ministry of Environment and Forest.
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18. The Noise Pollution Control Rules. (2006). Schedule 1: Government of the People's Republic of Bangladesh Ministry of Environment and Forest.

Annexures

Annexure 01

DoE Approved ToR

শেখ হাসিনার বাংলাদেশ
পরিচ্ছন্ন পরিবেশ

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, Paribesh Bhaban
E-16 Agargaon, Sher-e-Bangla Nagar, Dhaka-1207
www.doe.gov.bd

Memo No: 22.02.0000.018.72.036.23. 147 Date: November, 07, 2023

Subject: Approval of Terms of Reference for EIA for Unitex Steel Mills Ltd, Daulatpur, Muhuriganj, Chhagalnaiya, Feni.

Ref: Your Application received on 30.07.2023

With reference to your letter received on 09.08.2023 for the subject mentioned above, the Department of Environment hereby gives approval of Terms of Reference to conduct EIA for **Unitex Steel Mills Ltd; Daulatpur, Muhuriganj, Chhagalnaiya, Feni** subject to fulfilling the following terms and conditions:

I. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) considering the overall activity of the said project in accordance with the ToR submitted to the Department of Environment (DoE).

II. The EIA report shall be prepared in accordance with the guidelines provided in the schedule-11 and Rules-15 of the Environmental Conservation Rules, 2023.

III. Hence the Department of Environment issues additional ToR to include in the EIA as follows:

1. **Environmental and Social Baseline information should include:**
   - Project site specific micro-meteorological data including temperature, humidity, wind speed & direction and rainfall;
   - Ambient air quality data at 8 locations for SPM, PM_{10}, $PM_{2.5}$ & SO_2 shall be collected for taking into consideration of predominant wind direction, population zone and sensitive receptors.
   - Surface water quality of nearby river (100 meter upstream and downstream of the discharge point) and other surface drains at 8 location;
   - Noise level monitoring at least 8 (eight) locations within the study area.
   - Detailed description of flora and fauna existing in the study area with special reference to rare, endemic and endangered species.
   - Socio-economic status of study area.

2. **Anticipated Environmental and Social Impacts due to the project shall be identified and assessed for their magnitude**:
   - Water Quality
   - Air quality (Air quality model to be used for predicting the impacts from potential emission source)
   - Hazardous waste
   - Noise
   - Flora and fauna
   - Livelihoods, community health and safety, vulnerable group and gender issues

3. **Environmental Mitigation, Management and Monitoring Plan shall include:**
   - Details of stack emission and air pollution control system including measure for fugitive emission control.

- Detailed specification and design of air quality control system. In the EIA report, information regarding Air Pollution Control System should be included following Rules 8 of Air Pollution (Control) Rules, 2022.
- Treatment of waste water from different plant operation, recycled and reused of waste water for different purposes shall be included.

4. **Occupational Health and Safety Plan should include:**
   - Details of exposure to specific occupational health and safety hazard;
   - Plan and fund allocation to ensure the occupational health and safety of all workers;
   - Annual report of health status of workers with special reference to OHS.

IV. A buffer zone of at least 300 meters should be kept from the boundary of Muhuriganj High School on the south side of the factory. Apart from this, a buffer zone of at least 300 meters should be maintained on the northern boundary of the factory from residential houses.

V. The proposed access road has to be constructed to the northern side of the existing Chhagalnaiya link road for providing access to the project area from the highway Existing access road cannot be used for vehicular movement.

VI. Approval of Bangladesh Railway, Roads & Highways Department and other concerned authorities should be taken for the construction of new link road with Chhagalnaiya Road for the project work. All approval letters must be submitted along with the EIA Report.

VII. A revised master layout plan showing the new road and proposed buffer zone should be submitted. For this purpose, the necessary land ownership documents also have to be submitted.

VIII. Consultation with Stakeholders/Public Consultation should be done in accordance with the Rule 16 of the Environmental Conservation Rules, 2023.

IX. The project authority shall submit the EIA report to the Head Office of DoE in Dhaka.

X. Without obtaining Site Clearance by the Department of Environment, the project authority shall not undertake land and infrastructure development of the project and shall not open L/C in favor of importable machineries.

07.11.2023

(Masud Iqbal Md. Shameem)
Director (Environment Clearance)
Phone: 88-02-222218342

Managing Director
Unitex Steel Mills Ltd.
Saiham Tower (10th Floor)
House # 34, Road # 136, Block # SE(C-1), Gulshan-1, Dhaka 1212

Copy Forwarded to:

1. Director, Department of Environment, Chattogram Regional Office, Chattogram.
2. Deputy Director, Department of Environment, Feni District Office, Feni.
3. Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

File No.	Date	Owner Name	BS DAG NO	Purchase Land in Satak
85	'21/12/2022	1. Pear Ahmed	3208	13.00
			3168	46.00
			3170	10.00
			3171	10.00
			3179	10.00
89	'10/01/2023	Mohmmad Kamrul Hasan , Father-Late Md. Shaik Abdullah Chaow, Mother,Kamrrun Nahaer	3745	22.00
			3748	5.32
			3749	9.18
90	17/01/2023	Abul kalam	3709	8.00
91	'23/01/2023	Sheikh Gul Mohammad	3721	5.13
92	7/02/2023	Sultana Razia	3661	24.00
			3692	23.00
			3693	11.00
			3643	
			3906	23.00
			3907	8.00
			3908	17.00
			3909	10.00
			3910	82.00
93	13/02/2023	Zebal Hoque	3669	5.00
		Siddique Ahmed	3692	3.50
94 (1)	20/02/2023	1. Md. Yusuf	3720	22.00
94 (2)	20/02/2023	1. Md. Yusuf	3704	12.00
			3711	6.67
95	07/03/2023	1. Jasim Uddin Ahmed	3164	74.00
96	18/04/2023	Jahangir Alam	3639	42.00
86 (1)	09/05/2023	1. Mohammad Nazim Uddin	3732	2.92
97	05/05/2023	1. Shazzater Rahman	3642	13.45
98	05/06/2023	1,. Monir Ahmmed	3901	29.00
			3889	13.00
99	12/06/2013	1. Mainul Islam	3822	7.63
			3892	1.91
3066/23	04/07/2023	1. Monirur Nesa Gong	3580	20.00
3202/23	23/07/2023	1. Md. Shahid Ullah	3767	26.00
			3770	48.00
			3771	43.00
3729/23	09/08/02023	1. Peyara Begum Gong	3587	30.00
4057/23	29/08/2023	1. Mozibul Hoque	3709	8.00
			3899	10.00
4287/23	12/09/2023	1. Rup Chandra Shil Dhana	3766	48.00
Total Land (Non- Mutated)				**1,021.53**

UNITEX STEEL MILLS LIMITED UNITEX GROUP

Unitex Steel Mills Ltd

Shahidullah

Directo

Annexure 02

Land Ownership Documents

Land Purchase (Mutated)

Sl. No.	Mutation Khatian No.	BS Dag	Mutated Land
1	1704	3700	18.00
		3703	38.00
2	1705	3859	3.42
		3860	5.58
		3858	8.00
		3709	24.00
3	1707	3704	24.00
		3711	13.33
		3761	20.00
4	1708	3717	50.00
		3704	16.00
5	1709	3857	13.00
		3761	16.00
		3854	37.00
6	1710	3715	10.00
		3866	46.00
		3868	45.00
7	1730	3661	13.36
		3692	4.45
		3693	6.12
		3906	2.79
		3765	4.00
		3765	10.00
8	1731	3722	22.00
9	1732	3716	39.36
		3714	10.00
10	1733	3887	10.00
		3687	10.00
		3732	9.17
11	1734	3831	24.00
		3881	43.00
		3882	19.00
		3884	70.00
		3885	22.00
		3883	49.00
12	1735	3773	29.00
		3880	20.00
13	1736	3877	21.00
		3724	15.00
		3728	17.00
		3729	12.00
		3718	14.00
		3710	22.00

Unitex Steel Mills Ltd.
Director

Land Purchase (Mutated)

Sl. No.	Mutation Khatian No.	BS Dag	Mutated Land
1	1704	3700	18.00
		3703	38.00
2	1705	3859	3.42
		3860	5.58
		3858	8.00
		3709	24.00
3	1707	3704	24.00
		3711	13.33
		3761	20.00
4	1708	3717	50.00
		3704	16.00
5	1709	3857	13.00
		3761	16.00
		3854	37.00
6	1710	3715	10.00
		3866	46.00
		3868	45.00
7	1730	3661	13.36
		3692	4.45
		3693	6.12
		3906	2.79
		3765	4.00
		3765	10.00
8	1731	3722	22.00
9	1732	3716	39.36
		3714	10.00
10	1733	3887	10.00
		3687	10.00
		3732	9.17
11	1734	3831	24.00
		3881	43.00
		3882	19.00
		3884	70.00
		3885	22.00
		3883	49.00
12	1735	3773	29.00
		3880	20.00
13	1736	3877	21.00
		3724	15.00
		3728	17.00
		3729	12.00
		3718	14.00
		3710	22.00

Dhaka Office:
Saiham Tower (10th floor), House-34, Road-136,
Block-SE(C-1), Gulshan Model Town, Gulshan-1, Dhaka-1212.
Tel: +88 02 222293 724, 02 2298389 + 880 1966555444

Chattogram Office:
C & F Tower (12th floor), 1712
Sk. Mujib Road, Agrabad C/A, Chattogram.
Tel: 031-2519861-3, Fax: 031-2519860.

Factory:
Unitex Steel Mills Ltd.
Ghopal, Chhagolnaiya,
Feni.

Sl. No.	Mutation Khatian No.	BS Dag	Mutated Land
14	1737	3716	17.44
		3708	20.00
		3890	9.00
15	1738	3698	20.00
		3898	34.00
16	1739	3862	23.00
		3848	13.00
		3896	7.21
		3674	3.85
		3670	1.44
17	1740	3964	10.00
18	1741	3826	17.00
		3827	9.00
		3828	23.00
		3829	21.00
		3876	10.00
19	1742	3712	27.00
		3733	23.00
20	1743	3878	18.00
		3853	16.00
		3861	22.00
21	1744	3769	28.00
		3775	36.00
22	1746	3874	32.00
23	1747	3701	73.00
		3928	30.00
		3931	4.00
		3929	20.58
24	1748	3888	36.00
		3702	36.00
25	1749	3727	6.00
		3740	33.00
		3768	28.00
26	1750	3903	31.00
		3897	30.00
27	1907	3696	27.00
		3870	19.00
28	1909	3823	51.00
		3825	27.00
		3852	23.00
29	1912	3730	17.00
		3754	50.00
		3754	11.00

UNITEX STEEL UNITEX GROUP MILLS LIMITED

Sl. No.	Mutation Khatian No.	BS Dag	Mutated Land
30	1934	3833	62.00
		3844	54.00
		3846	7.00
		3758	26.00
		3755	25.00
		3756	21.46
		3886	9.50
		3757	51.04
31	1935	3493	17.00
		3716	19.20
32	1937	3822	40.37
		3892	10.09
33	1938	3735	20.00
		3713	24.00
35	1999	3752	45.00
		3753	47.00
		3739	19.00
36	2000	3748	26.67
		3749	45.83
37	2014	3721	17.87
		3859	13.17
		3860	17.42
38	2015	3906	3.00
		3907	0.33
		3908	0.67
		3910	28.00
		3905	0.55
		3865	18.50
		3665	15.00
		3666	3.25
39	2016	3904	24.00
		3927	8.00
		3699	15.75
40	2017	3665	18.20
		3666	3.55
		3865	14.50
		3905	0.45
		3910	21.00
41	2018	3894	16.00
		3899	18.00
		3900	6.00
		3723	13.00
		3873	37.00
42	2019	3695	9.00
		3760	33.00

UNITEX STEEL UNITEX GROUP MILLS LIMITED

Sl. No.	Mutation Khatian No.	BS Dag	Mutated Land
43	2030	3677	42.00
		3905	2.00
		3910	19.00
		3736	9.00
		3869	15.00
		3732	2.91
44	2039	3904	7.00
		3699	4.25
		3686	12.00
		3689	4.00
		3676	3.50
		3678	7.50
45	2047	3759	19.00
		3759	20.00
46	2048	3863	36.00
		3697	32.00
47	2050	3832	60.00
		3726	17.00
		3731	17.00
		3893	13.00
48	2051	3851	29.00
		3872	16.00
		3849	27.00
49	2053	3867	53.00
		3762	24.00
		3871	15.98
50	2054	3774	36.00
		3879	31.00
54	2082	3759	12.00
		3763	35.00
55	2083	3707	36.00
	SA 1308	SA-2986	16.00
		SA-824	18.00
	SA 1307	SA-811/3	36.54
		SA-830/2	36.00
		SA-838	39.00
		SA-839	15.50
		SA-2990	10.00
		SA-3050	36.00
Total Mutated Land			**3,688.65**

UNITEX STEEL MILLS LIMITED UNITEX GROUP

Unitex Steel Mills Ltd.
Director

Dhaka Office:
Saiham Tower (10th floor), House-34, Road-136,
Block-SE(C-1), Gulshan Model Town, Gulshan-1, Dhaka-1212.
Tel: +88 02 222293 724, 02 2298389 + 880 1966555444

Chattogram Office:
C & F Tower (12th floor), 1712
Sk. Mujib Road, Agrabad C/A, Chattogram.
Tel: 031-2519861-3, Fax: 031-2519860.

Factory:
Unitex Steel Mills Ltd.
Ghopal, Chhagolnaiya,
Feni.

Land Purchase (Non- Mutated)

File No.	Date	Owner Name	BS DAG NO	Purchase Land in Satak
2	03.10.2019	Mustafa, Sokina, Jasim	3763	35.00
12	06.02.2020	Husne Ara/Husneara, Shariful Islam, Tahmina	3895	9.75
40	19.10.2021	Anowarul Islam, Dr. Shahidul, Jahidul, Didarul, Nasima, Samsun Nahar, Selina Akter	3879	23.94
56	04.01.2022	Nazmul Hasan Chowdhury	3840	34.04
59	18.01.2022	Aleya Begum	3639	2.90
			3661	1.66
			3693	0.76
			3983	4.21
			3986	0.69
			3987	1.66
			3907	0.14
			3908	0.21
			3909	0.21
			3910	0.21
			3920	0.69
			3921	1.38
			3924	2.76
			3985	2.07
			4178	0.69
			3692	0.55
			3925	0.21
			4004	0.28
			3922	0.69
			3923	0.69
			3906	0.35
61	24.01.2022	Md. Sahab uddin	3951	7.70
70	26/04/2022	Momtaz Ara & Ferdous Ara	3847	18.00
77		Ferdous Ara	3091	10.00
87	18/10/2022	Amin Sarif- Rofiqul Haider- Salin	3896	2.50
			3674	
			3670	
83	05/12/2022	1. Rahim Ullah- (owner), Father: Shorif Ullah, Mother: Sufia Khatun	3194	30.00
			3206	2.00
82	21/11/2022	1. Jobada Khatun (owner), Husband: Shak Md. Nizam Uddin , Mother: Late Begam Biya	3206	3.91
88	21/12/2022	1. Pear Ahmed	3504	15.00
			3714	2.00
			3705	2.00

Unitex Steel Mills Ltd.

File No.	Date	Owner Name	BS DAG NO	Purchase Land in Satak
85	'21/12/2022	1. Pear Ahmed	3208	13.00
			3168	46.00
			3170	10.00
			3171	10.00
			3179	10.00
89	'10/01/2023	Mohmmad Kamrul Hasan , Father-Late Md. Shaik Abdullah Chaow, Mother,Kamrrun Nahaer	3745	22.00
			3748	5.32
			3749	9.18
90	17/01/2023	Abul kalam	3709	8.00
91	'23/01/2023	Sheikh Gul Mohammad	3721	5.13
92	7/02/2023	Sultana Razia	3661	24.00
			3692	23.00
			3693	11.00
			3643	
			3906	23.00
			3907	8.00
			3908	17.00
			3909	10.00
			3910	82.00
93	13/02/2023	Zebal Hoque	3669	5.00
		Siddique Ahmed	3692	3.50
94 (1)	20/02/2023	1. Md. Yusuf	3720	22.00
94 (2)	20/02/2023	1. Md. Yusuf	3704	12.00
			3711	6.67
95	07/03/2023	1. Jasim Uddin Ahmed	3164	74.00
96	18/04/2023	Jahangir Alam	3639	42.00
86 (1)	09/05/2023	1. Mohammad Nazim Uddin	3732	2.92
97	05/05/2023	1. Shazzater Rahman	3642	13.45
98	05/06/2023	1,. Monir Ahmmed	3901	29.00
			3889	13.00
99	12/06/2013	1. Mainul Islam	3822	7.63
			3892	1.91
3066/23	04/07/2023	1. Monirur Nesa Gong	3580	20.00
3202/23	23/07/2023	1. Md. Shahid Ullah	3767	26.00
			3770	48.00
			3771	43.00
3729/23	09/08/02023	1. Peyara Begum Gong	3587	30.00
4057/23	29/08/2023	1. Mozibul Hoque	3709	8.00
			3899	10.00
4287/23	12/09/2023	1. Rup Chandra Shil Dhana	3766	48.00
Total Land (Non- Mutated)				**1,021.53**

UNITEX STEEL MILLS LIMITED UNITEX GROUP

Unitex Steel Mills Ltd

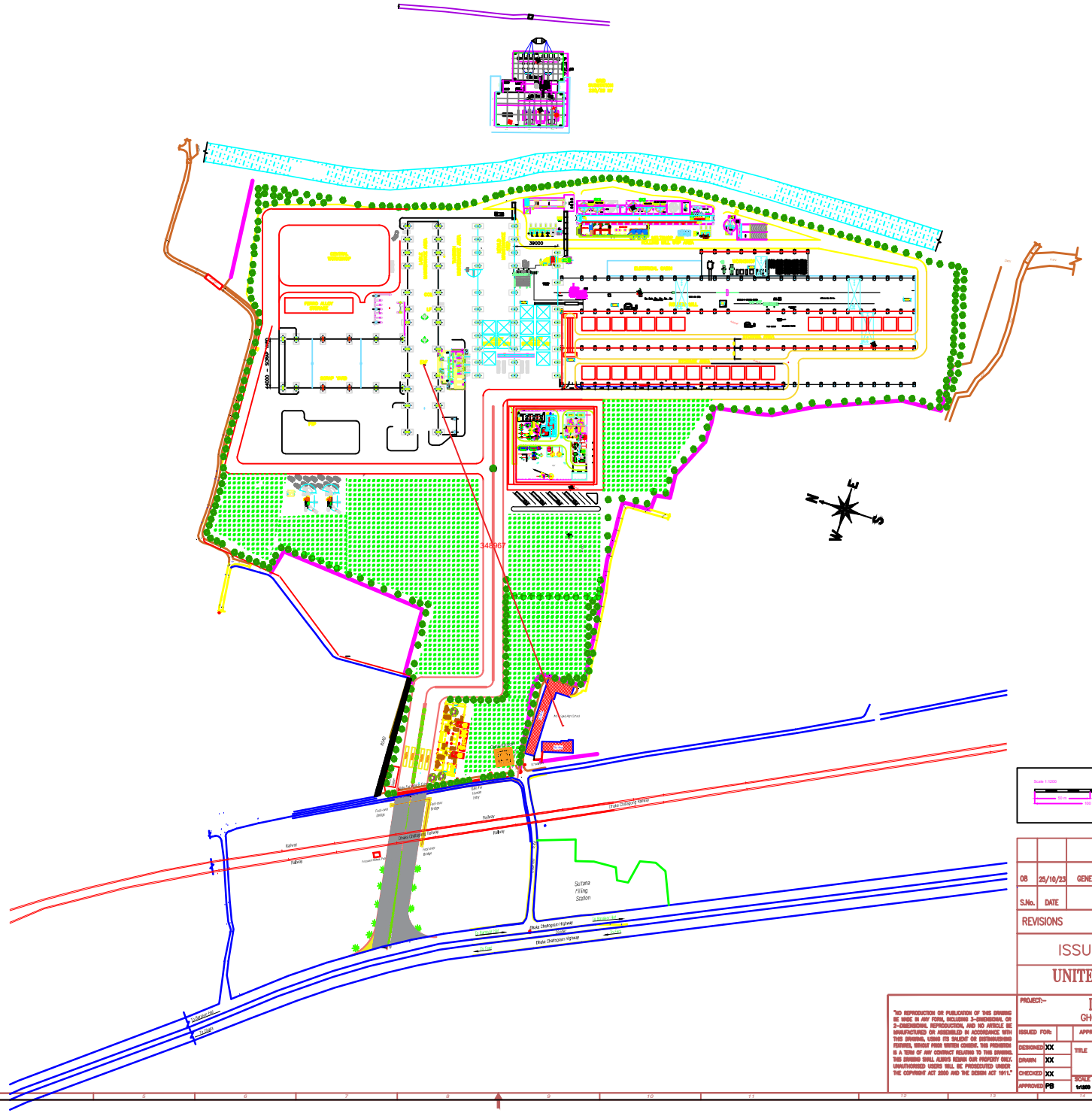
Shahidullah

Directo

Annexure 03

Layout of the Proposed Project

Steel Mill layout



S.No.	DATE	DESCRIPTION	BY	CHD	APD
08	25/10/23	GENERAL REVISION	XX	XX	PB

REVISIONS

ISSUED FOR INFORMATION

UNITEX STEEL MILLS LIMITED

PROJECT:- Integrated Steel Manufacturing Plant
GHOPAL, CHAGOLNAIYYA FENI, BANGLADESH

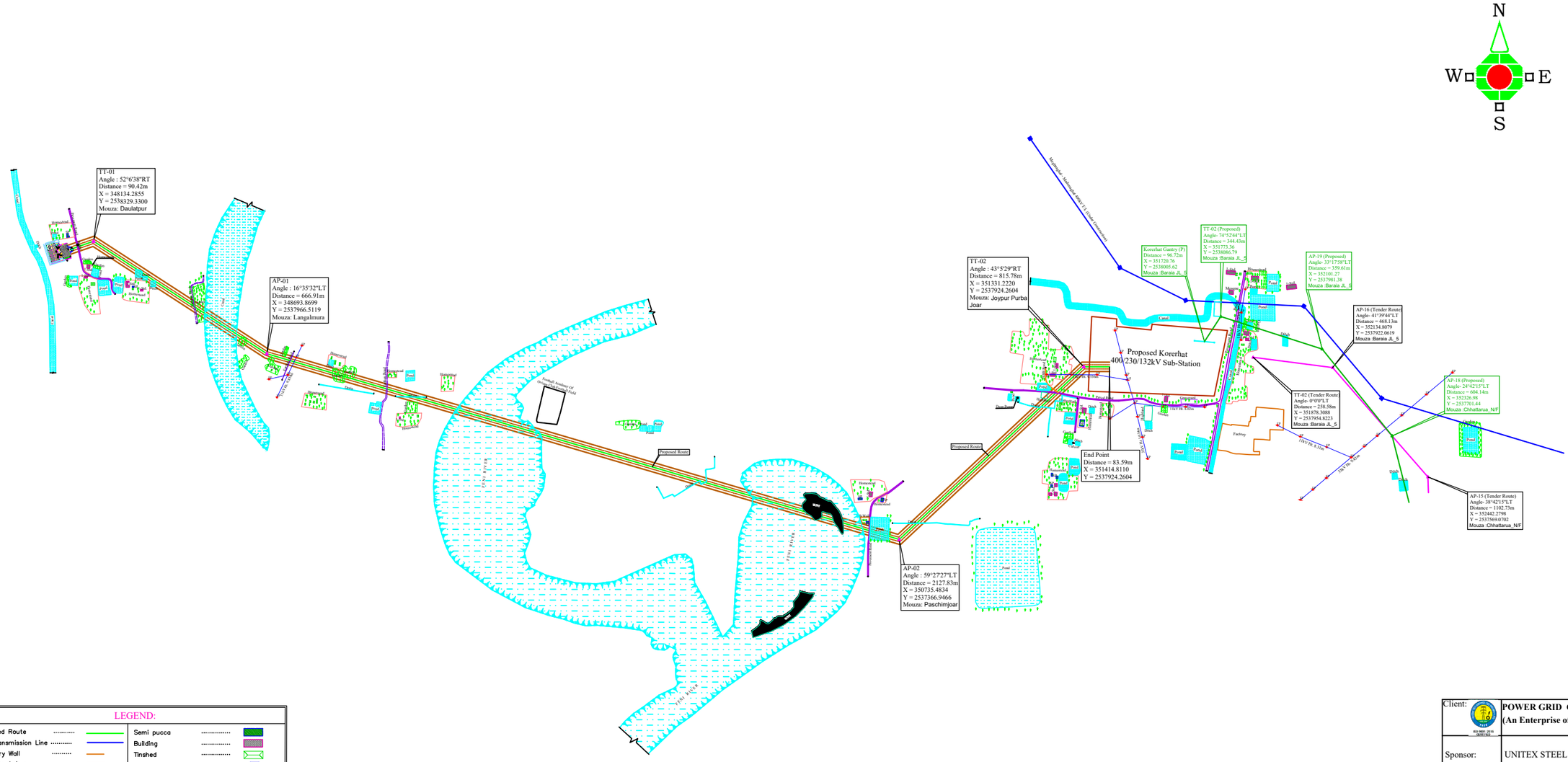
ISSUED FOR:	APPROVAL	X	INFORMATION		CONSTRUCTION
DESIGNED	XX				
DRAWN	XX				
CHECKED	XX				
APPROVED	PB				

TITLE: PROJECT SITE AREA LAYOUT PLAN

SCALE: 1=1000 | DATE: 25.10.23 | Dwg. No.: USML-E-1001 | SH — 1 OF — | Rev. 08

Transmission line layout

Proposed Route Korerhat 400/230kV Substation to Unitex Steel Mills Limited, Feni 230kV Transmission Line Length = 3.785km



LEGEND:

Proposed Route		Semi pucca	
Ext. Transmission Line		Building	
Boundary Wall		Tinshed	
Homestead Area		Ext. Tower	
Canal		EP Line/EP pole)	EP EP
Drain		Angle Point	
River		Pond/Ditch	
Lowland		Graveyard /Garden Tree	
Pavement Road		Gate & Pillar	
HBB Road		Deep Pump/Bridge	
Eathen Road		Betel Leaf Tree/TBM	
Pipe Line & lamp Post		Mango Tree	
Crematorium		Banana & Kul Tree	
Sand Filling Area		Litchi Tree	
Open Land		Date Palm Tree	
Highland		Jackfruit Tree	
Railway Line		Bamboo/BanyanTree	
Temple Area		Garden/Others Garden	
Brick Field Area		Proposed Substation	
Solar			
Filling Station			
Eidgah			

Client:	**POWER GRID COMPANY OF BANGLADESH LTD. (An Enterprise of Bangladesh Power Development Board)**		
Sponsor:	UNITEX STEEL MILLS LIMITED		
Project:	Design, Supply, Installation, Testing & Commissioning of Korerhat 400/230kV Substation to Unitex Steel Mills Ltd., Ghopal, Chhagalniya, Feni-39911 230kV Transmission Line		
Drawing Title:	Proposed Route Alignment Key Plan Drawing from Proposed TT-1(USML End) to TT-2 (Korerhat end) , Length : 3.785 km		
Survey by:	Ideal Survey Organisation	Date:	31/05/2022
Drawn by:	Ideal Survey Organisation	Scale:	Not To Scale
Submitted by:	CSTC	Drg. No.	USML/230 KV/TL/ TT-01 TO TT-02
Sub Contractor:	CSTC	Rev.No.	00
		Sheet No:	01 of 01

Annexure 04

Load Sanction Approval

''শেখ হাসিনার উদ্যোগ
ঘরে ঘরে বিদ্যুৎ''

বাংলাদেশ বিদ্যুৎ উন্নয়ন বোর্ড
কেন্দ্রীয় সচিবালয়, ওয়াপদা ভবন(২য় তলা)
মতিঝিল বা/এ, ঢাকা-১০০০
www.bpdb.gov.bd

স্মারক নং: ২৭.১১.০০০০.১০১.১৪. ০০১'২২-৩৭৫১ তারিখ: ১৬/৪/২০২২ খ্রিঃ।

পরিচালক (অপারেশন)
ইউনিটেক্স ষ্টীল মিলস্ লিঃ
সায়হাম টাওয়ার (১০ম তলা)
বাড়ী নং-৩৪, রোড নং-১৩৬
গুলশান-১, ঢাকা-১২১২।

ফ্যাক্টরী: ঘোপাল, ফেনী।

বিষয়: ইউনিটেক্স ষ্টীল মিলস্ লিঃ, ঘোপাল, ফেনী এর অনুকূলে ২৩০ কেভি ভোল্টেজ লেভেলে ১০০মেঃওঃ লোড অনুমোদন প্রসঙ্গে।

পূর্ব সূত্র: ১। ইউনিটেক্স স্টিল মিলস লিঃ এর ১৭/৬/২০২১ তারিখের পত্র, সূত্র-ষ্টীল/২০২১০৬/১০১।

উপর্যুক্ত বিষয় ও সূত্রের আলোকে অবহিত করা যাচ্ছে যে, ফেনী জেলা ঘোপাল ইউনিয়নে নির্মাণাধীন শিল্প প্রতিষ্ঠান **ইউনিটেক্স ষ্টীল মিলস্ লিঃ** এর জন্য ১০০মেঃওঃ লোড গত ১১/৪/২০২২খ্রিঃ তারিখে অনুষ্ঠিত বিউবো'র ১৯৪১তম সাধারন বোর্ড সভায় নিম্নোক্ত শর্তাবলীর ভিত্তিতে অনুমোদিত হয়। যাহা আপনাকে অত্র পত্র মারফত অবহিত করা হলো।

শর্তাবলী:

(ক) বিদ্যুৎ সংযোগ প্রদানে সরকারের নিষেধাজ্ঞা না থাকা, কুমিল্লা অঞ্চলের বিদ্যুৎ উৎপাদন পরিস্থিতি চাহিদার সাথে সংগতিপূর্ণ থাকা, সংশ্লিষ্ট কোন Transmission Component ওভারলোড না হওয়া, ভোল্টেজ ড্রপ গ্রহণযোগ্য মাত্রায় থাকা ইত্যাদি কারিগরী বিষয় পরিপূরণ সাপেক্ষে ইউনিটেক্স ষ্টীল মিলস্ লিঃ কে পিজিসিবি কর্তৃক নির্মাণাধীন কুমিল্লা(উঃ)-বিএসআরএম ২৩০কেভি ডাবল সার্কিট সঞ্চালন লাইনের করেরহাট উপ-কেন্দ্র প্রান্তের LILO অংশের দু'টি সার্কিটের সাথে সাময়িকভাবে সংযুক্ত করে চাহিত ১০০মেঃওঃ লোড গ্রহণের অনুমোদন প্রদান করা যায়। পিজিসিবি'র মতামত অনুযায়ী ২০২৫ সাল নাগাদ নির্মাণাধীন করেরহাট ৪০০/২৩০/১৩২কেভি গ্রীড উপ-কেন্দ্র চালু হলে উক্ত উপ-কেন্দ্রের ২৩০কেভি বাস থেকে ইউনিটেক্স ষ্টীল মিলস্ লিঃ কে বিদ্যুৎ সরবরাহ প্রদান করা হবে।

(খ) সরকারের সর্বশেষ নির্দেশনা অনুযায়ী কারখানা আঙ্গিনায় সৌর বিদ্যুৎ সিষ্টেম স্থাপন নিশ্চিত করতে হবে।

(গ) পিক আওয়ারে (বিকাল ৫.০০ টা হতে রাত ১১.০০ টা পর্যন্ত) বিদ্যুৎ গ্রহনে বিরত থাকতে এবং পিক-আওয়ার ছাড়াও বিউবো/পিজিসিবি'র যথাযথ কর্তৃপক্ষের নির্দেশনা/চাহিদা মোতাবেক যে কোন সময় লোড শেডিং করতে গ্রাহককে সম্মত থাকতে হবে।

(ঘ) বিদ্যুৎ এর মূল্যহার ও নিয়মাবলী, বাণিজ্যিক পরিচালন পদ্ধতি, ইলেকট্রিসিটি এ্যাক্ট এবং সময়ে সময়ে জারীকৃত সকল নির্দেশাবলী মেনে চলতে গ্রাহককে সম্মত থাকতে হবে।

(ঙ) প্রস্তাবিত ১০০মেঃওঃ লোডের কারখানায় ২৩০ কেভিতে সংযোগ গ্রহণের সাথে সংশ্লিষ্ট সকল নক্সা/স্পেসিফিকেশন, প্রটেকশন স্কীম পিজিসিবি হতে পূর্ব অনুমোদন গ্রহণ করত: অনুমোদিত নক্সা/স্পেসিফিকেশন অনুযায়ী কাজগুলি পিজিসিবি'র সার্বিক তত্ত্বাবধায়নে বাস্তবায়ন করতে হবে এবং সংযোগ গ্রহণ সংশ্লিষ্ট যাবতীয় ব্যয়ভার ও সকল দায়িত্ব গ্রাহককে বহন করতে হবে।

(চ) বিউবো'র ষ্ট্যান্ডার্ড/স্পেসিফিকেশন অনুযায়ী ট্যারিফ পয়েন্টের এনার্জি মিটারিং/রেকর্ডিং সিস্টেম স্থাপন নিশ্চিত করতে হবে। নক্সা অনুমোদন ও নির্মাণ কাজ তদারকীর সময় বিউবো/পিজিসিবি এটি নিশ্চিত করবে।

(ছ) গ্রাহকের ট্যারিফ পয়েন্টে সিঙ্গেল পয়েন্ট মিটারিং সিস্টেম নিশ্চিত করত: বিউবো থেকে মিটারিং স্কীমের পূর্বানুমতি গ্রহণ করতে হবে এবং অনুমোদিত নক্সা অনুযায়ী বাস্তবায়ন কাজ নিশ্চিত করতে হবে। কারিগরীভাবে গ্রহনযোগ্য পিজিসিবি'র নিয়ন্ত্রণাধীন পয়েন্টে ট্যারিফ মিটার স্থাপনে গ্রাহককে সম্মত থাকতে হবে।

(জ) প্রস্তাবিত ১০০ মেঃওঃ লোড ২৩০ কেভিতে সংযোগের ফলে সিষ্টেমের উপর যে Impact পড়বে তাহা বুয়েট অথবা সমমানের উপযুক্ত প্রতিষ্ঠান দিয়ে Impact Study সম্পাদন করতে হবে এবং Study এর সুপারিশ অনুযায়ী বিউবো/পিজিসিবি'র অনুমোদন স্বাপেক্ষে প্রয়োজনীয় Mitigation Measure বাস্তবায়ন নিশ্চিত করতে হবে। Impact Study তে ব্যবহৃত Load Characteristics এর সাথে বাস্তব লোডের সামন্জস্যতা নিশ্চিত করতে হবে।

(ঝ) বিউবো, পিজিসিবি ও ইউনিটেক্স ষ্টীল মিলস্ লিঃ এর মধ্যে নির্ধারিত ফরমেট অনুযায়ী ত্রি-পক্ষীয় চুক্তি সম্পাদন করতে হবে এবং চুক্তির সকল শর্তসমূহ গ্রাহককে মেনে চলতে হবে।

(ঞ) কারখানাটি প্রস্তাবিত ১০০মেঃওঃ লোডের সংযোগ গ্রহণের জন্য প্রস্তুত (Ready) হওয়ার পর বিউবো/পিজিসিবি'র উপযুক্ত প্রতিনিধিগণ কর্তৃক কারখানার লোড এবং গ্রাহক উপকেন্দ্রে স্থাপিত প্রটেকটিভ ডিভাইস/হারমনিক মিটিগেশন ডিভাইস/পাওয়ার ফ্যাক্টর ইমপ্রুভমেন্ট ডিভাইস/বিলিং মিটারিং ইউনিট ইত্যাদি পরিদর্শনে সন্তোষজনক ফলাফল পাওয়া গেলে কারখানাটি ১০০ মেঃওঃ লোড গ্রহণ করতে পারবে।

এমতাবস্থায় বর্ণিত শর্তাবলীর আলোকে জরুরী ভিত্তিতে আপনাকে ত্রি-পক্ষীয় চুক্তি সম্পাদন করার জন্য নির্দেশক্রমে অনুরোধ করা হলো।

ধন্যবাদান্তে

(মোহাম্মদ সেলিম রেজা)
সচিব
বাংলাদেশ বিদ্যুৎ উন্নয়ন বোর্ড, ঢাকা।

মোঃ গোলাম মর্তুজা
আইডি নং-০১-১২৬৭
উপ-মহাব্যবস্থাপক
বাণিজ্যিক পরিচালন
বিউবো, ঢাকা।

স্মারক নং: ২৭.১১.০০০০.১০১.১৪. ০০১.২২- ১৭৫২

তারিখ: ১৬/৪/২০২২ খ্রিঃ।

অনুলিপি সদয় জ্ঞাতার্থে:

১) ব্যবস্থাপনা পরিচালক, পিজিসিবি, ঢাকা।
২) সদস্য, বিতরণ মহোদয়, বিউবো, ঢাকা।
৩) মহাব্যবস্থাপক, বাণিজ্যিক পরিচালন, বিউবো, ঢাকা।
৪) সিএসও টু চেয়ারম্যান, বিউবো, ঢাকা।
৫) পরিচালক, বিদ্যুৎ পরিকল্পনা পরিদপ্তর, বিউবো, ঢাকা।
৬) দপ্তর নথি/সমবেত নথি।

(আহাম্মদ ভূঞা লিপু)
সহকারী সচিব (উন্নয়ন)
কেন্দ্রীয় সচিবালয়, বিউবো, ঢাকা।

Annexure 05

Gas Supply Approval

বাখরাবাদ গ্যাস ডিস্ট্রিবিউশন কোম্পানী লিমিটেড
(পেট্রোবাংলার একটি কোম্পানী)
BAKHRABAD GAS DISTRIBUTION COMPANY LIMITED
(A Company of Petrobangla)

সূত্র নং-২৮.১১.০০০০.৬২১.৩৪.০০১.২১/ ৫৯৬ তারিখঃ ০৯/০২/২০২১

বিষয়ঃ শিল্প শ্রেণীতে নতুন গ্যাস সরবরাহের মঞ্জুরীপত্র।

আপনার আবেদনের প্রেক্ষিতে জানানো যাচ্ছে যে, কর্তৃপক্ষ আপনার প্রতিষ্ঠানে শিল্প শ্রেণীতে গ্যাস সরবরাহ সম্মতি প্রদান করেছেন ও নিম্নে বর্ণিত শর্তাবলী পূরণ/প্রতিপালন সাপেক্ষে আপনার প্রতিষ্ঠানে সর্বোচ্চ ঘন্টায় ৮,৫০০ ঘনমিটার এবং মাসিক ৩৯,৭৮,০০০ ঘনমিটার গ্যাস ব্যবহারের মঞ্জুরীপত্র প্রদান করা হলো।

শর্তাবলীঃ

১। বিকেবি-চট্টগ্রাম লেটারাল লাইন জিটিসিএল এর আওতাধীন হওয়ায় জিটিসিএল এর সম্মতি এবং প্রতিষ্ঠানটির পক্ষ হতে সড়ক বিভাগ ও বাংলাদেশ রেলওয়ের রাস্তা কর্তনের অনুমতি গ্রহন করার পর বর্ণিত ছাড়পত্র সমূহসহ প্রযোজ্য অন্যান্য ছাড়পত্র বিজিডিসিএল-এ দাখিল সাপেক্ষে প্রতিষ্ঠানটির নিজ খরচে পাইপ লাইন ও টিবিএস নির্মাণ করে গ্যাস সংযোগ প্রদানের নীতিগত অনুমোদন প্রেদান করা হয়েছে।

২। মাসিক অনুমোদিত লোডের ভিত্তিতে ০২ (দুই) মাসের গ্যাস বিলের সমপরিমাণ টাকা ''নিরাপত্তা জামানত'' (সিকিউরিটি মানি) হিসাবে অর্ধাংশ নগদে ও বাকী অর্ধাংশ ব্যাংক গ্যারান্টি/লিয়েনে FDR/সঞ্চয়পত্র/ সেভিংস সার্টিফিকেট/অন্যকোন গ্রহণযোগ্য বন্ড গ্যাস সংযোগের পূর্বেই জমা দিতে হবে। আপনি ইচ্ছা করলে সম্পূর্ণ জামানত নগদে জমা দিতে পারেন। এ ব্যাপারে পরবর্তীতে একটি ''চাহিদাপত্র'' প্রেরণ করা হবে।

৩। গ্যাস বিপণন নিয়মাবলী ২০১৪ (বর্তমান ও ভবিষ্যতে সংশোধিত আকারে)- এর বিধি অনুযায়ী গ্যাস সংযোগের জন্য প্রযোজ্য সকল প্রক্রিয়া সম্পন্ন করতে হবে।

৪। অভ্যন্তরীণ লাইন এবং ১০ বার চাপের লাইন ও প্রযোজ্য ক্ষেত্রে উচ্চ চাপের লাইন এবং টিবিএস নির্মাণের জন্য কোম্পানীর তালিকাভূক্ত যথাক্রমে নূন্যতম ১.২, ১.৩ ও ১.৪ ক্যাটাগরির ঠিকাদার নিয়োগ করতে হবে। এজন্য সমস্ত ব্যয়ভার আপনাকেই বহণ করতে হবে। কোম্পানী কর্তৃক নক্সা অনুমোদনের পরই কেবল মাত্র পাইপ লাইন স্থাপনের কাজ শুরু করা যাবে।

৫। গ্যাস বিতরণ নিয়মাবলী ২০১৪ (বর্তমান ও ভবিষ্যতে সংশোধিত আকারে) ও গ্যাস সরবরাহ চুক্তিপত্রের সকল নিয়মাবলী (বিশেষ এবং সাধারণ) আক্ষরিক অর্থে এবং অর্ন্তনিহিত মর্ম উপলব্ধিপূর্বক মেনে চলতে হবে।

৬। সংযোগস্থলে অনুমোদিত গ্যাস সরঞ্জামাদি স্থাপন নিশ্চিত হলেই গ্যাস সংযোগ প্রদান করা হবে। অন্যথায়, সংযোগ প্রদান করা হবে না।

৭। উৎস লাইনে চাহিদা অনুযায়ী গ্যাসের প্রাপ্যতা সাপেক্ষে সংযোগ প্রদান করা হবে।

৮। আপনার প্রতিষ্ঠানের জন্য যে সার্ভিস লাইন স্থাপিত হবে তা হতে আপনার চাহিদা বিবেচনায় রাখিয়া অন্য যে, কোন গ্রাহককে গ্যাস সংযোগ দেওয়ার অধিকার কোম্পানী সংরক্ষন করে।

৯। এই মঞ্জুরীপত্র গ্যাস সংযোগের লক্ষ্যে কোম্পানীর অঙ্গীকার প্রকাশ করে না। আইনগত বা কারিগরী কারনে মঞ্জুরীপত্র বাতিল হইতে পারে। উল্লেখ্য, এই মঞ্জুরীপত্রের মেয়াদ ০৬ মাস। এই সময়ের মধ্যে কার্যক্রম গ্রহণ না করলে মঞ্জুরীপত্র বাতিল বলে গন্য হবে।

১০। আপনি/আপনারা যদি উপরোক্ত শর্তসমূহ পালনে সম্মত থাকেন, তবে সংযুক্ত প্রতিলিপিটি 'সীলমোহর' সহ দস্তখত করে ২০ (বিশ) দিনের মধ্যে অত্র দপ্তরে জমা দেয়ার জন্য অনুরোধ করা যাচ্ছে।

ধন্যবাদান্তে,

উপ-মহাব্যবস্থাপক (বিক্রয়)
বিজিডিসিএল, নোয়াখালী।

ব্যবস্থাপনা পরিচালক
মেসার্স ইউনিটেক্স ষ্টীল মিলস লিমিটেড
মুহুরীগঞ্জ, ছাগলনাইয়া, ফেনী।

অনুলিপিঃ
১। মহাব্যবস্থাপক (বিপণন), বিজিডিসিএল, কুমিল্লা।
২। ব্যবস্থাপক (বিক্রয়), বিজিডিসিএল, ফেনী।
৩। অফিস কপি।

Annexure 06

Approval Application from Bangladesh Railway, Roads and Highway Department

Annexure 07

Rain Water Harvesting Tank Layout

Unitex Steel Mills Limited

Rain Water Harvesting:

Source: From Roof of the Pre-engineered Building

Surface Area: 56,000 m^2

Storage Capacity: 1,250 m^3

12,50,000 Liters

1.2 million Liters

Rain Water Storage Location:

Underground tanks of Water Treatment Plant

Underground Tank 01: Dimensions (L x W x H): 14m x 8m x 3m

Actual Volume: 336 m^3

Effective Volume: 250 m^3

Underground Tank 02: Dimensions (L x W x H): 19m x 8m x 3m

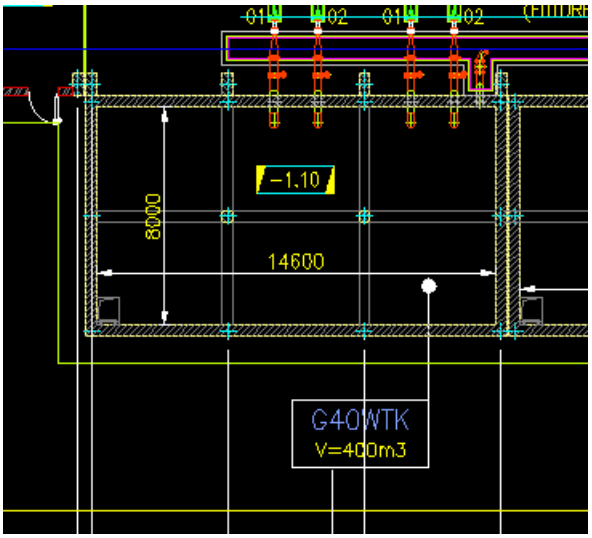
Actual Volume: 456 m^3

Effective Volume: 350 m^3

Underground Tank 03: Dimensions (L x W x H): 35m x 8m x 3m

Actual Volume: 840 m^3

Effective Volume: 650 m^3



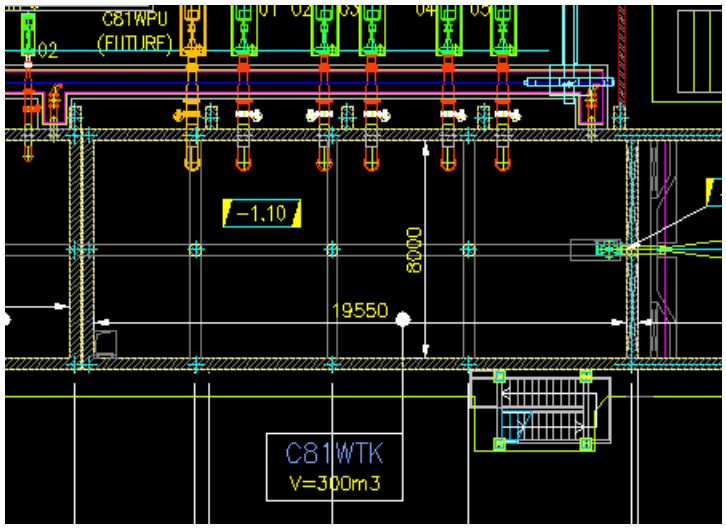
Underground Tank 01:

Dimensions L x W x H): 14m x 8m x 3m

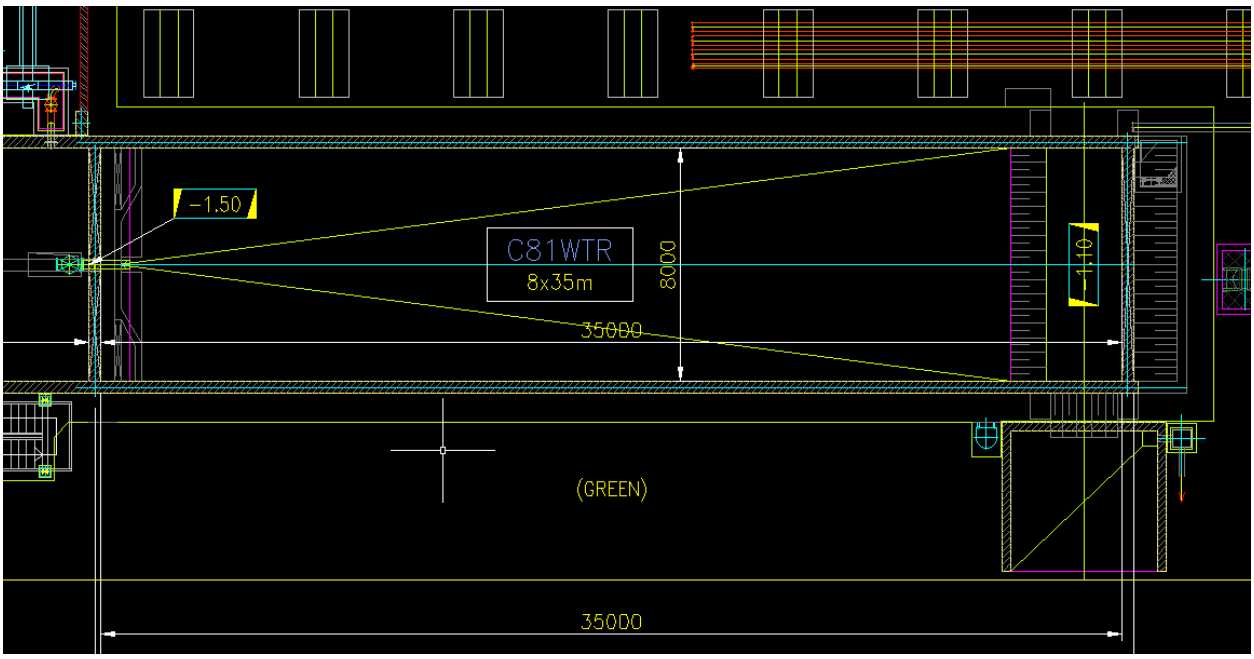
Actual Volume: 336 m^3

Effective Volume: 250 m^3

Unitex Steel Mills Limited



Underground Tank 02:	
Dimensions (L x W x H):	19m x 8m x 3m
Actual Volume:	456 m^3
Effective Volume:	350 m^3



Underground Tank 03:	
Dimensions (L x W x H):	35m x 8m x 3m
Actual Volume:	840 m^3
Effective Volume:	650 m^3

Annexure 08

WWTP Layout

CCM
Spray machine
Q = 220 m3/h
P = 12,0 bar
ΔP= 12,0 bar
Ti = 35 °C
ΔT = 15 °C

CCM
Open Machine
Q = 20 m3/h
P = 12,0 bar
ΔP= 12,0 bar
Ti = 35 °C
ΔT = 15 °C

MILL
Rebar Mill
Q = 900 m3/h
P = 6,0 bar
ΔP= 6,0 bar
Ti = 35 °C
ΔT = 10 °C

MILL
Furnace/descaler
Q = 60 m3/h
P = 3,0 bar
ΔP= 3,0 bar
Ti = 35 °C
ΔT = 10 °C

MILL
Cooling beds
Q = 200 m3/h
P = 2 bar
ΔP= 2 bar
Ti = 35 °C
ΔT = 10 °C

MILL
THP
Q = 1800 m3/h
P = 14 bar
ΔP= 14 bar
Ti = 35 °C
ΔT = 10 °C

MELTSHOP SCALE PIT AREA

HT 40
HOIST

BK 40
BUCKET

OS 40
OIL SKIMMER

SP 40
SCALE PIT
diam. 8 m

TK40
Working capacity 50 m3

PU 41
Q= 150 m3/h tot
P= 4,0 bar
n° 1
Q= 150 m3/h each
N= 30 kW

PU 40
Q= 240 m3/h tot
P= 3,0 bar
n° 1+1 (stand by)
Q= 240 m3/h each
N= 22 kW

RM SCALE PIT AREA

HT 50
HOIST

BK 50
BUCKET

OS 50
OIL SKIMMER

SP 50
SCALE PIT
diam. 10 m

TK50
Working capacity 120 m3

PU 51
Q= 150 m3/h tot
P= 4,5 bar
n° 1
Q= 150 m3/h each
N= 37 kW

PU 50
Q= 960 m3/h tot
P= 3 bar
n° 1+1 (stand by)
Q= 960 m3/h each
N= 160 kW

ROLLING MILL AREA

TK 61
Working capacity 15 m3

PU 61
Q= 200 m3/h tot
P= 2,0 bar
n° 1+1 (stand by)
Q= 200 m3/h each
N= 22 kW

TK 60
Working capacity 200 m3

PU 60
Q= 2000 m3/h tot
P= 3,0 bar
n° 2+1 (stand by) + space for future extension
Q= 1000 m3/h each
N= 132 kW

ROLLING MILL AREA

SLUDGE TREATMENT

ST 90
n° 1 sludge thickener
11 m diameter
Q= 130 m3/h tot

PU91
Q= 5 m3/h tot
P= 12,0 bar
n° 1+1 (stand by)
N= 5,5 kW

PF90
Filter Press

MX80

TK 80
Working capacity 60 m3

PD 80
DOSING UNIT

PU 80
Q= 130 m3/h tot
P= 2,5 bar
n° 1+1 (stand by)
Q= 130 m3/h each
N= 15 kW

WATER TREATMENT PLANT AREA

SB70
SCRAPER BRIDGE

BLADE

OS 70
OIL SKIMMER

TK70
Working capacity 350 m3

LS70
LONGITUDINAL SETTLING BASIN
1 basin 8m x 40m each

PU 70
Q= 3330 m3/h tot
P= 3,8 bar
n° 3+1 (stand by) + space for future extension
Q= 1107 m3/h each
N= 200 kW

PU 71
sludge pump
n= 1+1
Q= 5 m3/h tot
Q= 5 m3/h each
P= 3 bar
N= 1.1 kW

SF 70
BATTERY FILTRATION
Q= 3330 m3/h tot
Φ 4200 mm diameter
11 SAND FILTERS + space for future extension

CT30
Q = 3330 m3/h
T. in = 45,5 °C
T. out = 35 °C
T. w.b. = 29°C (design)
Concrete type + space for future extension

MAKE UP WATER SUPPLIED BY CUSTOMER

BLOW DOWN WATER AS MAKE UP WATER

BLOW DOWN WATER
To drainage system

TK30
Working Capacity 550 m3

OVERFLOW

DRAIN

SEWAGE

PD 30
DOSING UNIT

PU 33
Q= 1800 m3/h tot
P= 16 bar
n° 6+1 (stand by) + space for future extension
Q= 300 m3/h each
N= 200 kW

PU 31
Q= 1160 m3/h tot
P= 7 bar
n° 2+1 (stand by)
Q= 580 m3/h each
N= 200 kW

PU 30
Q= 240 m3/h tot
P= 13 bar
n° 1+1 (stand by)
Q= 240 m3/h each
N= 132 kW

PU 32
Q= 180 m3/h tot
P= 2,5 bar
n° 1+1 (stand by)
Q= 180 m3/h each
N= 18.5 kW

EB 70
Q= 960 m3/h
P= 0,3-0,6 bar
N° 1+1 BLOWER
N= 30 kW

LEGEND : AUTOMATIC VALVE (YV) STATUS

F.C. : FAIL CLOSED
F.O. : FAIL OPEN

FLOW RATE	OPERATING PRESSURE	TEMPERATURE
m3/h (max flow)	bar	C°

Δp = PRESSURE DROP
Δt° = TEMPERATURE INCREASE

MAIN NOTE

ALL EQUIPMENTS PERFORMANCES INCLUDING RELATED QUANTITY HAVE TO BE DEFINED ACCORDING TO PLANT/PIPING CHARACTERISTICS

LEGEND : EQUIPMENT CODE

ET	EMERGENCY TOWER	HT	HOIST
BK	BUCKET	OS	OIL SKIMMER
CT	COOLING TOWERS	SF	SAND FILTERS
EB	BLOWER	ST	SLUDGE THICKENER
PU	PUMPS UNIT	TK	WATER TANK
PD	DOSING UNIT	AV	AUTOMATIC VALVE
HE	HEAT EXCHANGER	SC	SCRAPING BRIDGE
SB	SEDIMENTATION BASIN	SP	SCALE PIT
MX	SLUDGE AGITATOR		
(Ce)	CONDUCTIVIMETER	(LS)	LEVEL SWITCH
(FI)	FLOW INDICATOR	(PH)	PH-METER
(FSL)	FLOW SWITCH	(PI)	PRESSURE GAUGE
(FT)	FLOW TRANSMITTER	(PT)	PRESSURE TRANSMITTER
(LT)	LEVEL TRANSMITTER	(TI)	THERMOMETER
		(TT)	TEMPERATURE TRANSMITTER

S LGRCV QRCCJ KGJJQ JGKGRCB

U ?RCP RPC?RKCLR $ K?L?ECKCLR NJ?L

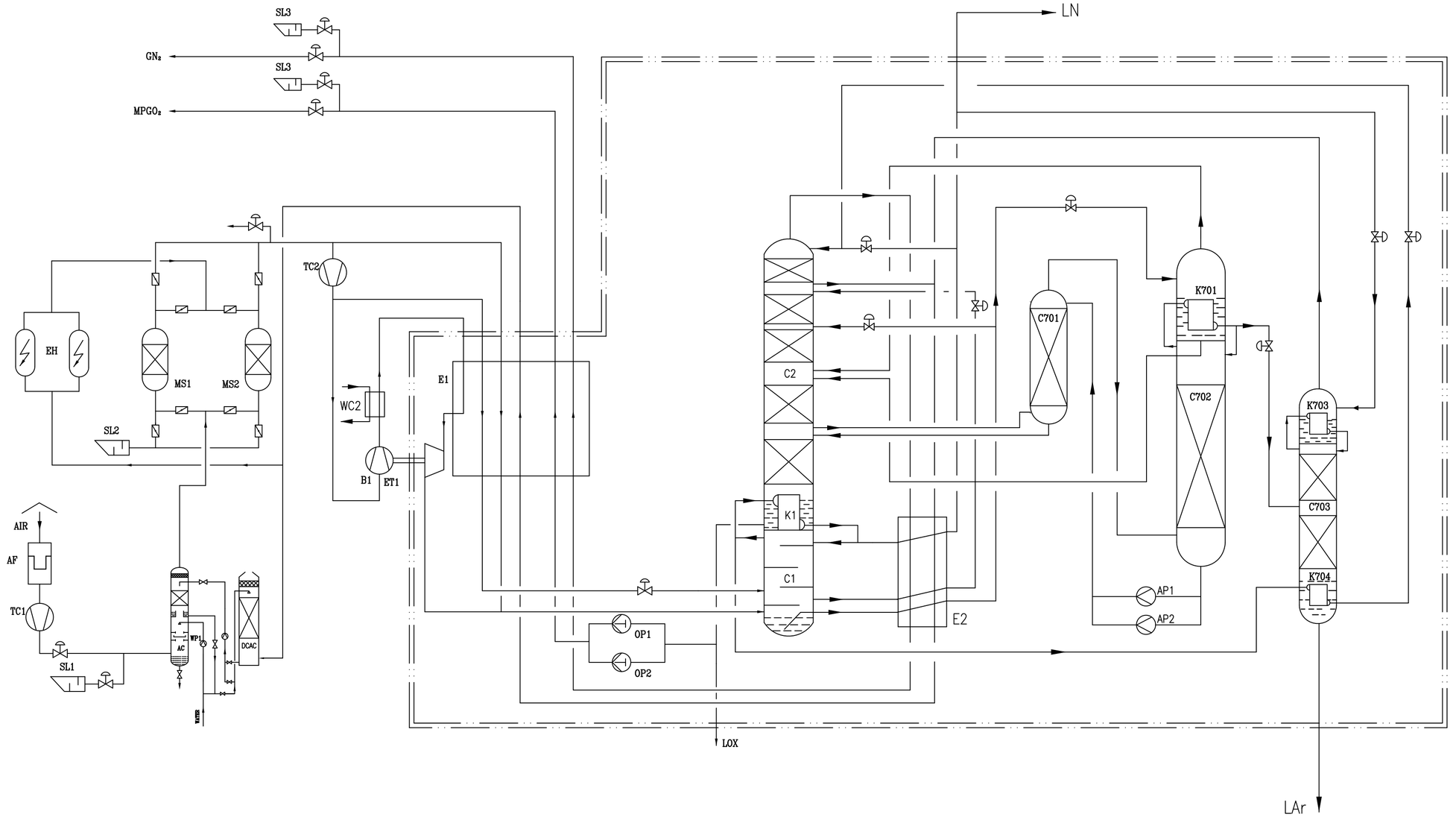
BP? UGLE ! 0.01+N@+URN+.0

Annexure 09

Air Separation Plant Layout

rev2

Air Separation Plant
Process Flow Diagram



(code)	(name)
AF	Air filter
TC1	Air compressor
TC2	Booster Air compressor
AC	Air cooling tower
DC	Water cooling tower
WP	Water pump
MS	Molecular sieve purifier
EH	Electric heater
SL	Silencer
BT	Booster
C1	Lower column
C2	Uper column
E1	Main heat exchanger
E2	Subcooler
ET	Tubine expander
K1	Condenser evaporator
K701	Crude argon condenser
K703	Pure argon condenser
K704	Pure argon evaporator
WC	Water cooler
AP	Argon pump
C701	Rrimary argon column
C702	Secondary argon column
C703	Pure argon column

UNITEX STEEL MILLS LIMITED

Annexure 10

Project Preliminary Schedule

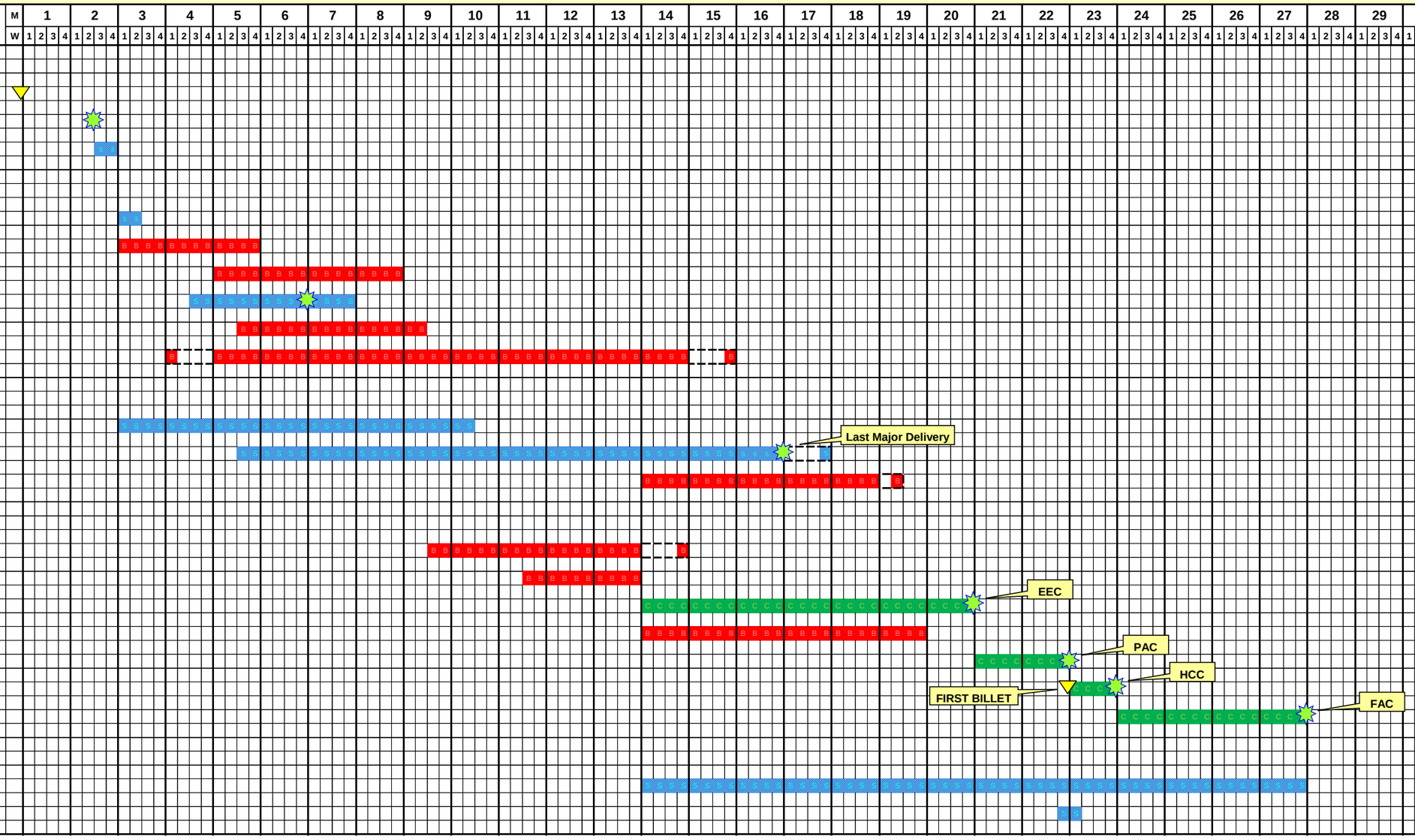
PMO OFFICE

Date: AUG, 2023

UNITEX STEEL MILLS LIMITED - 1,000,000 TPY Mini Mill

PROJECT TIME SCHEDULE (PRELIMINARY)

Item N°	Main Activity Description
1	**STARTING DATE OF THE TIME SCHEDULE**
1.1	Starting date of the Time Schedule
1.2	Kick-Off Meeting
1.3	Final Layout
2	**BUILDINGS, CIVIL WORKS and FOUNDATIONS**
2.1	BD for Technological Equipment Steel Buildings
2.2	BE and DE for Technological Equipment Steel Buildings
2.3	Manufacturing of Steel Buildings
2.4	BE for Technological Equipment Foundations *(Milestone for foundations loads per area)*
2.5	DE for Technological Equipment Foundations
2.6	Execution of Steel Buildings, Civil Works and Foundations
3	**SELLER'S EQUIPMENT**
3.1	BE and DE Activities for Technological Equipment
3.2	Equipment Manufacturing and Delivery (CFR)
3.3	Equipment Delivery to the Site
4	**ERECTION and COMMISSIONING**
4.1	Erection of Steel Buildings
4.2	Erection of Cranes
4.3	Erection of Technological Equipment
4.4	Erection of Auxiliary Plants
4.5	Cold Tests
4.6	Hot Tests (Production Start)
4.7	Performance Test (Five products)
5	**TECHNICAL ASSISTANCE & TRAINING SERVICES**
5.1	Technical Assistance Period
5.2	Training Period



Responsibility: B B B B **UNITEX** S S S S **OEM** C C C C **UNITEX Personnel Operates under OEM Supervision**

Remark: *In case of variations to the contractual dates, layout and scope of supply, the delivery time and the price will be adjusted in accordance with the changes.*

BD = Basic Data
BE = Basic Engineering
DE = Detail Engineering

Annexure 11

Laboratory Test Report

Surface water Quality Test Report

Adroit Environment Consultants Ltd.

A House of Complete Environmental Management Solutions

AECL LABORATORY ANALYSIS REPORT
SURFACE WATER QUALITY TEST REPORT

Project Name : **Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya,Feni**
Project Location : **Muhuriganj, Gopal Union, Chhagalnaiya, Feni.**

Sample Collector : Adroit Environment Consultants Ltd. (Monitoring team)
Description of Sample : River Water
Sample Location : Muhuriganj, Gopal Union, Chhagalnaiya, Feni (Near project area)
Sampling date : 12th September, 2023
Reporting date : 20th September 2023

Description of analysis

Parameter	Concentration present								Unit	Bangladesh Standard	IFC Standard	Method of analysis
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8				
Temperature	23.7	20.1	23.6	25.7	22.4	23.7	23.9	24	°C	-	-	Mercury filled thermometer
pH	7.02	6.9	7.2	6.8	7.05	7.8	7.2	7.9	-	6-9	6-9	pH meter
Dissolved Oxygen (DO)	5.7	5.9	6	6.03	5.7	6.1	6.5	6.1	mg/l	>5	-	DO meter
BOD_5	3.2	3.1	2.6	2.4	4.2	3.8	2.2	2	mg/l	≤ 6	50	5-day BOD test
Pb	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	0.1	0.1	AAS
Cr	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	-	0.1	AAS
Nitrate	2.0	2.5	2.07	3.08	3.0	2.3	2.05	3.01	mg/l	7.0	-	Potentiometric
TDS	220	201	210	202	225	212	199	221	mg/l	1000	-	Sensor
TSS	14	13.4	21	18	20	19	18	19	mg/l	-	50	Dried at 105°C

****No standard was found for River Water*

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Md. Saiful Islam
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Ground Water Quality Test Report

Adroit Environment Consultants Ltd.

A House of Complete Environmental Management Solutions

AECL LABORATORY ANALYSIS REPORT
GROUND WATER QUALITY TEST REPORT

Project Name : **Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni**
Project Location : **Muhuriganj, Gopal Union, Chhagalnaiya, Feni.**

Sample Collector : Adroit Environment Consultants Ltd. (Monitoring team).
Description of Sample : Ground Water
Sample Location : Muhuriganj, Gopal Union, Chhagalnaiya, Feni
Sampling date : 12th September, 2023
Reporting date : 20th September 2023

Description of analysis

Name of the Parameter	Concentration Present	DoE (Bangladesh) Standard for Drinking Water	WHO Standard for Drinking Water	Unit	Method of analysis
Temperature	24.4	20-30	-	˚C	
pH	6.84	6.5 – 8.5	6.5 – 8.5	-	pH Meter
TDS	410	1000	1000		Sensor
Alkalinity	38.2	-	-		Titrimetric
Hardness	22	500	-		Titrimetric
BOD	0.1	-	-		5-day BOD test
COD	0.7	-	-		Digestion
Nitrate	19.5	45	50	mg/l	Potentiometric
Phosphate	0.07	6	-	mg/l	Photometric
Chlorine	20.1	-	5	mg/l	Spectrophotometric
Calcium	26.3	75	-	mg/l	AAS
Sodium	81.6	200	200	mg/l	AAS
Potassium	1.0	12			AAS
Total Coliform	0	0	0	n/100 ml	Membrane Filter Technique
Fecal Coliform	0	0	0	n/100 ml	Membrane Filter Technique
Oil & Grease	Not Detected	0.01	-		APHA 5520.B

Comment: All the parameters conform to the given standards.

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Air Quality Test Report

Adroit Environment Consultants Ltd.

A House of Complete Environmental Management Solutions

AECL LABORATORY ANALYSIS REPORT
AMBIENT AIR QUALITY TEST REPORT

Project Name : **Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni**
Project Location : **Muhuriganj, Gopal Union, Chhagalnaiya, Feni**

Description of Sample : Ambient Air
Sample Collector : Adroit Environment Consultants Ltd. (Monitoring team)
Sampling date : 12th - 13th September, 2023
Reporting date : 21st September, 2023

Description of Analysis

Parameters	Method	Test Duration (hr)	Unit	AQ1	AQ2	AQ 3	AQ 4	AQ5	AQ6	AQ 7	AQ 8	DoE Standard	IFC Standard
PM2.5	Gravimetric	24	µg/m^3	25.4	27.3	25.7	28.5	23.4	27.4	25.01	28.3	65	75
PM10	Gravimetric	24	µg/m^3	36.2	39.6	35.3	40.2	31.2	39.4	34.1	39.2	150	150
SPM	Gravimetric	8	µg/m^3	67.7	73.4	68.2	75.1	67.8	71.4	68.2	73.1	200	NF
SO2	West-Geake	24	µg/m^3	2.1	3.0	2.2	3.3	2.1	3.2	2.0	3.3	365	125
NOx	Jacob and Hochheiser	1	µg/m^3	3.3	4.1	3.1	4.1	3.3	3.9	3.1	3.1	NF	200
CO	CO/O_3 Meter	1	ppm	1	2	1.2	2.1	1	2.1	2	2.1	35	NF

(NF – not found, DoE – Department of Environment.), *1-hour standard Not Found

Note: *This monitoring report was usually accomplished by - Respirable Dust Sampler (Model-Envirotech India APM-460BL) and Fine Particulate Sampler (Model- Envirotech India AAS-127BL).*

Comment: *From the aforementioned results it is discernible that, all the parameters are inside the allowable limits.*

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Noise Quality Test Report

AECL LABORATORY ANALYSIS REPORT
AMBIENT NOISE QUALITY TEST REPORT

Project Name : **Unitex Steel Mills Ltd. at Daulatpur, Muhuriganj, Chhagalnaiya, Feni**
Project Location : **Muhuriganj, Gopal Union, Chhagalnaiya, Feni**

Description of Sample : Ambient Noise
Sample Collector : Adroit Environment Consultants Ltd. (Monitoring team)
Sampling date : 12th - 13th September, 2023
Reporting date : 21st September, 2023

Description of Analysis

SN.	Site Location	Site Condition	Concentration present (LA_{eq}) dBA.			
			Day Time		Night Time	
			Minimum	Maximum	Minimum	Maximum
01	Near temporary site office, (location # 01) 22°56'41.42"n 91°30'43.32"e	Pre-construction Stage	37.2	45.6	30.2	36.5
02	North-East side of the project site (near adjacent canal), (Location # 02) 22°56'53.13"N 91°30'56.48"E	Pre-construction Stage	39.1	48.3	33.3	38.4
03	Center point of the project area, (Location # 03) 22°56'43.87"N 91°30'53.16"E	Pre-construction Stage	35.8	40.7	28.7	35.4
04	South-East corner of the project site (Location # 04) 22°56'32.59"N 91°30'59.88"E	Pre-construction Stage	38.0	46.8	32.8	37.7
05	Settlement area near the project south-west boundary (Location # 05) 22°56'29.31"N 91°30'50.27"E	Pre-construction Stage	37.2	45.6	30.2	36.5
06	Settlement area near the project site access route (Location # 06) 22°56'49.34"N 91°30'42.27"E	Pre-construction Stage	35.1	41.3	30.3	37.4
07	Settlement area near the proposed transmission route (Location # 07) 22°56'20.80"N 91°31'42.41"E	Pre-construction Stage	33.8	40.7	28.7	35.4
08	Settlement area near the proposed transmission route (Location # 08) 22°56'25.16"N 91°32'30.02"E	Pre-construction Stage	40.0	48.8	35.8	39.7
DoE (Bangladesh) Standard for Mixed area (mainly residential area, and also simultaneously used for commercial and industrial purposes)			**60**		**50**	
IFC/International Standard for Residential; institutional; educational			**55**		**45**	

Note: *This noise data was usually accomplished by – CEM Sound Level Meter (Model – DT 8850)*

Comment: According to the Department of Environment (Noise Pollution Control Rules, 2006), the standard for ambient noise level for mixed area is 60 and 50 decibels at day & night time respectively. The results were found within the limit as per DoE Standards.

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Annexure 12

Checklist of Terrorist Attack, Bomb Threat and Kidnapping

Attachment 1 - Kidnap and Extortion Checklist

This checklist supplements the normal ERT checklists where Kidnap or other extortion is occurring or is possible.

Kidnap And Extortion Checklist	Responsibility
1. Call-out - EHS Manager - ERT - Human Resources Coordinator	Project Director
2. Establish secure communications link with ERT	EHS Manager
3. Ensure secure meeting room for ERT.	EHS Manager
4. Maintain effective logs	ERT
5. Establish: - The current situation - The political and operational background - If any contacts or demands have been made by the instigators. - Who is aware of the incident? • Government • Security Forces/Police of country • Embassy/High Commission • Local employees • Relatives - What the country's policy is concerning negotiation with kidnappers etc.	EHS Manager
6. Notify Project Management and pass on details	PD
7. Consult with professional advisors/security consultants. PD to make final decision upon confirmation from APSCL Authority.	PD
8. Consider the need to bring in other internal and external expertise, or reduce the team. In general, confine knowledge to minimum team.	EMP Implementation Team
9. Evaluate the situation ▪ Is there positive evidence of kidnap? ▪ How reliable is the available information? ▪ Are the instigators known to be criminals, psychopaths or terrorists? ▪ What are the likely future actions of the instigators? - What is the risk? ▪ What threats have been made? Likely to be carried out? ▪ Is there a threat to life - hostage or others?	EHS Manager

Kidnap And Extortion Checklist	Responsibility
▪ Are other employees/families at risk? ▪ What is the business risk? ▪ What is the local Government likely to do if you negotiate?	
10. - Need for containment of information - Is containment of information possible, likely to last and appropriate? - What time scale may the Company have to work to? - What is likelihood rescue? - What attitude is local Government likely to take? - What are the immediate implications on operations?	EMP Implementation Team
11. Confirm Company objectives - Remove threat to life - Display Company's determinations to show firm resolves and remain - a responsible corporate citizen	EMP Implementation Team
12. Advise ERT on local laws and potential liabilities relating to communication and negotiation with kidnappers etc. and other liabilities.	Legal
13. Consider basic Company policies/strategies a. Response b. Control/secrecy c. Risk	Project Management
14. Confirm roles, powers and delegated authority of both the ERG and the ERT - Who is to be the ultimate Decision Maker? - Who is to conduct any negotiations? - Who will make up the Negotiating team locally? - Is additional support required in Country?	Project Management
15. Decide basic policies and initial way ahead. How much is to be proactive, and how much sit-and-wait?	Project Management

Attachment 2 - Bomb Threat Response Actions

CONTROL

The Project Director is responsible for directing the action to be taken in response to any bomb threat. Responsibilities include the following:

- ✓ Producing a risk assessment.
- ✓ Devising and maintaining a search plan of the office.
- ✓ Devising and maintaining an evacuation plan.
- ✓ Liaising with the responsible authorities.
- ✓ Arranging staff awareness and bomb threat practices.

Bomb Threat

The person receiving the call will:

- ✓ Activate recording equipment if fitted and the threat is received by telephone. This could be mobile phone and have telephone on speaker phone.
- ✓ Adopt helpful attitude and be conciliatory.
- ✓ Make written notes using guidelines issued for that purpose.
- ✓ Report immediately to Security Focal Point.
- ✓ The Project Director should inform project management who must assess the credibility of the threat and possible consequences and consider whether to:
- ✓ Do nothing, evacuate or stay and search.
- ✓ Notify law enforcement agencies/emergency services.
- ✓ Alert neighboring business/residents.
- ✓ Implement emergency shutdown procedures.

Search (only if search is not a Police responsibility)

Searches may be undertaken in response to a specific warning. Attention points:

- ✓ Know the police policy and role on search and evacuation.
- ✓ Prepare search plans in advance to ensure that premises are checked as quickly and effectively as possible.

- ✓ Divide the area into manageable-sized sectors
- ✓ Form search teams familiar with the area.
- ✓ Define search priorities.
- ✓ Search in a logical and thorough manner so that no part of the sector is left unchecked.

"Do not touch or move any suspicious object"

Suspicious Object

If a suspicious object is found:

- ✓ If possible, leave a marker near the device.
- ✓ Inform the Security Focal Point.
- ✓ Stay out of sight of the object at a safe distance (normally at least 25 meters) and report every possible detail to the Security Focal Point.

Evacuation

The decision to evacuate will be taken by management on the advice of the EHS Manager. The police will be consulted for advice:

- ✓ Evacuate as quickly and efficiently as possible using all available exits.
- ✓ Provide alternative routes to avoid the danger of passing close to any suspicious device.
- ✓ Consult neighboring premises and emergency services.
- ✓ Gather all people in pre-designated "Assembly Areas" taking personal belongings with them.
- ✓ Do not use the car park as an assembly area**.**
- ✓ Check that everyone has left the premises.

Attachment 2A - Bomb Threat Checklist

- Switch on tape recorder (if connected)
- Tell the caller which town/district you are answering from
- Record the exact wording of the threat
- Ask these questions
    - Where is the bomb right now? ……
    - When is it going to explode? .....
    - What does it look like? .....
    - What kind of bomb is it? .....
    - What will cause it to explode? .....
    - Did you place the bomb? .....
    - Why? .....
    - What is your name? .....
    - What is your address? .....
    - What is your telephone number? .....
- Record time call completed.....
- Keep telephone line open
- Where automatic number reveal equipment is available record number
- Inform the security focal point

Time informed.....

This part should be completed once the caller has hung up and the security focal point has been informed

Time and date of call.....

Length of call.....

Number at which call is received (Your extension number) .....

- ABOUT THE CALLER

Sex of caller? ..... Male ☐ Female ☐

Nationality? ..... Age? .....

- THREAT LANGUAGE

Well Spoken ☐ Irrational ☐ Taped ☐

Foul ☐ Incoherent ☐

Message read by threat-maker ☐

- CALLER'S VOICE

Calm	☐	Crying	☐	Clearing throat	☐
Angry	☐	Nasal	☐	Slurred	☐
Excited	☐	Stutter	☐	Disguised	☐
Slow	☐	Lisp	☐	Accent	☐
Rapid	☐	Deep	☐	Familiar	☐
Laughter	☐	Hoarse	☐		

If the voice sounded familiar, who did it sound like?

……..

- BACKGROUND SOUNDS

Street noises	☐	House noises	☐	Motor	☐
Animal noises	☐	Crockery	☐	Static	☐
Clear	☐	Voices	☐	Music	☐
PA system	☐	Booth	☐		
Factory machinery	☐	Office machinery	☐		

Other (specify).....

- REMARKS

.....

.....

.....

Signature..... Date.....

This appendix may be freely photocopied

Letter and Parcel Bomb Recognition Points

- Foreign mail, air mail and special delivery
- Restrictive markings such as confidential, personal etc.
- Excessive postage

- Hand-written or poorly typed address
- Incorrect titles
- Titles but no names
- Miss-spellings of common words
- Oily stains or discolorations
- No return addresses
- Excessive weight
- Rigid envelope
- Lopsided or uneven envelope
- Protruding wires or tinfoil
- Excessive securing material such as making tape, string etc.
- Visual distractions

Attachment 3 - Terrorist threat or action against company Personnel or facilities

Upon receipt of terrorist threat or action against company personnel or facilities, the senior company official will notify police/ RAB/ army for necessary actions. The following information can be used as a guide when reporting:

a. Nature and circumstances of threat or incident including date, time, location, injuries and damages sustained.

b. Fill data concerning affected employees including names and addresses of next of kin and whether they or other interested parties should be notified.

c. Reports on contacts and assistance offers to next of kin, if made, if the next of kin is residing or located in the immediate area.

d. If kidnapping/taking of hostages occurs, provide

1. Location, number, and identity of victims
2. Number and identity of terrorists involved, organizations, weapons used, other descriptive information.
3. Terrorist demands or claims.
4. The local assessment of the situation, including effect on business operations.
5. Initial actions taken by host government to respond to terrorist threat/incident. If company personnel, dependents, and facilities are threatened or subjects of a terrorist attack describe efforts in arranging enhanced security, medical assistance with host country officials (police, foreign minister, etc.).

e. Precautionary measures taken for other employees at the location of the incident and elsewhere in the host country.

f. Name of person sending message along with complete address, telephone number, and telex number for future contacts.

Terrorist Incidents & Kidnappings

<u>Immediate Action</u>

In the event of an actual or threatened terrorist incident or kidnapping, the Bangladesh Leadership Team shall be notified immediately. A sequence of events will occur at all locations; therefore, prompt detailed information is essential. The information above outlines what is needed in notification of this type of incident.

Checklists

Ransom Demand Telephone Checklist

Time of call: _____ Date: _____

Make every attempt to gain as much information from the caller as will furnish, but do not give the caller the impression you are reading questions from a checklist or that you are trying to keep him on the line so the call can be traced. Write down the responses of the caller word for word.

If a Demand:

Would you please repeat your statement?

_____

Who is making this demand?

_____

Why have you done this?

_____

If a Kidnap:

What is he/she wearing?

_____

Is he/she unharmed?

_____

Could you explain what you want?

_____

(Attempt to establish a time and date for next contact. Furnish a specific phone number.)

IF THE CALLER GETS INTO SPECIFICS ON PAYMENT, ASK:

What do you want?

_____

If money: What currency and how do you want it?

_____

Where and when should the ransom be delivered?

_____

How should the payment be made?

_____

End the call on a positive note by assuring the caller his demand will be communicated to the proper person in the company, as soon as possible. Leave the caller with the impression that his call has been understood and action will be taken. Make note of the following information.

Time call ended: _____

Background noises: _____

Sex of caller: _____

Approximate age: _____

Any accent: _____

What was the caller's attitude?

_____

Was the caller sober?

_____

Did the caller sound educated?

_____

What did you notice about the call that you find unusual?

_____

If the caller seemed familiar with the building or operation, indicate how:

_____

_____

Name of Person Receiving Call

_____

Date

IMPORTANT: Pass this form to your supervisor immediately after completing call details.

Annexure 13

FGDs and KII Participation List

FGD Participation List

Sl. No.	Name	Occupation	Age	Gender	Village	Contact No.
Local Community						
1	Md. Shahjahan	Businessman	40	M	Muhuriganj Bazar	01819-325362
2	Rabi Chandra Das	Businessman	45	M	Muhuriganj Bazar	-
3	Mansur Alam	Salesman	35	M	Muhuriganj Bazar	01844-889435
4	Md. Hasan	Shopkeeper	28	M	Muhuriganj Bazar	01846-199787
5	Abdul Jalil	Sweeper	22	M	Muhuriganj Bazar	01878-404129
Local Farmer						
6	Jamal Shekh	Farmer	35	M	Muhuriganj Bazar	01868-429416
7	Md. Moksud	Farmer	32	M	Muhuriganj Bazar	01885-538955
8	Md. Sabuj	Farmer	30	M	Muhuriganj Bazar	-
9	Hamid Mia	Farmer	37	M	Muhuriganj Bazar	01885-668772
10	Rahim Shekh	Farmer	40	M	Muhuriganj Bazar	01892-447289
Local Day Laborer						
11	Shamsuddin	Day Laborer	32	M	Muhuriganj Bazar	01885-416317
12	Nasiruddin	Day Laborer	30	M	Muhuriganj Bazar	01788-303352
13	Alauddin	Day Laborer	27	M	Muhuriganj Bazar	01844-820439
14	Shahadat Hossain	Day Laborer	29	M	Muhuriganj Bazar	01842-856707
15	Sahadat Hossain	Day Laborer	29	M	Muhuriganj Bazar	01788-286921
16	Jalil	Day Laborer	21	M	Muhuriganj Bazar	01305-963089
17	Roni Hasan	Day Laborer	20	M	Muhuriganj Bazar	01619-101440
18	Jahid Hasan	Day Laborer	20	M	Muhuriganj Bazar	01883-477215
Local CNG Drivers						
19	Nizam Uddin	CNG Driver	37	M	Muhuriganj Bazar	01829-942858
20	Saiful Islam	CNG Driver	40	M	Muhuriganj Bazar	01828-057543
21	Md. Jamal	CNG Driver	18	M	Muhuriganj Bazar	-
22	Md. Ershad	CNG Driver	32	M	Muhuriganj Bazar	01829-419585
23	Hasan Mahmud	CNG Driver	29	M	Muhuriganj Bazar	01645-084577
24	Mizan Ali	CNG Driver	33	M	Muhuriganj Bazar	01453-289289
25	Kuddus Bepari	CNG Driver	32	M	Muhuriganj Bazar	01716-011377

FGD Participation List

Sl. No.	Name	Occupation	Age	Gender	Village
Local Community					
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2	Rabi Chandra Das	Businessman	45	M	Muhuriganj Bazar
3	Mansur Alam	Salesman	35	M	Muhuriganj Bazar
4	Md. Hasan	Shopkeeper	28	M	Muhuriganj Bazar
5	Abdul Jalil	Sweeper	22	M	Muhuriganj Bazar
Local Farmer					
6	Jamal Shekh	Farmer	35	M	Muhuriganj Bazar
7	Md. Moksud	Farmer	32	M	Muhuriganj Bazar
8	Md. Sabuj	Farmer	30	M	Muhuriganj Bazar
9	Hamid Mia	Farmer	37	M	Muhuriganj Bazar
10	Rahim Shekh	Farmer	40	M	Muhuriganj Bazar
Local Day Laborer					
11	Shamsuddin	Day Laborer	32	M	Muhuriganj Bazar
12	Nasiruddin	Day Laborer	30	M	Muhuriganj Bazar
13	Alauddin	Day Laborer	27	M	Muhuriganj Bazar
14	Shahadat Hossain	Day Laborer	29	M	Muhuriganj Bazar
15	Sahadat Hossain	Day Laborer	29	M	Muhuriganj Bazar
16	Jalil	Day Laborer	21	M	Muhuriganj Bazar
17	Roni Hasan	Day Laborer	20	M	Muhuriganj Bazar
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21	Md. Jamal	CNG Driver	18	M	Muhuriganj Bazar
22	Md. Ershad	CNG Driver	32	M	Muhuriganj Bazar
23	Hasan Mahmud	CNG Driver	29	M	Muhuriganj Bazar
24	Mizan Ali	CNG Driver	33	M	Muhuriganj Bazar
25	Kuddus Bepari	CNG Driver	32	M	Muhuriganj Bazar

Adroit Environment Consultants Ltd.

Project Name: **Project Name: Environmental and Social Impact Assessment (ESIA) of Steel Manufacturing Mini Mill of Unitex Steel Mills Limited (USML) at Muhuriganj, Feni**

Participant List for Stakeholder consultation (KII) with Govt. Official (Union Level)

Venue: Time: Date:

SL	Name	Address	Age	Sex	Profession	Mobile No	Sign
1.	Mohammad Salim	Ghopal Union parisadh	43	M	U.P. Chairman	01811-424210	
2.	আরিফ হোসেন	করেরহাট ইউনিয়ন	৩৪	M	ইউ.পি. সচিব	০১৮২৬৯৬৫৫৩	
3.	Manik Chandra Shil	Doulatpur	42	M	Head Master (Doulatpur Govt. Primary)	01970723699	Manik
4.	Shaheda Khatun	Shuvopur	36	F	Field officer, BRAC	01782225564	
5.	Md. Shafiul Islam	Shuvopur	48	M	A.B.M., ASA	01912-388628	
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							

Adroit Environment Consultants Ltd.

Project Name: Environmental and Social Impact Assessment (ESIA) of Steel Manufacturing Mini Mill of Unitex Steel Mills Limited (USML) at Muhuriganj, Feni

Participant List for Stakeholder consultation (KII) with Govt. Official (Upazila Level)

Venue: Time: Date:

SL	Name	Address	Age	Sex	Profession	Mobile No	Sign
1.	Nayan Kanti	Upazila Parisadh Chhagalnaiya	38	M	D. Admin officer	01812559350	Nayan
2.	Moumita Das	UNO Office, Chhagalnaiya		F	UNO	01713-187317	
3.	Fakhrul Islam	Land office	40	M	A.C. Land	01713-187327	
4.	Md. Sheikh Farid	LGED, Chhagalnaiya	33	M	Sub Asst. Engineer	01913935676	Sheikh
5.							
6.							
7.							
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Adroit Environment Consultants Ltd.

Project Name: Environmental and Social Impact Assessment (ESIA) of Steel Manufacturing Mini Mill of Unitex Steel Mills Limited (USML) at Muhuriganj, Feni

Participant List for Stakeholder consultation (KII) with Govt. Official (District Level)

Venue: Time: Date:

SL	Name	Address	Age	Sex	Profession	Mobile No	Sign
1.	Mst. Showkat Ara Koli	Department of Environment FENI	–	F	Deputy Director (DD)	01733-063048	
2.	Md. Mominul Islam	BWDB, Feni	–	M	Deputy Chief Extension Officer (DCEO)	01720 541280	
3.	Md. Sofuel Hossain	Department of Agricultural Extension, Feni		M	Additional Deputy Director	01712-088527	
4.	Engr. Shorif Ahmed	Department of Inspection for factories and Establishment, Feni		M	Deputy Impector General (DIG)	01855-765936	
5.							
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11.							
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