ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT OF

KR LOGISTICS LIMITED

NORTH BANSHBARIA, BANSHBARIA SITAKUNDA UPOZILA

Consultancy By:

JAMS ENGINEERING SOLUTIONS
QUALITY, STRENGTH & TRUST

2456/3452, K. B. Aman Ali Road, Bakalia, Chowkbazar, Chatlogram.

+88 01979 170 001
jamsenggbd@gmail.com
www.jamsengineering.com

Report Review Form

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Proponent: KR Logistics Limited North Banshbaria , Banshbaria, Sitakunda, Chattogram Ph: 01730 328570 E-mail: taslim_iiuc@yahoo.com Web:	Prepared By: JAMS ENGINEERING SOLUTIONS 2456/3452 K.B Aman Ali Road,Bakalia,Chwakbazer,Chattogram Trade License No: TRADE/CHTG/002048/2023 Ph.:+880 1979 17 00 01 Email: jamsenggbd@gmail.com Web:www.jamsengineering.com

Prepared By: *DIPTA CHOWDHURY*	Position: B.Sc. in Environment Science. Field Surveyor
Submitted Date: 02/01/2026	Signature:
Checked By: *ENGR.JAHIRUL ISLAM* (IEB-M/36189)	Position: B.Sc. in Mechanical Engineering Chief Executive Officer
Submitted Date: 05/01/2026	Signature:
Verified By: ***MILON KUMAR CHAKRABORTY***	Position: M.Sc. in Chemistry (Chittagong University) **Project Specialist –CWASA JACA Project** EX. Senior Chemist – Mohora Water Treatment Plant (WTP)
Submitted Date: 11/01/2026	Signature:
Verified By: ***ENGR. MR. IUSUF KHAN***	Position: M.Sc. in Chemical Engineering (Wuhan Textile University, China) **Chairman Department of Textile Engineering** (Port City International University) Air Quality (Modeling and Prediction,Pollution Control, Prevention and Monitoring),
Submitted Date: 11/01/2026	Signature:
Summary: EIA Report This document presents the environmental Impact Assessment (EIA) reports as required for lnland Container Deport by **KR Logistics Limited**, North Banshbaria, Banshnaria, Sitakunda, Chattogram, Bangladesh.	

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CHAPTER- 01
EXECUTIVE SUMMARY

1.1 Background of EIA Report

Chittagong is the commercial capital of Bangladesh, primarily due to the Chittagong Port. The national economy of Bangladesh is heavily dependent on this port. The national economy and development of a country largely depend on the efficiency of export and import processing times from the port for its materials and services.

Chittagong Port is experiencing increased cargo handling with an average annual growth of over 10%. To address the growing volume of both container and bulk cargo, the port is undergoing various development projects and modernization efforts. These include the construction of the deep-sea port at Matarbari, the Patenga Container Terminal (PCT), and the Bay Terminal, as well as the procurement of new equipment. However, the port also faces challenges, including congestion and the need for dedicated bulk cargo handling facilities.

According to port officials, Chittagong Port has a container storage capacity of 53,518 TEUs (twenty-foot equivalent units) for import, export, and empty containers. the daily delivery of containers has ranged between 3,500 to 4,000 TEUs .

The port has faced congestion issues due to various factors, including political unrest and disruptions to customs clearance. In mid-August, the port yard held over 44,000 TEUs due to delivery disruptions.

While the port has seen improvements in container delivery since then, with a record 5,100 TEUs delivered in a single day, the port still aims to keep container volumes between 30,000 and 32,000 TEUs for smooth operations.

Report Source : TheBusiness Standard (23 July,2025,)

“https://www.tbsnews.net/bangladesh/container-handling-chattogram-port”

The government is planning to start the construction of the Bay Terminal at Chattogram Port next year, a landmark project anticipated to boost the capacity of the country's main trade gateway by up to sixfold.

when the project will impletmetn then the space to handle empty contaier will create a large change for smooth operaton of Chittagong port.

By considering this upcoming change, the government has taken the initiative to create empty tank terminals through private investment as part of this mega project.

As a part of this mega project, **KR Logistics Limited** has taken inatiative to estabilish an lnland Container Deport (ICD) to store empty Container Terminal , storage capacity of average 5000 TEUs (twenty-foot equivalent units) and Waiting Zone Capacity of 200 TEUs.

1.2: The main objectives of this Environment Management Plan (EMP) report:

Identify the possible environmental issues which might be involved with the project and the source of pollution, if there is any, and to suggest a mitigation or management plan to comply with the Environmental standard which is describes in ECR, 2023. The other objectives of the study are to:

- ✓ Present a general description of the project and existing environment;
- ✓ To identify the key impact of the project on environment;
- ✓ To evaluate of their importance and recommendation of mitigation measures;
- ✓ To suggest abatement plan if necessary with the environment quality standard of ECR, 2023;
- ✓ Develop a well-balanced environment management plan to reduce unresolved environmental impacts and enhance positive impacts to comply with the environmental quality standards of Bangladesh;
- ✓ Identify possible optimum management options leading to improvement of the waste management system;
- ✓ To adopt and implement the Environmental Management Plan throughout the pharmacitucal Project;
- ✓ Develop concise waste segregation principles and promote practical guidelines for re-usable products;
- ✓ Foster commitment from all staff and management to actively participate in waste avoidance, reduction, reuse and recycling programs;

- ✓ Introduce a continuing waste management education program for all staff to increase awareness of occupational;
- ✓ Adopt policies and procedures to minimize the environmental impact of waste treatment and disposal;

1.3: Scope of the Study of EIA:

This study will be limited to the **Container Handling and Processing Activities at the Inland Container Depot (ICD)**. Although a general environmental evaluation, such as noise and air pollution assessment, will be conducted at the initial stages, a detailed audit will primarily focus on **waste management and operational impacts** associated with container handling processes. The Environmental Impact Assessment (EIA) aims to identify the interactions between the activities of the project, namely the ICD, and the environmental components of the surrounding area. The EIA will examine all aspects of the ICD operations that are likely to impact the environment. Suitable and cost-effective mitigation measures will be recommended to address any adverse environmental impacts.

Under the existing regulatory framework of Bangladesh, establishing an ICD requires an **Initial Environmental Examination (IEE)** before initiating any project activities. The key legislative documents governing environmental protection in Bangladesh include the **Environment Conservation Act, 1995 (ECA, 95)** (Amendment 2010) and the **Environment Conservation Rules, 2023 (ECR, 23)**. The **Department of Environment (DoE)** is the primary authority responsible for enforcing these regulations.

The Environment Conservation Rules, 2023 (ECR, 23) mainly consist of:

- ❖ Categorized list (Green,Yellow, Orange & Red) of the projects;
- ❖ Application format for taking environmental clearance;
- ❖ Ambient standards in relation to water pollution, air pollution and noise as well as permitted discharge or emission levels of water and air pollution also noise by industries or projects.

Under these rules, all existing industries or projects in Red and Red category will require an Environmental Impact Assessment (EIA) for the necessity of environmental clearance. According to ECR,2023 guideline it's identified that KR Logistics Limited in Red category(Sl No:71). EIA helps in understanding the potential extent of environmental changes and in finding the way to mitigate the environmental impact.

1.4: Methodology:

The report has been prepared on the basis of information of the project activities supplied by the project proponent. The Consultant's multi-disciplinary team of experts made reconnaissance and exploratory site visits. Environmental data from different sources (B.B.S., DoE, Department of Meteorology (DoM) and other environmental reports of the existing project area were collected to prepare an environmental impact assessment . The Consultant's multi-disciplinary team of experts made a visit to visualize the condition of the project site and its surroundings areas. This report has been prepared based on the information supplied by the management of the KR LOGISTICS LTD as well as undertaking a site visit to the project also survey of the surrounding areas and to get field validation. Also collected primary and secondary data relating to the project and other environmental information was collected.

- Collecting information related to the project by requesting and meeting with the project representatives;
- Undertaking field visit to the project site also surrounding site;
- Survey the local area for information collection;
- Public Consulation to inform about upcoming project according to ECR,2023 Guideline
- Gathering information from various government and other agencies;
- Analysis of the project documents and other information;
- Identification of possible environmental impact and evaluation of their significance;
- Identification of the source of pollution and other causes of degradation;
- Collection of data on environmental, social, health and natural resource component parameters of the project area;
- Identified sources of environmental and biodiversity degradation and social disturbances of significance;

CHAPTER- 02
GENERAL INFORMATION

2.1 :PROJECT ENTERPRONEUR INFORMATION

1.	Name of the Project	**: KR LOGISTICS LIMITED**
2.	Project Proponent	: 1. Md. Taslim Uddin (Managing Director) 2. Tahmina Sanjid (Director)
3.	Office Address	: BBS Steel Bhaban, South Shitalpur, Sitakunda, Chattogram.
4.	Factory Address /Project Location	North Bashbaria , P.O: Bashbaria , Sitakunda, Chattogram. Bangladesh.
5.	Geographical Position:	Latitude : 22°34'05.4"N Longitude: 91°41'03.3"E
6.	Contact No & E-mail	: +88 01730 328570
7.	Project Location	: North Bashbaria , P.O: Bashbaria , Sitakunda, Chattogram. Bangladesh.

2.2 EIA TEAM COMPOSITION & ENVIRONMENT CONSULTANT:

The EIA study was carried out by a team of consultants from the JAMS ENGINEERING SOLUTIONS, in which the team leader was Mr. Milon kumar Chakraborty, MS in Environmental Science & EX. Senior Chemist –Mohora Water Treatment Plant (WTP). Other members listed below table 01 .

SL. NO	Name of Expertise	Educational Qualification	Area of Expertise	Experience in Year	Signature
1	MR. MILON KUMAR CHAKRABORTY	M.Sc. in Chemistry (CU)	**Project Specialist –CWASA JACA Project** EX. Senior Chemist –Mohora Water Treatment Plant (WTP) Water Advisor-Pacific Jeans Group Contact no : 01711-144852 Air Quality (Modeling and Prediction,Pollution Control, Prevention and Monitoring), Water Quality (Modeling and Prediction,Pollution Control, Prevention and Monitoring), Water Quality (Modeling and Prediction, Risk Assessment)	35 Years	

2	ENGR. JAHIRUL ISLAM	B.Sc. in ME. (DUET) IEB-M/36189)	**Environmental Expert & Air Modelling Expert.** Contact no : 01979-170001	13 Years	
3	ENGR. MR. IUSUF KHAN	M.Sc. in Chemical Engineering (Wuhan Textile University, China)	**Chairman Department of Textile Engineering** (Port City International University) Air Quality (Modeling and Prediction,Pollution Control, Prevention and Monitoring), Contact no: 01928-464124	10 Years	
4	ENGR. TAHAZIBUL HOQUE	B.Sc. in EEE (CUET)	Energy Saving Expert Contact No : 01717-453432	12 Years	
5	A.S.M IMRUL KAYES	Masters of Science (MS)-Geography & Environment Study University of Chittagong	Geography & Environment Specialist Contact: 01676-886474	08 Years	
6	Mohammad Rizvi	B.Sc. in Textile Engineering	Chemical & Environment Expert Contact No: 01874-456837	04 Years	

The team of the environmental service and design visited the site and held interviews with the project proponent and local people regarding the environmental aspects. The EIA report has been prepared based on the data supplied by the project proponent and data collected by the local people interview and by the site investigation.

The name of the KR Logistic Limited (KRLL) personnel is given below (table 1.1) who contribute to JAMS team of expertise by providing informational and documentation supports.

Sl.NO	Name of KR Logistics Ltd	Assign Position
1.	MR.MD. TASLIM UDDIN	Managing Director
2.	MR. MD. JAHEDUL HASAN	Legal & Compliance Office (Project Coordinator)Manager (Project Coordinator)
3.	MD. SHAHARAJ (B.SC IN CVIL ENGG.)	Structural Analysis

2.3: SCOPE AND LIMITATIONS

This report presents an Environmental Impact Assessment (EIA) of the proposed Industry. The EIA includes environmental reconnaissance of the project area, identification of potential impacts and corresponding mitigating measures, identification of significant environmental issues and recommendations for further studies in order to address these issues. It provides a brief description of the project activities to be carried out and identifies major environmental impacts resulting from these activities, both during development phase and after project implementation. An Environmental Management Plan (EMP) has been provided that suggests specific measures to mitigate adverse environmental impacts and to enhance beneficial impacts. Important environmental issues that need further studies have been identified also.

CHAPTER- 03
PROJECT DESCRIPTION

3.1 RATIONALE OF INLAND CONTAINER DEPOT (ICD) PROJECT IN BANGLADESH

The establishment of the Inland Container Depot (ICD) by KR Logistics Limited is grounded in Bangladesh's critical need for efficient logistics infrastructure to support national trade expansion and industrial growth. The rationale addresses several strategic objectives:

I. **Rising Container Traffic and Port Congestion:**
Bangladesh's major seaports, particularly Chattogram and Mongla, are experiencing increasing container volumes due to rapid industrialization and export growth. Establishing ICDs in strategic inland locations will help decongest seaports, ensure faster cargo clearance, and improve supply chain efficiency.The pharmaceutical market is projected to surpass $6 billion by 2025, growing at a compound annual growth rate of over 12% between 2019 and 2025.

II. **Facilitation of Export-Oriented Industries:**
More than 80% of Bangladesh's export earnings come from the ready-made garments (RMG) sector, which requires efficient and reliable containerized cargo handling. Inland container depots near industrial zones enable timely shipment consolidation and reduce transportation delays, directly benefiting export competitiveness.

III. **Expansion of Regional and Multimodal Connectivity:**
With the development of regional transport corridors such as **BBIN (Bangladesh–Bhutan–India–Nepal)** and **BCIM (Bangladesh–China–India–Myanmar)**, ICDs play a vital role in promoting cross-border trade. They function as logistics hubs integrating road, rail, and waterways, enhancing connectivity and reducing logistics costs.

IV. **Support for National Economic Growth and Employment:**
The ICD project contributes to the country's trade facilitation infrastructure, generating significant employment opportunities in transportation, warehousing, and customs-related services. It also supports the government's **Vision 2041** goal of transforming Bangladesh into a regional logistics and manufacturing hub.

Table 03 : Salient Features of the Project

Sl. No.	Salient Features	Description/Quantities
1.	Name of the project	**KR LOGISTICS LIMITED**
2.	Types of Project	Empty Container Tank Terminal
3.	Name of the proponent	1. Md. Taslim Uddin (Managing Director) 2. Tahmina Sanjid (Director)
4.	Location of the project	North Banshbaria, Banshbaria, Sitakunda, Chattogram, Bangladesh.
5.	Geographical Information	Latitude : 22°34'05.5"N Longitude: 91°41'02.9"E
6.	Total Project Area	20.0 Acre (2000 Shotangsho,or 80966.54 SQM OR 871200.0 1SFT 1. R.S Khotian-Attached , 2. Mouja-Banshbaria & Nowakhali 3. Dag No : Attached
7.	Contact Person Designation Contact Details Mobile Phone E-mail	Md. Taslim Uddin (Managing Director) +8801730- 328570)
8.	Nearest Highway Road	Dhaka – Chittagong Highway
9.	Type of Land	Occupency-J1 (As per BNBC-2020 & Fire License)
10.	Nearest Highway Road	Dhaka – Chittagong highway
11.	Total Amount of Investment	98.0 Crore (According to Investment Statement)
12.	Annual Working Day	260 Days
13.	Employee	200-250 Persons
14.	Daily Operational Hour	12 Hours Per Day
15.	Project Location Google Map	Attached
16.	Source of Energy	PDB, Diesel Generator (Standby Unit)
17.	Source of Fuel	Diesel (120-150 Lit/Day)
18.	Power requirement	1.0 MW Substation (Power Supply by PDB)
19.	Standby Power	Diesel Generator (600 KVA X 02)
20.	Source of Water	Chittagong WASA
21.	Water Requirement	20000-30000 liter/ day
22.	Liquid waste	5000-10000 liter per day and rest of the water domestic use only.
23.	Types of Waste Water Treatment system	N/R

24.	Waste management process	Standard
25.	Solid Waste Management System	: Flow Chart Attached.
26.	Solid waste	100-200 KG/Day
27.	List of Equipment	Attached
28.	License for Project	Attached
29.	List of machinery	Attached
30.	Location map	Figure A,B
31.	Khotian Copy of Land (Muja Map)	Attached
32.	Building Layout Map	Attached
33.	NOC From local Authority	Attached
34.	Trade License	Attached
35.	Fire License	Attached
36.	Building Approval Plan	Attached
37.	Fire Safety Plan	Attached
38.	Floor Layout Plan	Attached
39.	Drainage Layout Plan	Attached.
40.	Investment MoU	Attached.

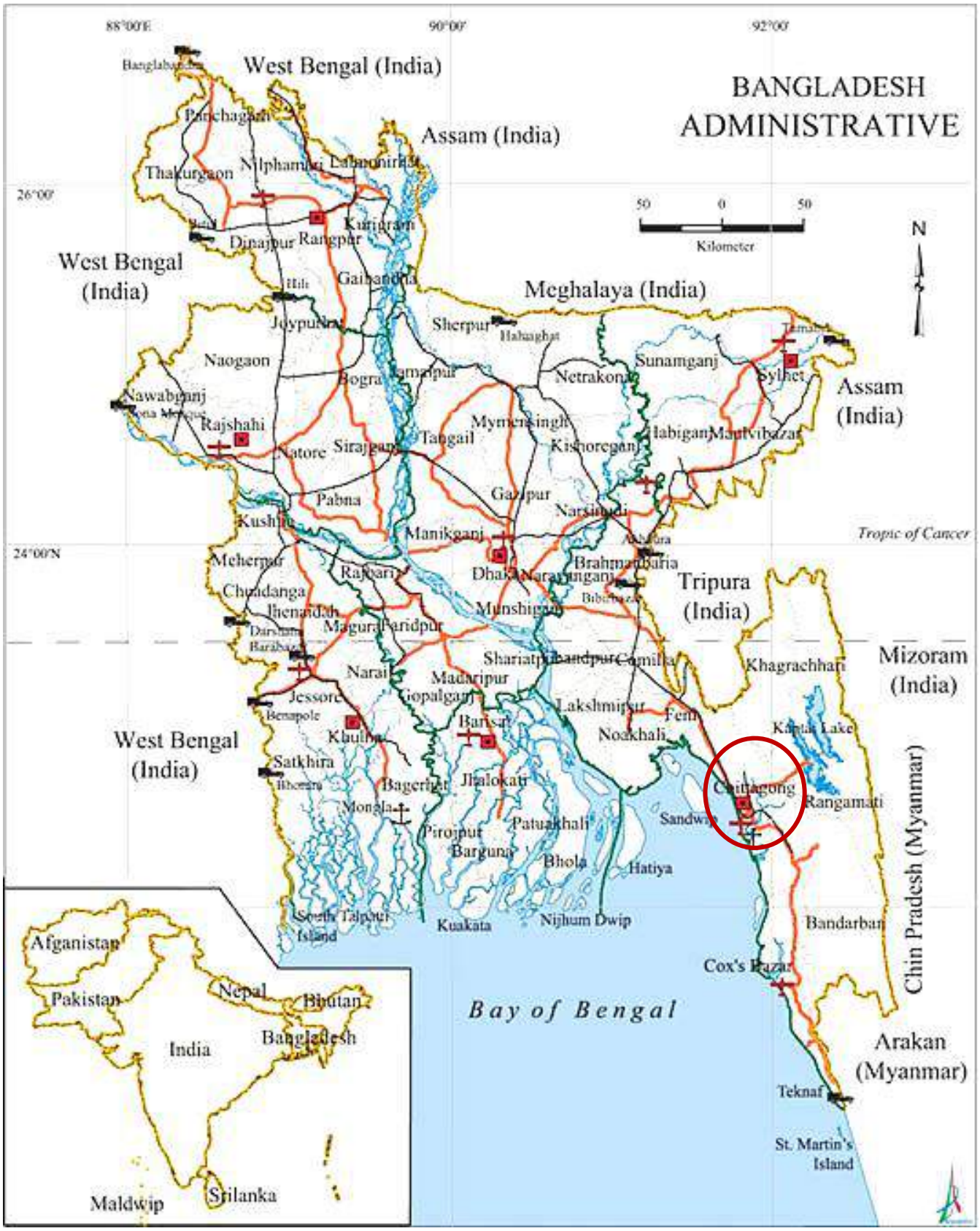
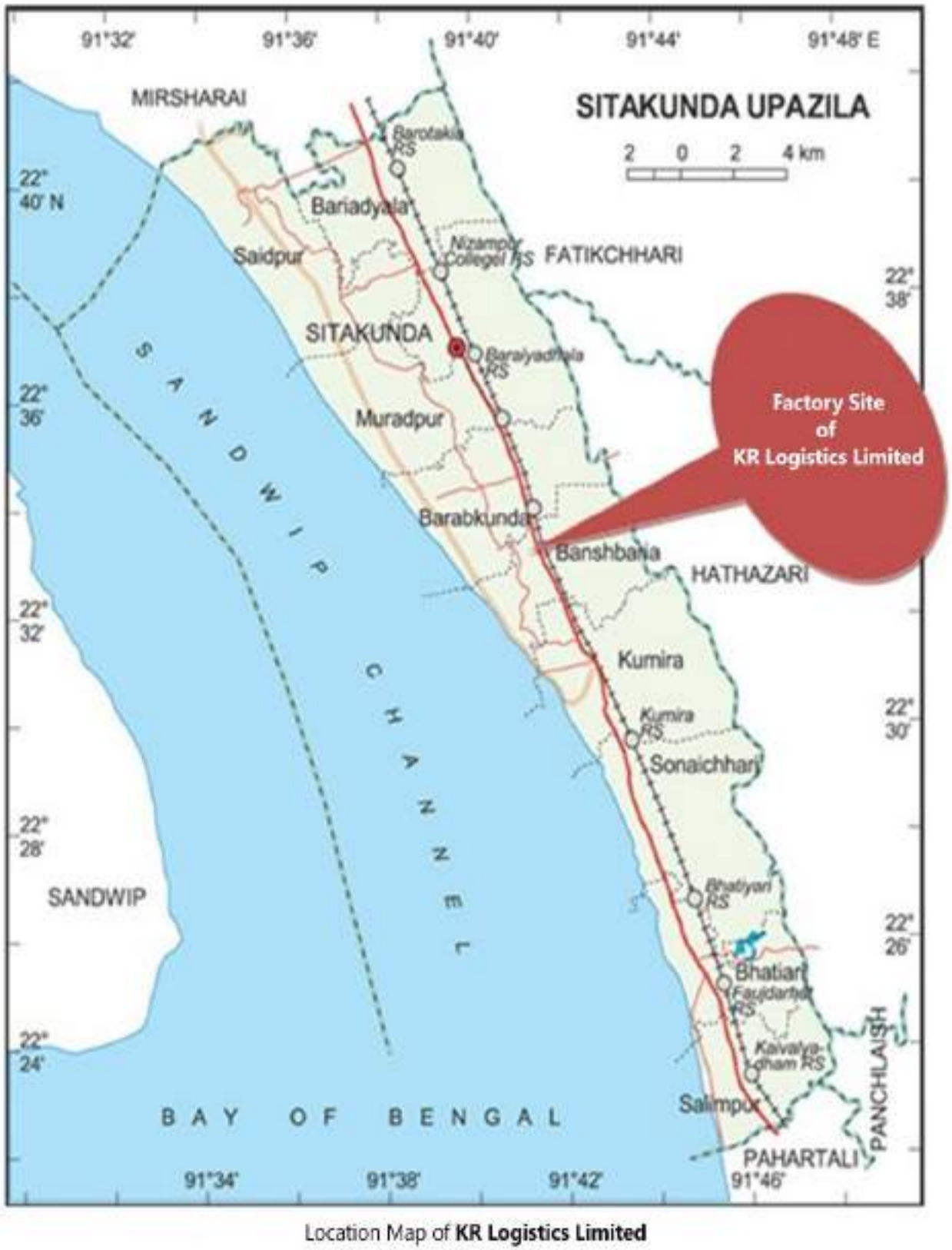


Fig:-3A: Geographical Location of Chattogram, Bangladesh.



Location Map of **KR Logistics Limited**

Fig : Geographical Location of Sitakunda, Chattogram, Bangladesh.

FIG (3B): GEOGRAPICAL LOCATION (SATALITE VIEW) MAP OF KR Logistics LTD

Figure: Distance from KR Logistics Ltd to Dhaka – Chittagong Highway (163.02 M or 534.83 ft)

Figure: Distance from KR Logistics Ltd to Unitex Spinning Limited CPP (488.88 M or 1603.94 ft)

Figure: Distance from KR Logistics Ltd to R.R Textile Mill (357.56 M or 1173.10 ft)

Figure: Distance from K R Logistics Ltd to PHP Float Glass Industries Ltd

(311.79 M or 1022.94 ft)

Figure: Distance from KR Logistics Ltd to BN Filling

Station (238.15 M or 781.34 ft)

FIG (3C): MASTER LAYOUT MAP OF KR Logistics Ltd

FIG (3D): DRAINAGE LAYOUT MAP OF KR LOGISTICS LTD

Table (3.2): Land Distribution

KR LOGISTICS LIMITED

Sl. No	Utilization Description	Area in Shotangsho	Area in SFT	(%) of Allocated Land
1.	Total Land Area (As per Khotian)	2000	871,200	100.00%
2.	Warehouse Space	1500.0	609,840	75%
3.	Cold Chain Facilities	150.00	65340	7.5%
4.	Internal Road	100.00	43560	5%
5.	Operational Building	50.00	21780	2.5%
6.	Canteen & Pantry	20.00	8712	1%
7.	C&F Working Area	50.00	21780	5%
8.	Customs Office Area	60.00	26136	6%
9.	Prayer Room for Officers	30.00	13068	2%
10.	Solid Waste Management Area	20.00	8712	1%
11.	Toilet	20.00	8712	1%
	Total Area=	2000	871,200	871,200

Art 3.3: Description of Project Infrastructures (Industrial Building Description)

Sl. No	Present Status of Infrastructure	Yes	No	Remarks
1.	As Built Infrastructure	√	☐	
2.	Rental Infrastructure	☐	√	
3.	Further Extension Proposal	√	☐	

Art-3.4: Project Operation

3.4.1. SOURROUNDING LAND USES (1.0 KM)

Side	Object
North side	Vacant Land and Samiha Agro
South Side	Vacant Land and Sonargaon Filling Station
East Side	1. Dhaka Chittagong Highway 2. PHP Aluminum Factory
West side	Vacant Land

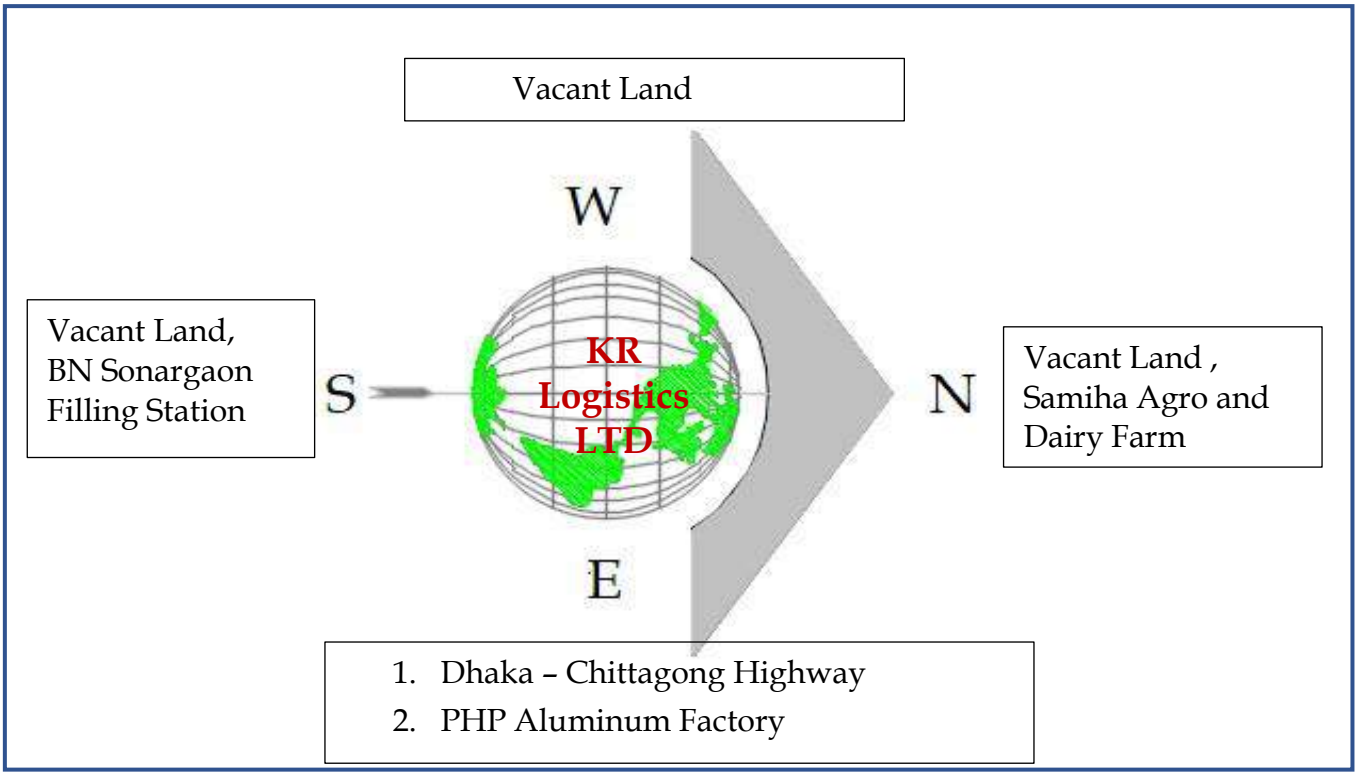


FIG : SOURROUNDING LAND USES (50.0 M)

KR LOGISTICS LTD
Geographical Location: a) Latitude: 22°34'05.5"N
b) Longitude: 91°41'02.9"E

Fig : Proposed Project 3D Model

3.5 LIST OF MACHINERIES

The project will be equipped with complete & balanced machinery together with all auxiliaries & equipment's. The main machinery for the project will be imported from the reputed manufacturer of USA, Polan, Japan, India, China & Bangladesh

Sl. No.	Name of Equipment	Quantity
1.	Load Reach Stacker	05
2.	Weigh Bridges At The Entrance	02
3.	Empty Container Handler	03
4.	Prime Mover + Trailer	20
5.	Container Handling Equipment Forklift (10 ton)	01
6.	Container Handling Equipment Forklift (05 ton)	02
7.	Container Handling Equipment Forklift (03 ton)	5
8.	Hydraulic Crane	01
9.	Basic Crane	01

REF: According To BIDA Registration

3.6 Technology and Major Components of the Project:

A range of highly specialized machineries and tools will be used for the operation of the river terminal and container freight station (CFS). Reach Stackers, Forklifts, and other handling equipments. Container vessels will be used for transportation of containers between Dhaka and Chittagong. Reach Stackers are used for flexible handling of containers (Fig.) and are usually designed to lift containers as heavy as 45 metric tons into heights of six containers. Reach Stackers are able to transport a container over a short distance very quickly and pile those rows as required. Forklifts as shown in Fig. 3.4 are used to handle 20ft empty containers and for stuffing, unstuffing of palletize cargo, bales, bags, etc. On recommendations of Seaport Innovations, KR LOGISTICS LTD has decided to procure FCCs from a company; other equipment and machineries (e.g., reach stacker, empty stacker) will be procured from a two companies named Kalmar and Fantuzzi. For barges/ vessels for carrying containers (see Fig.), SMRCTL has elected Ship broker Shipwright Bangladesh Limited; initially SMRCTL plans to procure four vessels. The following equipment will be used at the ICD during operational conditions.

Figure: Reach Stackers

Figure: Hydraulic Pulley

Figure: Forklift

3.7 Working Process of KR Logistics LTd: The proposed Inland Container Terminal (ICT) is planned as a customs-bonded logistics facility intended for handling import and export containers through rail and road connectivity. The terminal will function as an extension of the seaport, facilitating inland customs clearance, container handling, storage, and value-added logistics services. The overall process flow of the Inland Container Terminal is illustrate.

3.7.1 Import Container Handling Process: Import containers will be transported from the designated seaport to the Inland Container Terminal by rail and/or road under customs bond. Upon arrival at the terminal, containers will enter through the designated entry gate where gate-in operations will be conducted. These include verification of container number, seal number, manifest, and associated shipping documents. Containers will also be weighed using an on-site weighbridge and visually inspected for external damage or seal integrity. Verified information will be recorded in the Terminal Operating System (TOS). Following gate-in clearance, containers will be unloaded from rail wagons or trucks using mechanized equipment such as reach stackers or rubber-tyred gantry cranes (RTGs).

The containers will then be transferred to the designated import container yard for temporary storage pending customs clearance.

3.7.2 Yard Storage and Container Handling Operation: The Inland Container Terminal will maintain separate yard areas for import containers, export containers, empty containers, and refrigerated containers (if applicable). Containers will be stacked systematically based on operational priority, delivery schedule, and customs status. Internal container movements will be carried out using diesel or electric-powered handling equipment. Proper spacing and stacking height will be maintained to ensure operational safety and efficient space utilization.

3.7.3 Customs Bonded Storage Clearance: The entire terminal will operate as a **customs-bonded area** under the supervision of the Customs Authority. Importers or their authorized clearing and forwarding agents will submit relevant documents including Bill of Entry, commercial invoice, packing list, and applicable permits for customs clearance. Customs officials may carry out documentary checks and physical inspection of containers as per prevailing rules. Upon completion of duty and tax payment and fulfillment of all customs requirements, containers will be released for delivery, de-stuffing, or onward transportation.

3.7.4 Container De-stuffing and Cargo Handling (Import): After customs clearance, import containers may be transferred to the Container Freight Station (CFS) area for de-stuffing operations. Cargo will be unloaded from containers and stored temporarily in covered warehouses before being dispatched to consignees by truck. All cargo handling activities will comply with safety and environmental guidelines to prevent spillage, dust generation, and material loss.

3.7.5 Export Cargo Handling and Container Stuffing: Export cargo will be received at the terminal by road transport and directed to designated export cargo handling areas.

The cargo will be inspected, weighed, and stored prior to container stuffing. Stuffing operations will be conducted under customs supervision inside the CFS or designated stuffing areas. After stuffing, containers will be sealed with official customs seals and documented for outbound movement.

3.7.6 Container Dispatch and Gate-Out Operations: Cleared import containers, de-stuffed cargo, and export containers will be dispatched from the terminal via rail or road transport. Before gate-out, containers will undergo final verification of documentation, seal condition, and container number. The terminal will prioritize railbased dispatch to minimize road congestion and environmental impact.

3.7.7 Empty Container Management: Empty containers generated from import operations will be segregated and stored in a designated empty container yard. The terminal will provide facilities for inspection, minor repair, and repositioning of empty containers as per shipping line requirements. Efficient management of empty containers will help reduce yard congestion and optimize terminal operations

3.7.8 Supporting Utilities and Facilities: The Inland Container Terminal will be supported by internal roads, drainage systems, power supply, lighting, administrative buildings, customs office, security installations, firefighting facilities, and wastewater management systems. All utilities will be designed and operated in compliance with national environmental and safety regulations.

3.7.9 Environmental Relevance of the Process: The process flow of the Inland Container Terminal emphasizes increased use of rail transportation, resulting in reduced fuel consumption, vehicular emissions, and traffic congestion. Environmental management measures such as dust suppression, noise control, stormwater management, and solid waste handling will be implemented as part of the Environmental Management Plan (EMP).

3.8 Analysis of Project Options:

The Inland Container Terminal has been strategically established near the main highway, approximately 50 km away from the seaport, to optimize logistics efficiency and support seamless import and export operations. The proximity to the main highway ensures smooth road-based movement of cargo to and from the terminal, while rail connectivity options can be integrated in the future to further enhance transportation efficiency. Being 50 km from the seaport allows inland customs clearance and container handling, effectively reducing congestion and vessel waiting times at the port.

The selected site lies within an industrial/non-residential area, minimizing potential social disturbances, such as noise, traffic congestion, and land-use conflicts with residential communities. It is also located away from environmentally sensitive zones, wetlands, flood-prone areas, and ecologically critical habitats, ensuring reduced environmental impact during construction and operation.

Adequate land availability at the site allows proper design of container yards, internal roads, storage facilities, and administrative buildings. The area also provides ready access to essential utilities such as electricity, water supply, and communication networks, ensuring uninterrupted terminal operations. Overall, the location has been chosen to balance operational efficiency, environmental safety, and potential for future expansion, making it highly suitable for establishing a modern Inland Container Terminal.

CHAPTER- 04
EXISTING ENVIRONMENTAL CONDITION

4.1 INTRODUCTION

It is important to understand existing physical, biological, cultural, economic and social environmental characteristics of the project area. This information forms the basis to analyze the probable impacts of the project activities. Mainly the following are the objectives or outcome of examining and defining the existing environment.

- To identify environmental and socioeconomic components that may be affected due to project activities;
- To recognize potential environmental impacts on them
- To provide a base line against which environmental conditions in the future project measured.

For this EIA study the emphasis is given on the environmental features like water, air and noise quality of study area. Considerations are given to both the environment and ancillary area that seems to be affected.

4.2 Environmental Condition of Project Area (North Banshbaria, Banshbaria, Chattogram): The environmental conditions of the North Banshbaria area in Chattogram are dominated by its riverine geography, which is highly vulnerable to seasonal flooding, waterlogging, and issues with water quality. The area's environment has been significantly impacted by human activity, including river encroachment, deforestation, and industrial expansion.

Specific Environmental Conditions and Challenges:

Key Factor	Environmental Condition
Climate Condition	Banshbaria in Sitakunda experiences a tropical monsoon climate with consistently high humidity and strong coastal influence. The hot season spans March to June, with temperatures typically reaching 31–33°C and occasional heat waves. From December to February, conditions become cooler and drier, averaging around 26°C. The area receives over 2,800 mm of annual rainfall, concentrated between June and September. Being directly exposed to the Bay of Bengal, Banshbaria often faces tidal surges, strong monsoon winds, and seasonal cyclone risks.
Deforestation	Banshbaria and its surrounding hilly–coastal areas in Sitakunda Upazila have faced significant deforestation driven by unplanned industrial growth, roadside hill cutting, and expanding settlements. Industrial corridors linked to the Sitakunda–Chattogram belt have accelerated vegetation loss and increased soil erosion. Although the Forest Department and local authorities have initiated afforestation programs, continuous hill cutting for housing, transport routes, and industrial facilities continues to degrade natural ecosystems and weaken slope stability.
Water Resources	Banshbaria in Sitakunda is shaped by coastal channels and tidal creeks connected to the Bay of Bengal. During the monsoon, heavy rainfall, tidal backflow, and poor drainage often cause flooding and siltation. In the dry season, salinity intrusion increases sharply, affecting freshwater availability. Water quality is further degraded by industrial effluents from nearby factories, shipbreaking-related contamination, oil leaks, and polluted surface runoff from the Sitakunda industrial corridor.
Air Pollution	Banshbaria in Sitakunda experiences moderate to unhealthy air quality, heavily influenced by nearby industrial clusters and transport corridors. Major pollution sources include emissions from trucks on the Dhaka–Chattogram highway, dust from construction and industrial yards, smoke from steel and cement factories, and particulate releases from the Sitakunda shipbreaking zone. Levels of PM2.5 and PM10 frequently exceed WHO guidelines, particularly in the dry season when suspended dust and industrial activity intensify.
Industrial	Sitakunda Banshbaria, part of Chittagong's industrial belt, faces severe environmental pressure from unplanned industrial growth. Untreated effluents from nearby textile, steel, cement, and ship-breaking industries pollute soil, water, and air. The are a notable source of heavy metal contamination and marine

Pollution	pollution. Lack of proper effluent treatment facilities remains a persistent environmental challenge.
Waste Management	Sitakunda Banshbaria generates significant solid and hazardous waste due to industrial, port, and urban activities. Poor collection, limited landfill capacity, and lack of source segregation worsen the situation. Although the Local Authority have initiated some waste management programs, marine litter and oil residues persist in local waterways and coastal areas, continuing to pose environmental and health hazards to the community.
Climate Change Impact	Banshbaria, as a low-lying coastal area, is highly vulnerable to climate change impacts like sea-level rise, storm surges, and coastal erosion. Frequent cyclones and tidal flooding damage infrastructure and disrupt livelihoods. Sedimentation in local rivers reduces navigability, affecting trade and port operations. To mitigate these risks, measures such as strengthened coastal embankments, flood-resilient infrastructure, and emergency preparedness are crucial for long-term environmental and economic resilience.

4.3 CONDITION OF STUDY AREA:

The major environmental and infrastructural features within the Chittagong Port project area have been assessed through field investigations and surveys conducted by the EIA team. The collected data, together with observations from site inspections, have been utilized in the preparation of this report.

The survey focused on key operational and surrounding zones, including:

- Main Container Handling Area and Access Roads (Part-1: Ch. 0–400 m, Part-2: Ch. 0–350 m, Part-3: Ch. 0–500 m)
- West Port Link Road and Adjacent Industrial Zones (Ch. 0–900 m, including Link-1: Ch. 0–450 m and Link-2: Ch. 0–200 m)
- Other Supporting Facilities and Cargo Yards within the port complex

Key findings from the site inspection include:

1. There are no monuments or sites of historical or archaeological significance within or immediately surrounding the port area.
2. No features of scientific or ecological interest—such as protected habitats, rare flora, or research installations—were observed within the immediate project vicinity.
3. There is no development of recreational or scenic facilities in the port premises or its immediate surroundings, as the area is primarily dedicated to industrial, logistics, and maritime operations.

This assessment establishes the baseline environmental and infrastructural conditions of the Chittagong Port area, providing a foundation for evaluating potential impacts of the proposed ICD/port development activities.

4.4 PHYSICAL ENVIRONMENT

4.4.1 LAND FORM AND SOIL CLASSIFICATION

Bangladesh exhibits three main physiographic divisions: Tertiary Hills (12%), Pleistocene Terraces (8%), and Recent Floodplains (80%). The soils are generally yellowish-brown to reddish-brown loams, grading into broken shale, sandstone, or mottled sand at variable depths. These soils are moderately acidic to acidic (pH 4.0–4.5) and have relatively low infiltration capacity.

The landform and soil classification of the North Banshbaria region in Sitakunda, Chattogram, is defined by its position between the western flank of the **Sitakunda Anticline** and the **Sandwip Channel**

4.4.1A Landform and Physiography:

- **Coastal Plain (Lowland):** Most of North Banshbaria consists of unbroken **flat alluvial plains**. This area lies below high-tide levels but is protected from daily tidal flooding by embankments.
- **Piedmont Plains:** A transitional zone of "Young Soils" and gentle slopes extending from the foot of the hills toward the coast.
- **Hilly Region (Sitakunda Range):** To the east, the terrain rises into an asymmetric, box-like anticline with peaks reaching up to **352 meters (1,155 ft)**. The western flank, near the terminal, is characterized by a major fault.

4.4.1B Soil Classification:

The soils in this industrial corridor are primarily influenced by sedimentary deposits from the Tertiary age and recent alluvial processes.

- **Floodplain Soils:** Dominant in the coastal flats; classified into sub-types ranging from calcareous to non-calcareous grey piedmont soils.
- **Entisols & Inceptisols:** Found in the piedmont and lower slopes. These are "young soils" with weak pedogenetic development and low base saturation.
- **Brown Hill Soils:** Found on the higher elevations, these vary from **brown sandy loams to clay loams** and are slightly to strongly acidic

4.4.1C Physical Properties:

- **Texture:** Primarily **sandy loam to silty clay loam**. Top-layer coastal soils typically contain **50–96% silt**, 2–33% clay, and 1–25% sand.
- **Acidity:** Generally acidic, with pH values often between **4.4 and 5.5** in hill-adjacent areas, though barren coastal land can show more alkaline pH (up to **8.3**) due to salinity.
- **Lithology:** Underlain by little-consolidated **sandstone and shale** of the Dupi Tila formation

4.4.1D Sedimentary Structure of Sitakunda:

- **Bedding:** On our whole field survey we found a lot of bedding that was expressed by work unit of granular tabular or lenticular form. Generally, a bed or structure is an individual layer of rocks more than 1cm thick.

- **Lenticular Bedding:** Lenticular bedding is a sedimentary bedding pattern displaying alternating layers of mud and sand. Formed during periods of slack water, mud suspended in the water is deposited on top of small formations of sand once the water's velocity has reached zero.

- **Wavy Bedding:** Wavy bedding occurs when mud is deposited over the whole area of a bed of rippled and/or cross stratified sand.

- **Lamination:** We also found some structures that were likely to be bedding but not so thick as bedding. We identified those as lamination which is a small-scale sequence of fine layers that occurs in sedimentary rocks. Laminations are normally smaller and less pronounced than bedding.

- **Groove cast:** We got a sedimentary structure that was curved outwards which was named groove casts and they are sedimentary structures found on the bases of certain strata that indicate small-scale grooves or irregularities. Generally, older strata are curved inward.

- **Nodular structure:** As much as we became closer to the axis we found some structures that were moderately hard bodies of rock similar to concretions. Nodules may also form by the selective precipitation of dissolved minerals that completely replace the original Sediments.

- **Mud cracks:** Mud Cracks are polygonal cracks formed as the mud dried. Mud Cracks indicate shallow water. They are used to show which way up.

- **Bioturbation Structure:** Bioturbation is defined as the reworking of soils and sediments by animals or plants. These include burrowing, ingestion, and defecation of sediment grains. Bioturbating activities have a profound effect on the environment and are thought to be a primary driver of biodiversity.

Bedding

Grove Cast

Lenticular Bedding

Mud Cast

Nodular

Lamination

Bioturbation

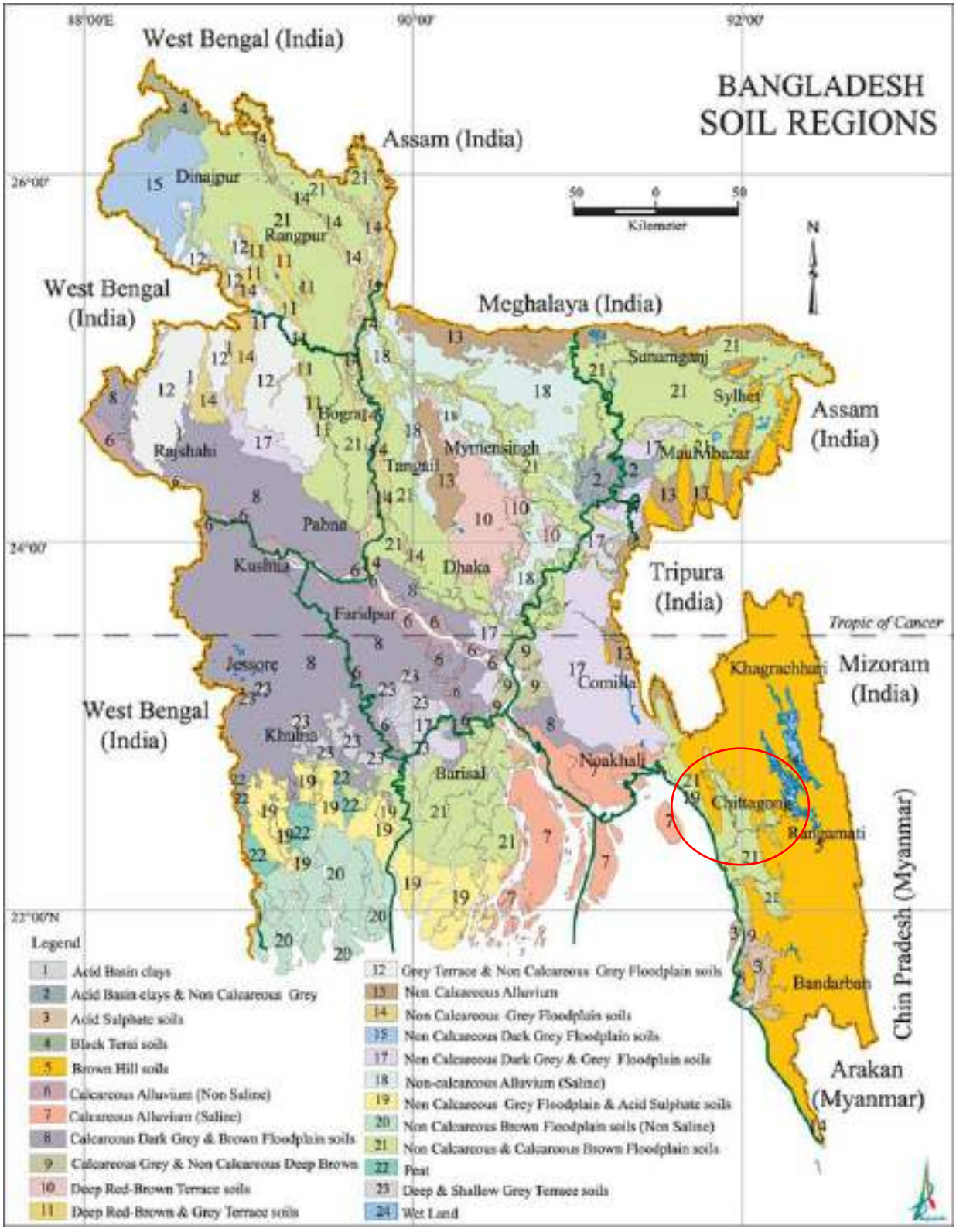
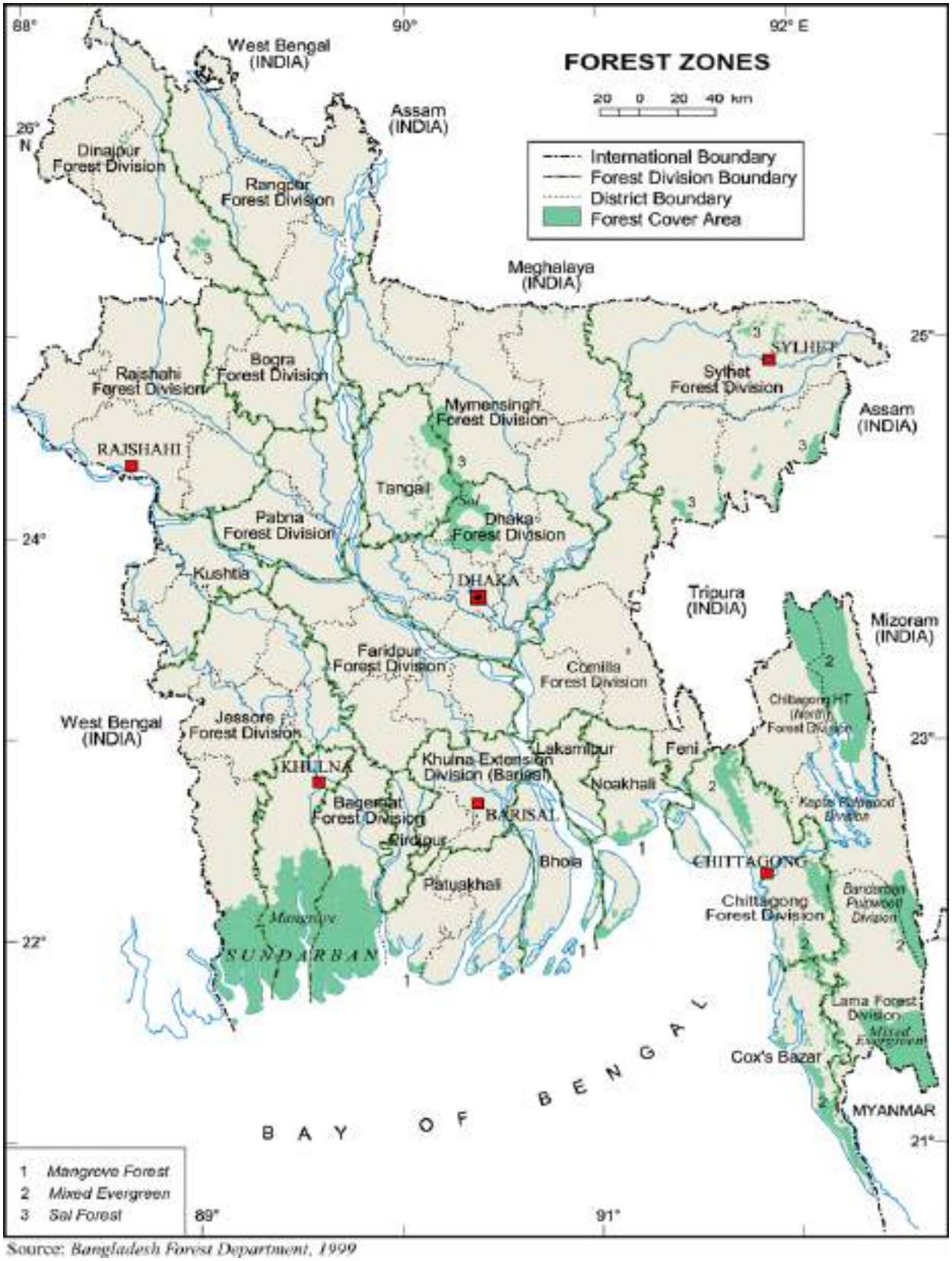


Figure 25: Land (Soil Regions) type map of Bangladesh (source: SRDI)



Source: *Bangladesh Forest Department, 1999*

Figure 26: Forest Zone map of Bangladesh (Source Bangladesh Forest dept.)

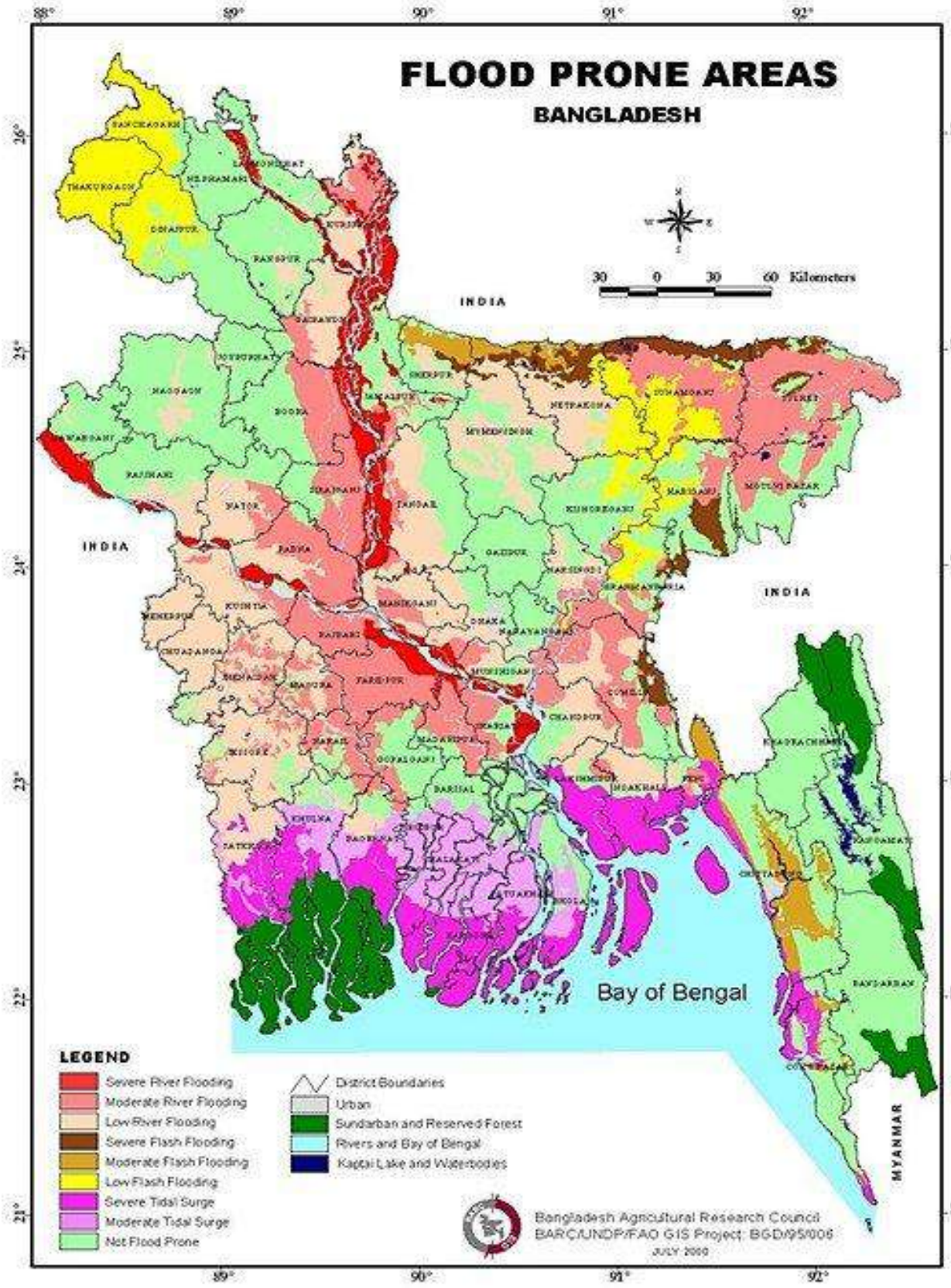


Figure 27: Flood Prone map of Bangladesh(Source Bangladesh Agriculture Research Council)

4.4.1E DRAINAGE PATTERN OF SITAKUNDA

There are numerous valley and steams along and across the anticline. The streams are locally known as ―Chara‖. Most of the valleys and streams of sitakund are in youth stage. Some streams are perennial and had a very narrow flowage. Two major types of drainage patterns are seen. One is the ‗Debdritic‘ pattern. There are no streams that are straight for hundred meters. All are curved and dendritic. Generally found southern and extern part and the second is ‗Trellised‘ Drainage pattern in the north and north west part of the area. But drainage of this area is mostly dendritic which indicated that the underlying bedrock is uniform. In these dendritic patterned streams and charas we found many geomorphic features such as waterfalls, rapids, etc. the general characteristics of those streams in the area are demonstrated and controlled by the geomorphic feature available here like waterfalls, rapids, potholes, gorge, V-shaped valley, etc.

Map 2.3: Drainage pattern of Sitakund

Map 2.4 : River system of Chittagong

A flood-prone mitigation plan for an Inland Container Terminal (ICT) in North Banshbaria, Sitakunda, must account for its unique coastal geography, where the primary risks are **tropical cyclones, storm surges, and extreme monsoon rainfall**

Drainage Pattern Mitigation Plan:

SL	Impact	Mitigation
1	Waterlogging inside terminal Yard	Contructed Properly sloped internal drain around container yards to allow rainwater to flow naturally towards main drain.
2	Over flow of rain water during heavy rain	Developed a terminal – wide stromewater drainage network connected to nearly natural outfalls with sufficient discharge capacity
3	Backflow of water from low laying area	Install flap gates or non return valves at drainage outlet
4	Drain Blockage due to slit and debris	Implement regular drain cleaning, desiliting and maintainace especially before during monsoon season.
5	Disruption terminal operation	Prepare a monsoon drainage management plan including inspection, standby pumps and quick response.

4.4.2 WATER SOURCES AND QUALITY OF PROJECT AREA

The **Bay of Bengal**,, flowing alongside the Project area, is the principal permanent surface water body influencing the area. Additional water sources include retention ponds, drainage canals, and storm water catchments within the port complex.

Groundwater is accessed through deep tube wells located in designated port zones. Quality assessments indicate that groundwater is suitable for domestic, industrial, and limited operational purposes, though salinity intrusion may occur in shallow aquifers during the dry season due to tidal influence from the Bay of Bengal.

Surface water collected from river intakes or retention ponds is primarily used for operational purposes, such as dust suppression, landscaping, and fire-fighting reserves. Drinking water supply within the port is predominantly sourced from treated municipal water or groundwater from deep tube wells.

Regular monitoring of water quality is recommended to ensure compliance with Bangladesh Environmental Conservation Rules (ECR, 2023), particularly regarding industrial effluent management, salinity levels, and microbial contamination.

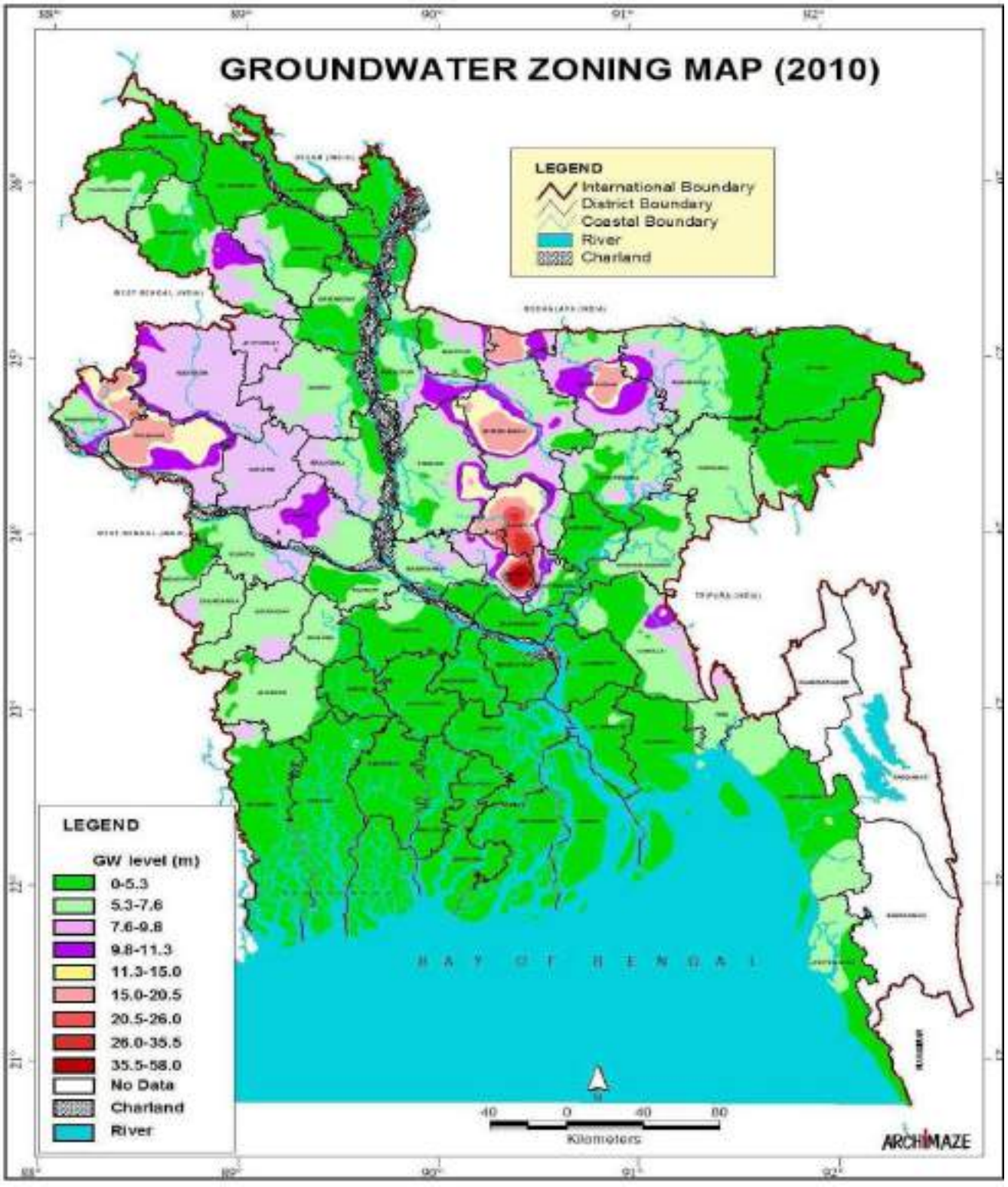
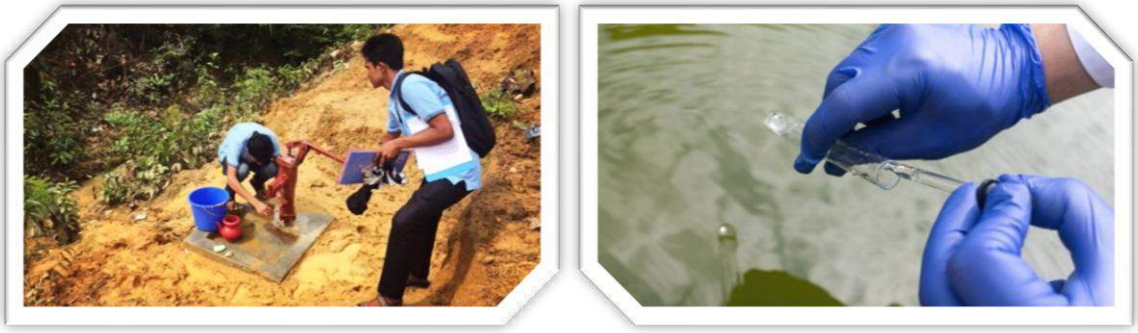


Fig 28: Ground Water Zoning Map of Bangladesh

4.4.2A: Modeling and Analysis



Collection and Preservation of Underground Sample

4.4.2B: Method at a Glance:

Parameter	Unit	Methods/ Instrument
Temperature	^{o}C	Thermometer
Ph	-	Combimeter (Hanna Portable Combometer, Modelno: HI9813-6)
Total Dissolved Solid (TDS)	mg/L	Combimeter (Hanna Portable Combometer, Modelno: HI9813-6)
Electrical Conductivity	mg/L	Combimeter (Hanna Portable Combometer, Modelno: HI9813-6)
Salinity	Ppt	Hand Refractometer (Model no: REF 201/211/201bp)
Turbidity	NTU	Turbidity Meter (Model no: TU-2016)
Arsenic (As)	mg/L	Test Kit

Hand Refractometer

Combometer

Arsenic Test Kit

Turbidity Meter

Figure: Instrument use to determine different perameters

4.4.2C Descriptive statistics Surface water quality at North Banshbaria, Chittagong

Water has been collected from a pond adjacent to the project site and analysis in SGS laboratory. The water quality of limited parameters of the ditch near the project site as analysed is given below:

Parameter	Unit	Concentration Sample	ECR 2023-Standard
pH		7.8-8.64	6-9
DO		5	≤6
Total Dissolved Solid (TDS)	mg/l	1014.89	≤1000
Total Suspended Solid (TSS)	mg/l	75	≤100
Total Ammonia as NH_3	mg/l	0.485	≤0.1
Phosphate	mg/l	0.127	≤0.1
Nitrate	mg/l	0.7	≤07
Lead (Pb)	mg/l	0.046	≤0.03
Arsenic (AS)	mg/l	0.02	≤0.001
Chromium	mg/l	NILL	≤0.05
BOD_5	mg/l	0.5	≤2
COD	mg/l	6.0	≤10
Total Coliform(TC)	Cfu/100ml	80	≤100
Fecal Coliform(FC)	Cfu/100ml	90	≤100
Alkainity	mg/l	126	≤200

Source: SGS Lab (Sample collected on 25.7.2025)

4.4.2D Impact of Ship Breaking Activity on Water: Growing industrialization and urbanization causes water pollution, particularly in the areas where rivers and the ocean meet and is currently on the rise. Sources from many, including runoff from agriculture, inappropriate application of dangerous element pesticides or fertilizers, disposal of metro- politan garbage, including shipping the introduction of danger- ous metals into the aquatic environment of the coastline is caused by a number of important

factors . Ship breaking activities are contaminating the seawater environment along the coastal area. Bangladesh is currently the most productive and promising nation, both for the home steel industry and the global ship breaking business. The ship breaking sector contributes between 2.2 and 2.5 million tons of the nation's steel production. There are between 250 and 350 re-rolling mills and at least 40 active ship breaking yards in Bangladesh . Because in the long run prevalence of toxic metals in aquatic water bodies, they may have negative impacts on the aquatic biota, particularly fish determination, toxicology of the environment and a considerable effect for bioaccumulation . Metals that are poisonous to aquatic life pose dangers to the health of people and aquatic organisms . The majority of hazardous metals are then discharged back into the water body as a result of depletion through the sediment as well as the environment in the water . As harmful metal contamination rises, it immediately affects human health through the chain of food , having substantial adverse effects on fish or invertebrate's species as well .

Toxic metals such as arsenic, lead, chromium, or mercury are present in the ballast water, as well as electrical cables containing copper protective electrodes and steel in the frame of the ship. Fluorescent light coils, light fixtures, temperature sensors, batteries, electrical panels and fire detectors also contain these hazardous materials. In ship breaking places, particularly in Bangladesh, arsenic, chromium, cadmium and lead are mainly found as poisonous metals. Pentachloro benzene (PCB) containing sealants are another risky contaminant present on ships, thousands of litters of oil and up to 7.5 tons of different kinds of asbestos (bilge oil, engine oil, oil lubricants, grease and hydraulics). Moreover, tankers may trans- port as much as 1,000 cubic meters of used oil. According to the Basel convention, the majority of these goods are classified as hazardous wastes.

Determination of Heavy Metal Pollution index (HPI): The level of water pollution was assessed for its fitness for human consumption, with a critical score of 100 applied to cases of contamination with heavy metals of drinking water. To determine the calibre of river water, the following formula was employed to determine the water pollution index.

Heavy metal pollution Index formula constitute of two different parts: 1. Units weight, and 2. Sub-index value

1. Units weight (Wi) is represented as

$$Wi\alpha\frac{1}{Si} \qquad (1)$$

$$Wi=\frac{K}{Si} \qquad (2)$$

Where K= Constant , Si= Standard permissible limit value of the i^{th} parameter.

2. Sub index value (Qi) of the parameter was calculated by the following formula:

$$Qi=\sum_{i=1}^{n}\frac{|Mi-Ii|}{(Si-Ii)}\times 100 \qquad (3)$$

Where, Mi= monitored the value of heavy metal of the i^{th} parameter , Li= ideal value of the i^{th} parameter, Si= standard value of the i^{th}

$$HPI=\frac{\sum_{i=1}^{n}WiQi}{\sum_{i=1}^{n}Wi} \qquad (4)$$

Sampling: About 1L of water using plastic containers with a pair of stoppers was randomly gathered from the area to be tested for water quality . The bottles were cleaned, rinsed and treated with 5% HNO_3 for an overnight period prior to sampling. After drying , deionized water used to rinse the bottles. The bottles were carefully screwed after sampling and the corresponding identification number was written on them. All water samples had their collection sites tested for temperature, EC,pH, TDS,BOD,COD,DO,TSS,DO, Salinity, Alkalinity, Total hardness and turbidity were measured at the laboratory.

Fig. 1. Map of the study area (Ship breaking yard, Sitakunda, Chattogram, Bangladesh)

Ship Breaking Impact on Water Parameter:

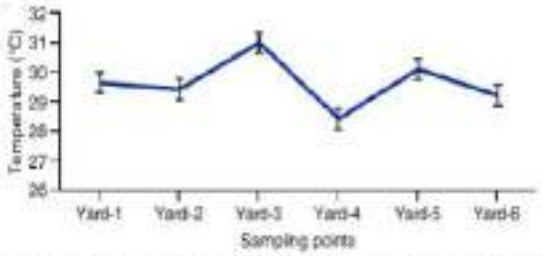


Fig. 2. Variation of temperature at different sampling points of the ship breaking area

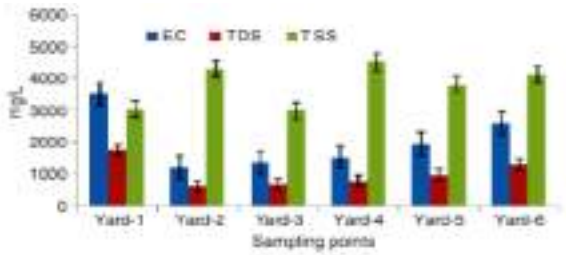


Fig. 3. Variation of EC, TDS and TSS at different sampling points at ship breaking area

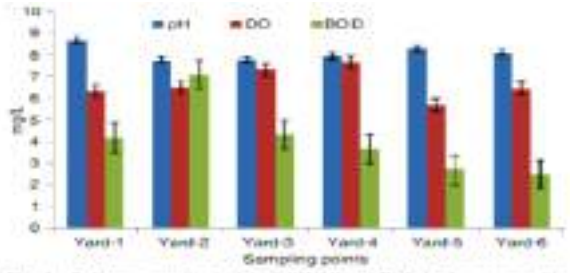


Fig. 4. Different sampling point of pH, DO and BOD in Chattogram ship breaking area

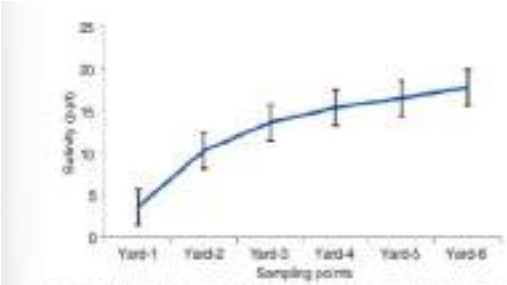


Fig. 5. Variation of salinity at different sampling points in the ship breaking area

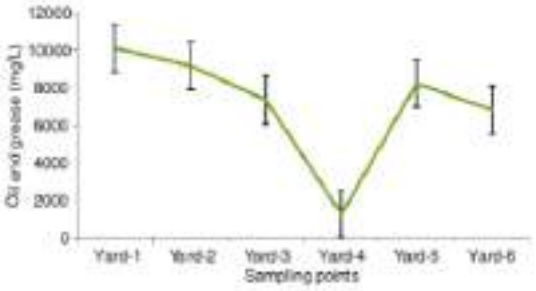


Fig. 6. Variation of oil and grease at different sampling points of ship breaking area

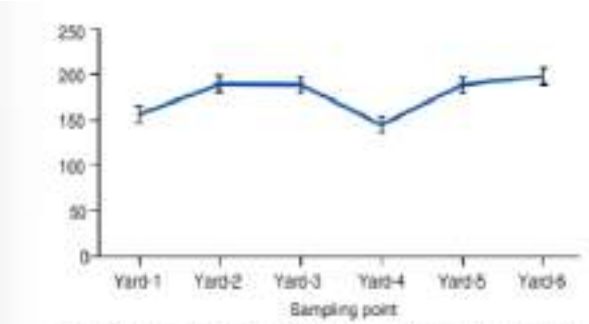


Fig. 8. Heavy metals pollution index at different point of ship breaking area

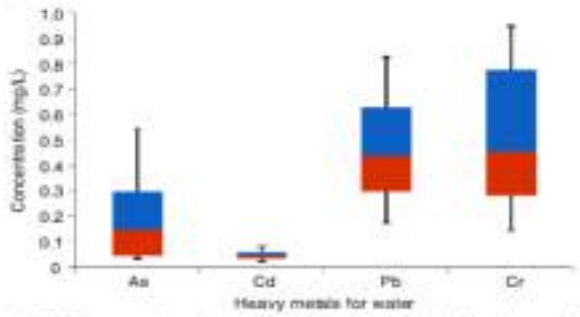


Fig. 7. Concentration of heavy metals in water at the ship breaking yard

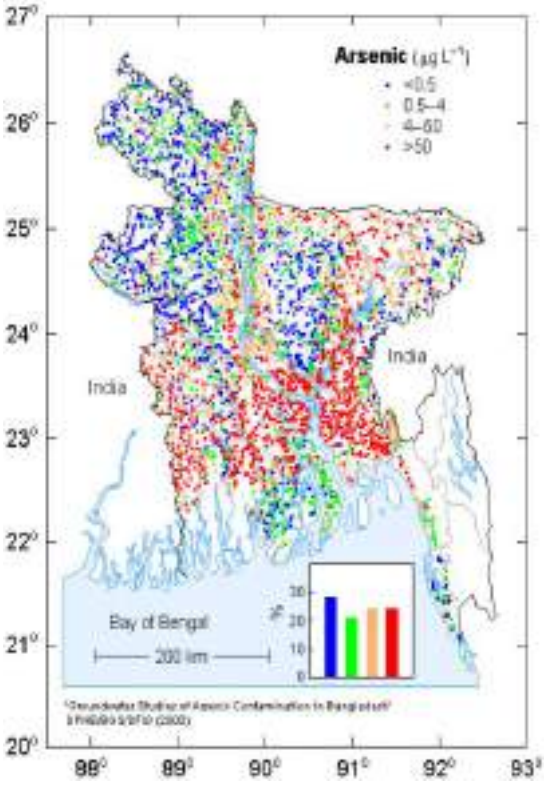
Ref:

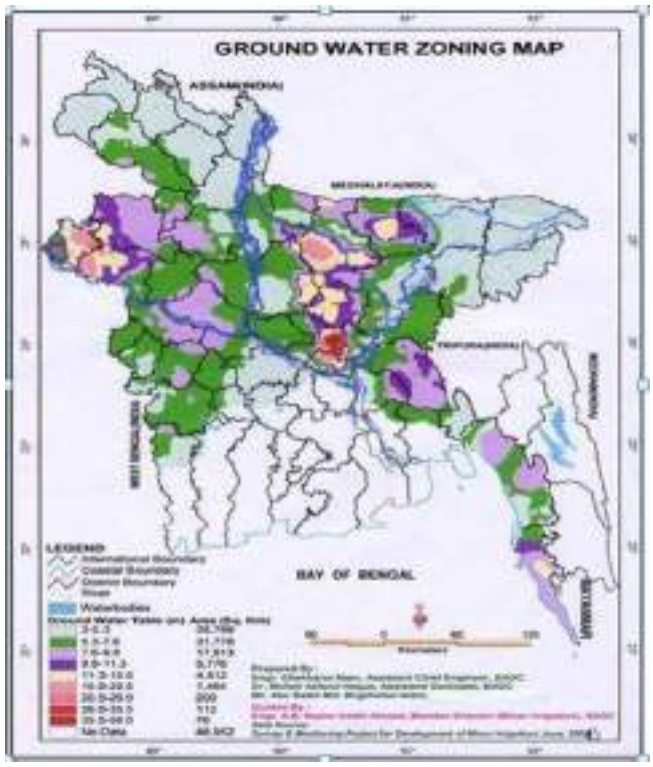
https://www.researchgate.net/publication/374265611_Impact_of_Ship_Breaking_Activities_on_the_Water_Quality_at_the_Coastal_Area_of_Chattogram_Bangladesh

4.4.2E Ground Water:

Ground water level exists at a moderate (Generally below 8.0 m) depth, which is being recharged mainly by infiltration of rainwater. The ground water zoning map is shown in Fig. Ground water is the source of water for domestic use in this area. Usage of ground water for irrigation is limited here. The recharge capacity of the ground water level seems to be adequate. To determine quality of ground water, water sample was collected from a nearby tube well of the existing plant of the KR Logistics Limited and analyzed for different parameters. The results shows that all the parameters remain within the allowable limit of drinking water value as per as Environmental Quality Standards for Bangladesh. The parameters which have been analyzed during this study are presented below in Table

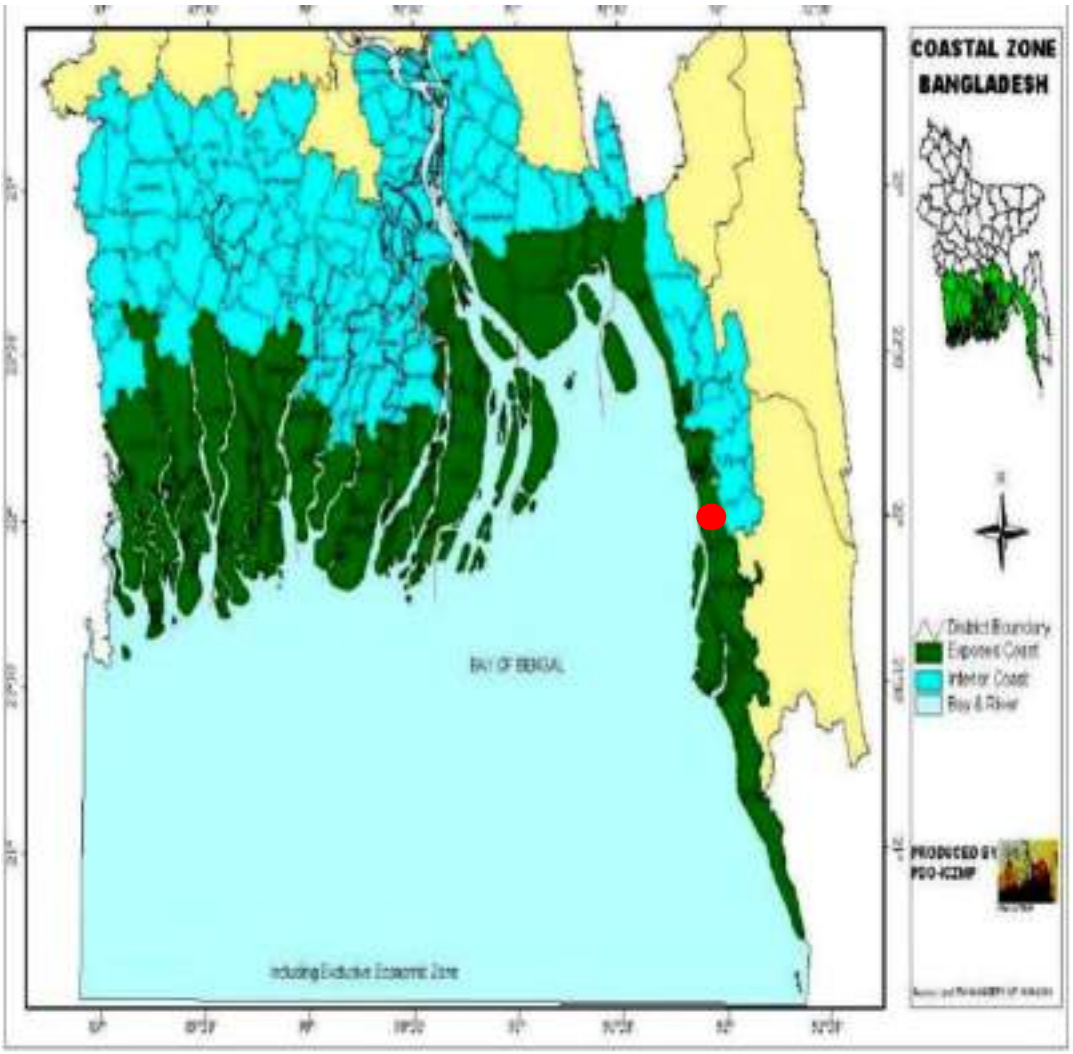
Parameter	Units	Value	Bangladesh Standard for Inland Surface
pH	mg/L	7.1	6-9
TDS	mg/L	280	1000
Iron	mg/L	1.2	.3-1.0
Alkalinity	mg/L	62.0	-
Hardness	mg/L	68.0	200-500
Chloride	mg/L	16.4	150-600
TSS	mg/L	4.8	10
BOD	mg/L	11.7	20-25
COD	mg/L	5.5	125
Arsenic	mg/L	0.050	0.05



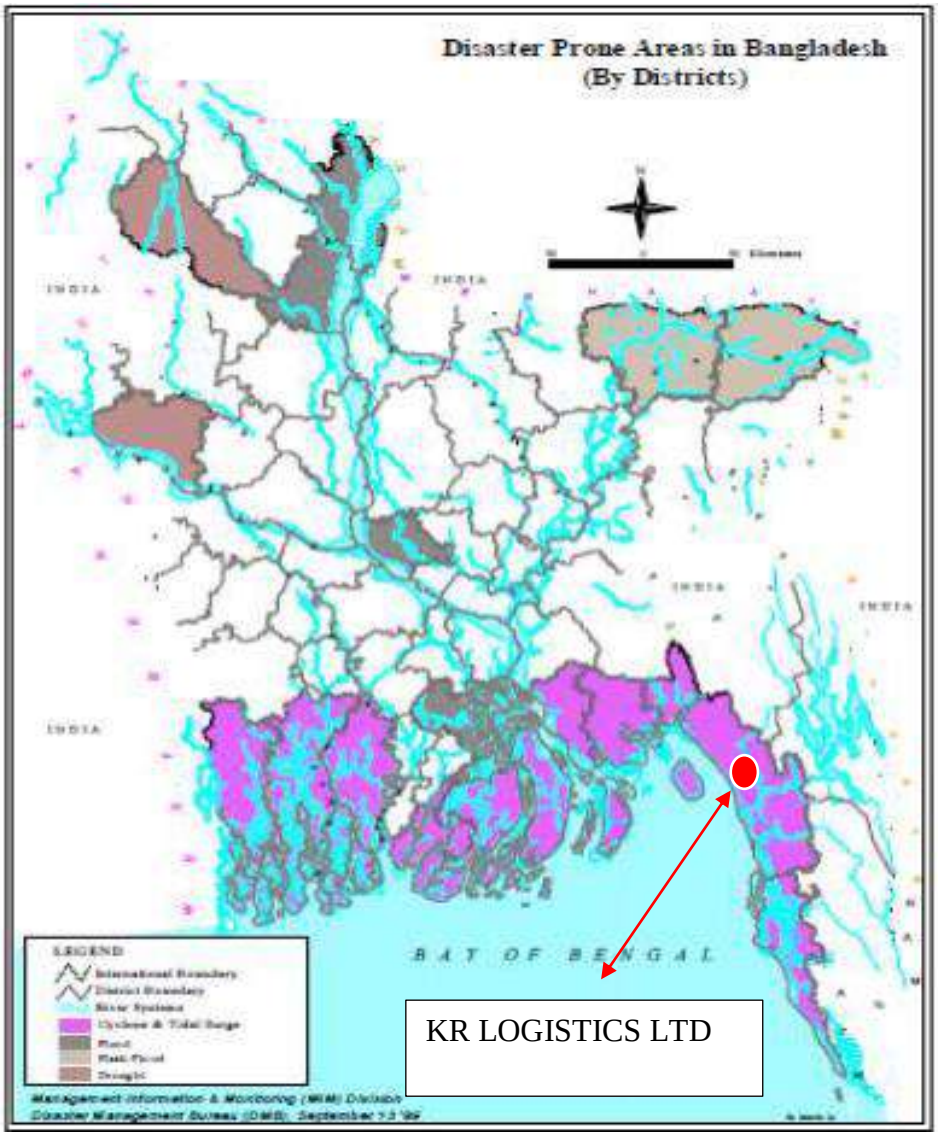


2.4.2F Coastal Region:

Bangladesh is one of the largest deltas in the world and it is formed mainly by the Ganges-Brahmaputra- Meghna river system, except for the hilly regions in the northeast and southeast and terrace land in northwest and central zones. It has about 710 km long coastline. About 28% of the populations live in coastal region. The coastal region of Bangladesh is prone to multi hazard threats such as cyclones, storm surges and floods, as well as earthquakes and above all, climate change. It is frequently visited by the cyclone-induced storm surge. *Map 4.7 & Map 4.8* shows the coastal region of Bangladesh as well as the disaster prone areas in Bangladesh. Chittagong where the project site is located falls in the exposed coastal zone as shown in the figures



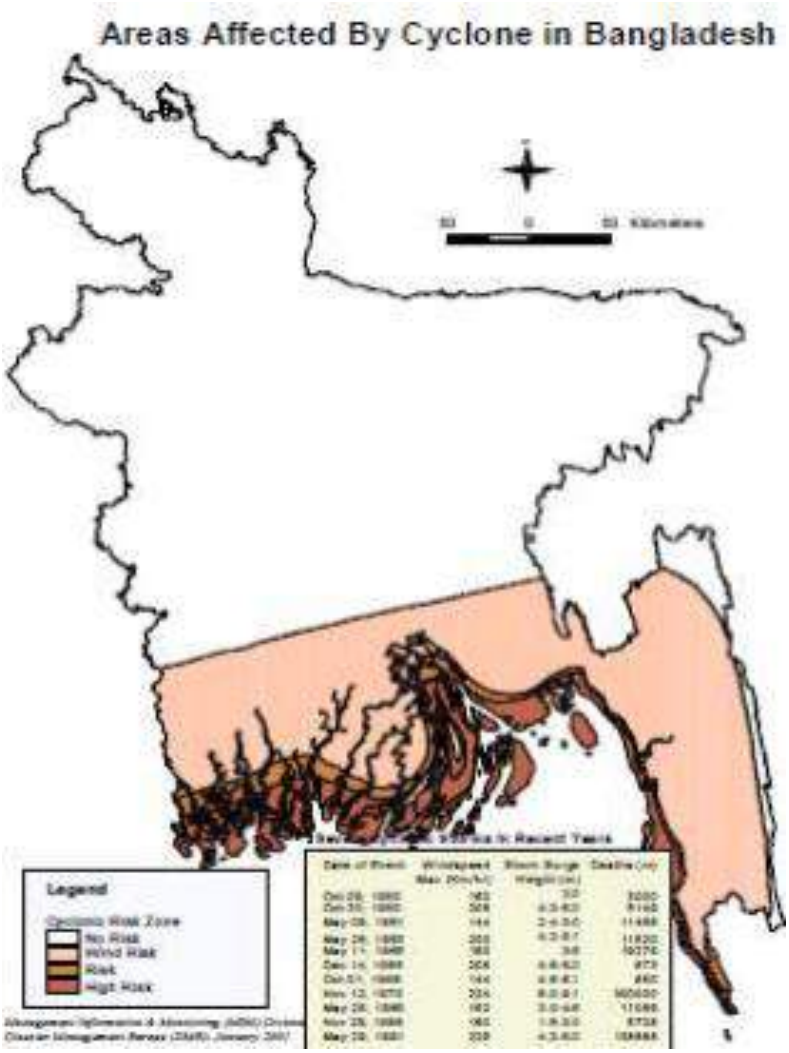
Map: Map of the Coastal Zone of Bangldesh



Map: Disaster Prone Area in Bangladesh

2.4.2G Cyclone and Tidal Surge

Bangladesh very often becomes the landing ground of cyclones formed in the Bay of Bengal. This is because of the funnel shaped coast of the Bay of Bengal, Most of the damage occurs in the coastal regions of Khulna, Patuakhali, Barisal, Noakhali and Chittagong and the offshore islands of Bhola, Hatiya, Sandwip, Manpura, Kutubdia, Maheshkhali, Nijhum Dwip, Urir Char and other newly formed islands. The coastal zone of Bangladesh is disaster prone. Chittagong is in the exposed coastal area which is frequently subjected to cyclone and storm surges.



Map: Areas Affected by cyclone in Bangladesh

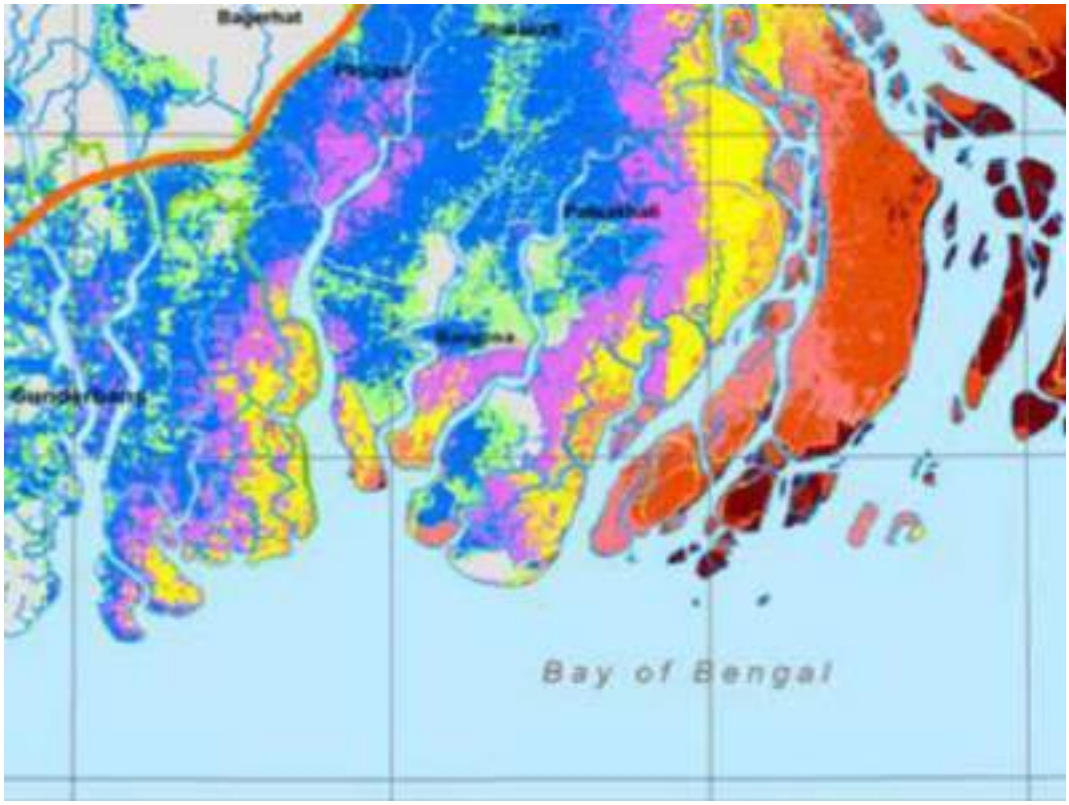
A cyclone risk map, prepared by the Management Information & Monitoring (MIM) Division of the Disaster Management Bureau (DMB) in 2001 (Map), was available that distinguishes between the following risk zones:

- No Risk
- Wind Risk
- Risk (Low Risk as Mentioned in 2003)
- High Risk

Further communications have happened with the Disaster Management Bureau (DMB) in 2003.

Both the "risk" and "high risk" zones have been incorporated as coastal zone.

The inundation risk map for storm surge *(Map: 4.10)* shows that the highest inundation depth having range between 5 m and 7.5 m lies in the Noakhali coast, Bhola, Urir Char, Sandwip and small islands in the Meghna Estuary. The eastern coast experiences maximum inundation between 4m and 6 m. The Tropical cyclones from the Bay of Bengal accompanied by storm surges are one of the major disasters in Bangladesh.



Map: Inundation risk map generated from 18 cyclones from 1960-2007 (Source: IWM)

The country is one of the worst sufferers of all cyclonic casualties in the world. The high number of casualties is due to the fact that cyclones are always associated with storm surges. Storm surge height in excess of 9m is not uncommon in this region. For example, the 1876 cyclone had a surge height of 13.6 m and in 1970 the height was 9.11 m (WARPO, 2005). Another high intensity cyclone of 1991 caused large scale destruction to coastal embankments along the Chittagong area, destroyed runways of Chittagong airport, ceased port activities by sinking a number of ships in the Patenga channel and

also in offshore anchorage. The storm surge height with respect to ground was within the range of 3.0 m to 3.7 m. A list of devastating cyclones in Bangladesh is given in *Table*

Table : Major Cyclones in Bangladesh (Source: BMD)

Date	Year	Maximum Wind Speed (Km/Hr)	Storm Surge Height (metres)	Death Toll
11 May	1965	161	3.7-7.6	19279
15 December	1965	217	2.4-3.6	873
01 October	1966	139	6.0-6.7	850
12 November	1970	224	6.0-10.0	300000
25 May	1985	154	3.0-4.6	11069
29 April	1991	225	6.0-7.6	138882
19 May	1997	232	3.1-4.6	155
15 November	2007	223	-	3363
25 May	2009	92	-	190

Chronology of major cyclonic storms in Chittagong

1960 (30-31 October) Chittagong, Noakhali, Bakerganj, Faridpur, Patuakhali and eastern Meghna estuary; severe cyclonic storm, maximum wind speed 210 km/h, surge height 4.5m -6.1m; about 10,000 persons killed, 27,793 cattle lost and 568,161 houses destroyed (especially 70% of houses in Hatiya blown off), two large ocean liners washed ashore, 5-7 vessels capsized in Karnafuli river. **1963 (28-29 May)** Chittagong, Noakhali, Cox's Bazar and the offshore islands of Sandwip, Kutubdia, Hatiya and Maheshkhali were badly affected; severe cyclonic storm with storm wave rising 4.3-5.2m in Chittagong, maximum wind speed 203 km/hr and at Cox's Bazar 164 km/hr; more than 11,520 people killed, 32,617 cattle lost, 376,332 houses, 4,787 boats and standing crops destroyed.

1966 (1 October) Sandwip, Bakerganj, Khulna, Chittagong, Noakhali and Comilla; severe cyclonic storm with storm-waves of 4.7-9.1m, maximum wind speed 146 km/hr; affected 1.5 million people, loss of human life and livestock were 850 and 65,000 respectively in Noakhali and Bekerganj.

1970 (12-13 November) The most deadly and devastating cyclonic storm that caused the highest casualty in the history of Bangladesh. Chittagong was battered by hurricane winds. It also hit Barguna, Khepupara, Patuakhali, north of Char Burhanuddin, Char Tazumuddin and south of Maijdi, Haringhata and caused heavy loss of lives and damage to crops and property. Officially the death figure was put at 500,000 but it could be more. A total of 38,000 marine and 77,000 inland fishermen were affected by the cyclone. It was estimated that some 46,000 inland fishermen operating in the cyclone affected region lost their lives. More than 20,000 fishing boats were destroyed; the damage to property and crops was colossal. Over one million cattle head were reported lost. The maximum recorded wind speed of the 1970 cyclone was about 222 km/hr and the maximum storm surge height was about 10.6m and the cyclone occurred during high-tide.

1974 (24-28 November) Coastal belt from Cox's Bazar to Chittagong and offshore islands; severe cyclonic storm with a wind speed of 161 km/h and storm surge of 2.8-5.2 m; 200 people killed, 1000 cattle lost and 2,300 houses perished.

1977 (9-12 May) Khulna, Noakhali, Patuakhali, Barisal, Chittagong and offshore islands; cyclonic storm with a wind speed of 112.63 km/h.

1983 (14-15 October) Offshore islands and chars of Chittagong and Noakhali; severe cyclonic storm with a wind speed of 122 km/h; 43 persons killed, 6 fishing boats and a trawler lost, more than 150 fishermen and 100 fishing boats missing and 20% Aman crops destroyed.

1983 (5-9 November) Chittagong, Cox's Bazar coast near Kutubdia and the low lying areas of St Martin's Island, Teknaf, Ukhia, Moipong, Sonadia, Barisal, Patuakhali and Noakhali; severe cyclonic storm (hurricane) with a wind speed of 136 km/h and a storm surge of 1.52m height; 300 fishermen with 50 boats missing and 2,000 houses destroyed.

1985 (24-25 May) Chittagong, Cox's Bazar, Noakhali and their offshore islands (Sandwip, Hatiya, and Urirchar); severe cyclonic storm, wind speed Chittagong 154 km/h, Sandwip 140 km/h, Cox's Bazar 100 km/h and storm surge of 3.0-4.6m; about 11,069 persons killed, 94,379 houses damaged, livestock lost 135,033 and road damaged 74 km, embankments damaged.

1986 (8-9 November) Offshore island and chars of Chittagong, Barisal, Patuakhali and Noakhali; cyclonic storm hit 110 km/h at Chittagong and 90/h at Khulna; 14 persons killed, damaged 97,200 ha of paddy fields.

1991 (29 April) The Great Cyclone of 1991, crossed the Bangladesh coast during the night. It originated in the Pacific about 6,000 km away and took 20 days to reach the coast of Bangladesh. It had a dimension of more than the size of Bangladesh. The central overcast cloud had a diameter exceeding 600 km. The maximum wind speed observed at Sandwip was 225 km/hr. The wind speeds recorded at different places were as follows: Chittagong 160 km/hr, Khepupara (Kalapara) 180 km/h, Kutubdia 180 km/h, Cox's Bazar 185 km/h, and Bhola 178 km/h. The maximum wind speed estimated from NOAA-11 Satellite picture obtained at 13:38 hours on 29 April was about 240 km/h. The cyclone was detected as a depression (wind speed not exceeding 62 km/h) on the 23rd April first in the satellite picture taken at SPARRSO from NOAA-11 and GMS-4 satellites. It turned into a cyclonic storm on 25 April. The cyclone in its initial stage moved slightly northwest and then north. From 28 April it started moving in a north-easterly direction and crossed the Bangladesh coast north of Chittagong port during the night of the 29th April. The cyclone started affecting the coastal islands like Nijhum Dwip, Manpura, Bhola and Sandwip from the evening of that day. The maximum storm surge height during this cyclone was estimated to be about 5 to 8m.

The loss of life and property was colossal. The loss of property was estimated at about Tk 60 billion. The death toll was estimated at 150,000; cattle head killed 70,000.EIA report on KR Logistics LTD , Prepared by JAMS Engineering Solutions

1991 (31 May to 2 June) Offshore islands and chars of Patuakhali, Barisal, Noakhali and Chittagong; cyclonic storm, maximum wind speed 110 km/h and surge height of 1.9m; people killed, cattle head perished, boats lost and standing crops destroyed.

1997 (16-19 May) Offshore islands and chars of Chittagong, Cox's Bazar, Noakhali and Bhola; severe cyclonic storm (hurricane) with a wind speed of 225 km/h, storm surge of 3.05m (similar strength to that of 1970 cyclone); only 126 people killed because of better disaster management measures taken by the government and the people.

1997 (25-27 September) Offshore islands and chars of Chittagong, Cox's Bazar, Noakhali and Bhola; severe cyclonic storm (hurricane) with a wind speed of 150 km/h, storm surge of 1.83 to 3.05m.

1998 (16-20 May) Offshore islands and chars of Chittagong, Cox's Bazar and Noakhali; severe cyclonic storm (hurricane) with a wind speed of 150 km/h, storm surge of 1.83 to 2.44m. 2007 (12-15 May) Upon striking Bangladesh, Cyclonic Storm Akash produced a moderate storm tide, along with strong winds and heavy rains. The storm left dozens of boats missing, with three fisherman confirmed killed and another 50 missing. Near the coast, thousands of houses were damaged from the flooding caused by the storm. Cyclone Sidr formed in 2007 did not put much affect in this area.

2009 (14-17 April) Cyclonic Storm Bijli formed from an area of Low Pressure on April 14. As the storm neared landfall, ports in Chittagong raised their warning level to seven. Following the increased warning level, an estimated 10,000 evacuated from coastal regions. Weather officials estimated that the storm would produce a storm surge of 2.1 to 3 m (7 to 10 ft). On April 17, all flights in and out of Bangladesh were cancelled due to dangerous conditions. Shelters were also opened and were reportedly able to accommodate about one million people.

2009 (23-26 May) Cyclonic Storm Aila was about 475 km southwest of Chittagong port, 435 km southwest of Cox's Bazar port and 345 km south southwest of Mongla port. Maritime ports of Chittagong and Cox's Bazaar had been advised to keep hoisted danger signal number 6. Maximum sustained wind speed within 54 km of the storm centre was about 70 km/h rising to 90 kph in gusts or squalls. (Source: DMB). The tracks of few major cyclones that hit Bangladesh are shown in Figure

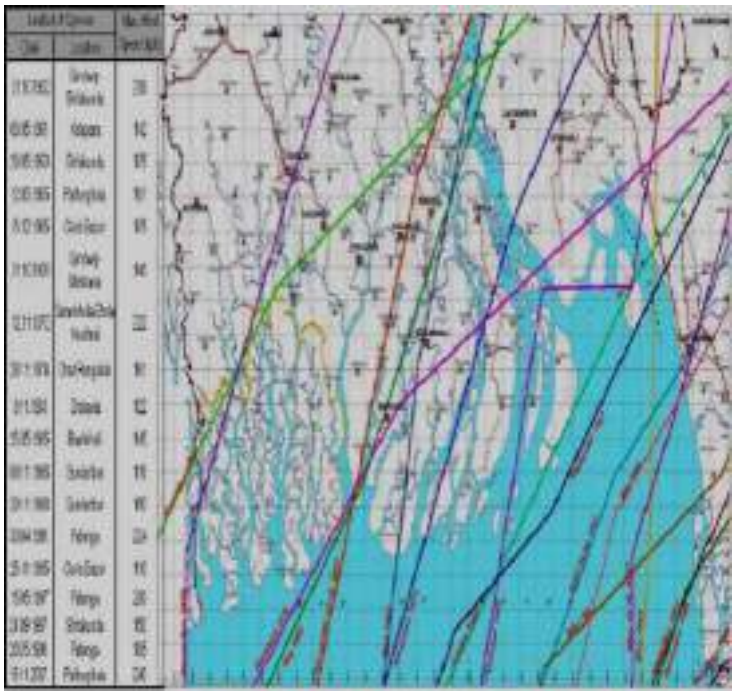


Fig.: Tracks of major cyclones crossed Bangladeshi coast during the period 1960- 2007 with information on landfall date and maximum wind speed

2.4.2H Environmental Impact Value of Ship Breaking Yard of Sitakunda, Chittagong:

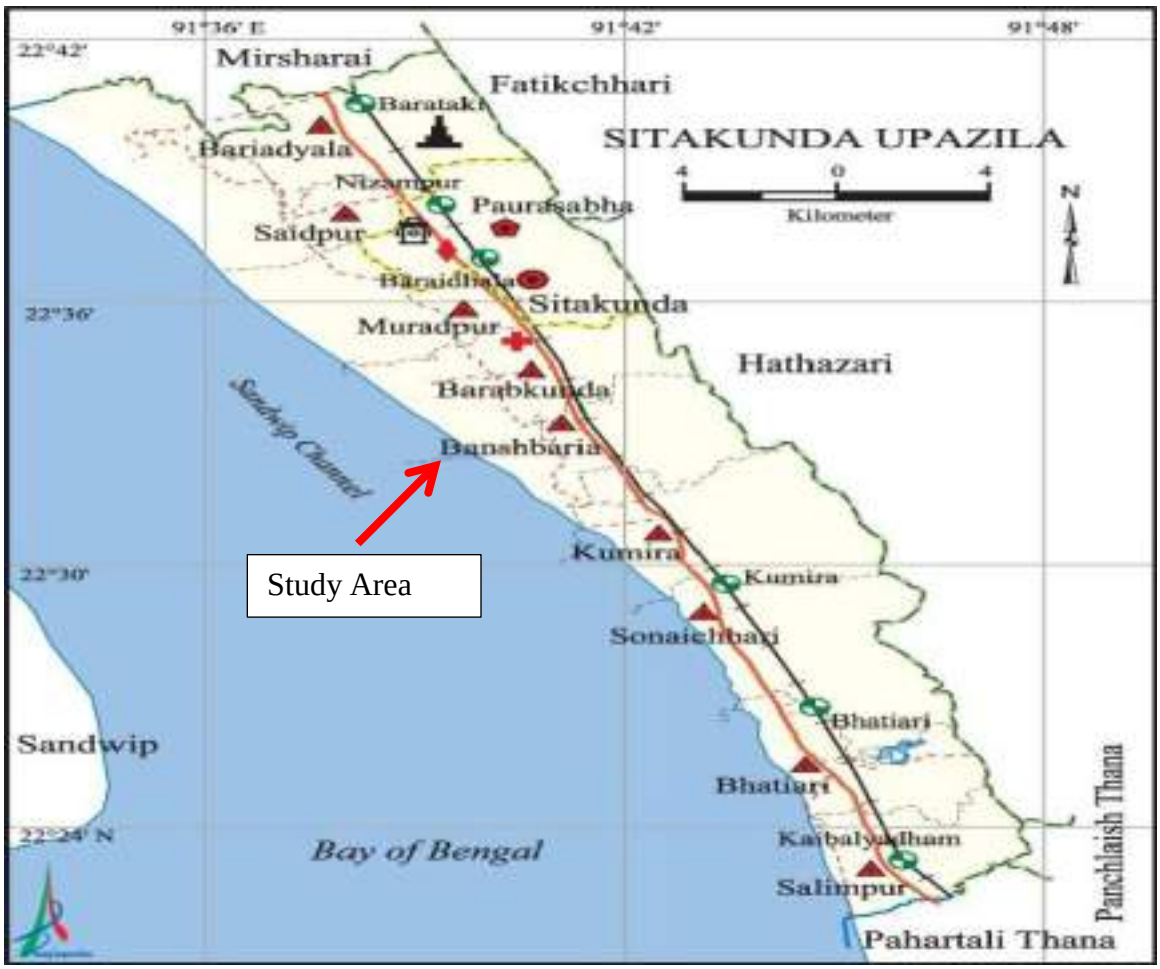


Figure: Study Area

Table 1
Physiochemical Parameters of Water Sample Collected From Different Ship Breaking Yard Area

Sample ID	Parameters					
	Turbidity (FTU)	Salinity (PPT)	EC (µs/cm)	DO (mg/l)	pH	TDS (mg/l)
V-1	33.89	8.05	1,100	7.76	7.7	11,000
V-2	76	9.03	1,125	6.60	7.98	12,490
V-3	35.72	8.10	1,110	6.60	7.85	11,360
V-4	119	7.2	1,132	6.47	7.90	13,230
V-5	11.06	8.9	1,080	7.05	8.11	12090
V-6	10.83	8.33	1,216	7.30	7.30	14620
V-7	93	7.96	1,260	6.68	8.24	11400
V-8	14.41	7.63	1,100	7.94	8.16	12700
V-9	44.55	8.03	1,135	7.30	8.28	11210
V-10	91	8.11	1,124	7.30	8.17	10340
F-1	17.63	0.95	1.75	5.46	8.10	1480
F-2	70	0.99	1.80	4.94	8.25	1280
F-3	7.71	14.28	1,280	4.58	7.92	14400
F-4	9.29	13.56	1,200	4.30	7.94	11980
F-5	67	13.60	1,278	3.77	8.09	15340

Table 2
Physiochemical Parameters of Water Samples Collected From the Surrounding Environment of Ship Breaking Yard

Sample ID	Parameters					
	Turbidity (FTU)	Salinity (PPT)	EC (µs/cm)	DO (mg/l)	pH	TDS (mg/l)
B.C.T-1	15.80	0.41	0.84	1.95	7.74	349
B.C.T-2	4.07	0.40	0.80	2.91	7.36	396
B.C.T-3	5.09	0.67	1.51	2.89	7.75	790
B.C.T-4	5.34	0.68	1.56	2.60	7.90	656
B.C.P-1	24.64	0.06	0.21	5.54	7.63	117
B.C.P-2	19.40	0.09	0.19	5.15	8.15	74
V.T-1	33.34	0.39	0.87	3.12	7.27	822
V.T-2	41.74	0.79	1.70	2.80	7.29	809
V.T-3	8.76	0.35	15.73	3.96	7.46	447
V.T-4	8.21	0.49	1.00	3.10	7.44	558
V.T-5	6.38	0.53	1.96	7.28	7.57	595
V.T-6	15.77	0.54	1.92	4.22	7.48	370
V.T-7	12.31	0.45	0.93	4.06	7.43	499

Note *B.C.T-Base Camp tube well, B.C.P- Base Camp Pond, V.T. Vatiary Tube well.

Table 3
Analysis of Ammonia-Nitrogen, Nitrate-Nitrogen and Phosphate Content of Water Samples Collected From the Surrounding Environment of Ship Breaking Yard

Sample ID	Parameters		
	NH_3-Nmg/L	NO_3-N\mg/L	PO_4mg/L
B.C.T-1	2.37	1.4	3.95
B.C.T-2	1.82	0.8	4.0
B.C.T-3	7.046	1.1	3.90
B.C.T-4	4.64	1.8	4.10
B.C.T-5	4.31	6.9	0.175
B.C.P-1	0.413	0.41	4.25
B.C.P-2	0.46	3.7	0.362
V.T-5	4.19	0.5	4.10
V.T-6	4.5	0.1	4.12
V.T-7	4.19	0.5	4.10

Note *B.C.T-Base Camp tube well, B.C.P- Base Camp Pond, V.T-Vatiary Tube well.

Table 4
Environmental Impact Value of Ship Breaking Yards of Sitakunda, Chittagong, Bangladesh

Environmental parameters	Relative importance value	Degree of impact	Relative impact (+)	Relative impact (-)	EIV
1. Ecological parameter					
Fisheries	5	-5		-25	-72
Forest	3	-5		-15	
Tree plantation	2	-4		-8	
Wildlife	3	-4		-12	
Wetlands	4	-3		-12	
Eutrophication	1	0		0	

Environmental parameters	Relative importance value	Degree of impact	Relative impact (+)	Relative impact (-)	EIV
2. Physico-chemical parameter					
Erosion & siltation	2	-2		-4	-70
Water logging	5	-2		-10	
Flooding	6	-1		-6	
Flood control & drainage	6	0		0	
Soil fertility	5	-4		-20	
Ground water table	3	-3		-9	
Water pollution	3	-5		-15	
Dust/ noise pollution	2	-3		-6	
Obstruction of waste water flow	3	0		0	
3. Human interested related parameter					
Health & nutrition	6	-3		-18	+49
Loss of agricultural land	8	-1		-8	
Employment opportunity	8	+4	+32		
Commercial & service facilities	6	+4	+24	0	
Navigation	3	0	+25		
Industrial facilities	5	+5		0	
Irrigation facilities	2	0		-2	
Land ownership	2	-1		-4	
Landscape	2	-2			
Total environmental impact value			+89	-142	-93

Table 5
Checklist of Environmental Parameter of Shipbreaking Yard Establishment Scheme

Environmental parameter	Impact on environment									
	Positive impact					Negative impact					No impact
	Very low	Low	Moderate	High	Very high	Very low	Low	Moderate	High	Very high	
1. Ecological											
Fisheries										√	
Forest										√	
Tree plantation									√		
Wildlife									√		
Wetlands								√			
Eutrophication											√
2. Physico-chemical parameter											
Erosion & siltation							√				
Water Logging							√				
Flooding						√					
Flood Control & Drainage											√

Ref: https://www.researchgate.net/figure/Environmental-Impact-Value-of-ShipBreaking-Yards-of-Sitakunda-Chittagong-Bangladesh_tbl1_275462381

2.4.2I Physiographic of the project area:

This area is occupied by permeable silt loam to silty clay loam soils on the ridges and impermeable clays in the basins which are neutral to slightly acidic in reaction. General soil types include predominantly Grey Floodplain soils. Organic matter content is low in ridges and moderate in basins. Within this area, elevations are less than 7.276m above sea level, which is shown *in above*

2.4.J Seismicity

Bangladesh is possibly one of the most vulnerable to potential earthquake threat and damage. Earthquake vulnerability of any place largely depends on its geology and topography, population density, building density and quality, and finally the coping strategy of its people and it shows clear spatial variations. Most of the parts of Chittagong, the port city of Bangladesh consisting of fine sand and silt deposits are susceptible to liquefaction. Chittagong City is mostly a hilly region, but it also consists of alluvial flood plain and sandy sea-shore area. Although the hilly region is less susceptible to liquefaction, it is formed by sandy and clayey soil and the area bottom of the hill also liquefy if the intensity of shaking is high, which may cause landslide in the highly region.

On the other hand, flood plains and sea shore areas consisting of fine sand and silt deposit with shallow water table in most of the places, which may liquefy during a strong earthquake. According to the Global Seismic Hazard Assessment Program (GSHAP), the most hazardous division in Bangladesh is the port city, Chittagong. Chittagong metropolis together with its surroundings is situated in the seismic zone 2, which has a basic seismic coefficient, Z=0.15 (BNBC, 1993). The Seismic zoning map is shown in *fig 4.10.* Bangladesh, a densely populated country in South Asia, is located in the north-eastern part of the Indian sub-continent at the head of the Bay of Bengal. Tectonically, Bangladesh lies in the northeastern Indian plate near the edge of the Indian croton.

Chittagong is slightly elevated above the surrounding floodplains and represents mostly flat land with minor undulations. Topographically Chittagong is of low relief

with many low depressions. **Fig. 4.4** is the Digital Elevation Model (DEM) which showing geological faults of Bangladesh and surroundings potential sources of major earthquakes.

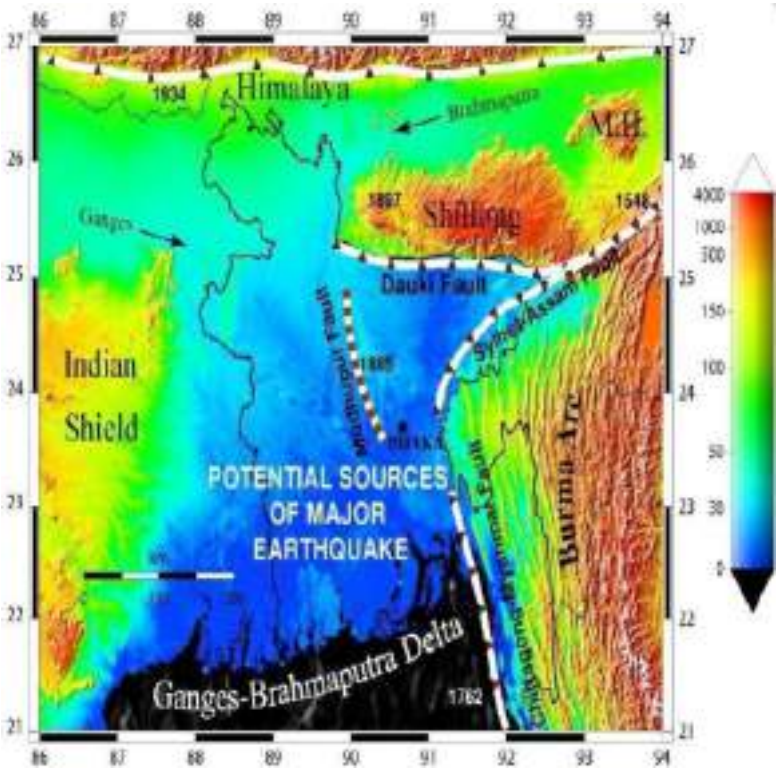
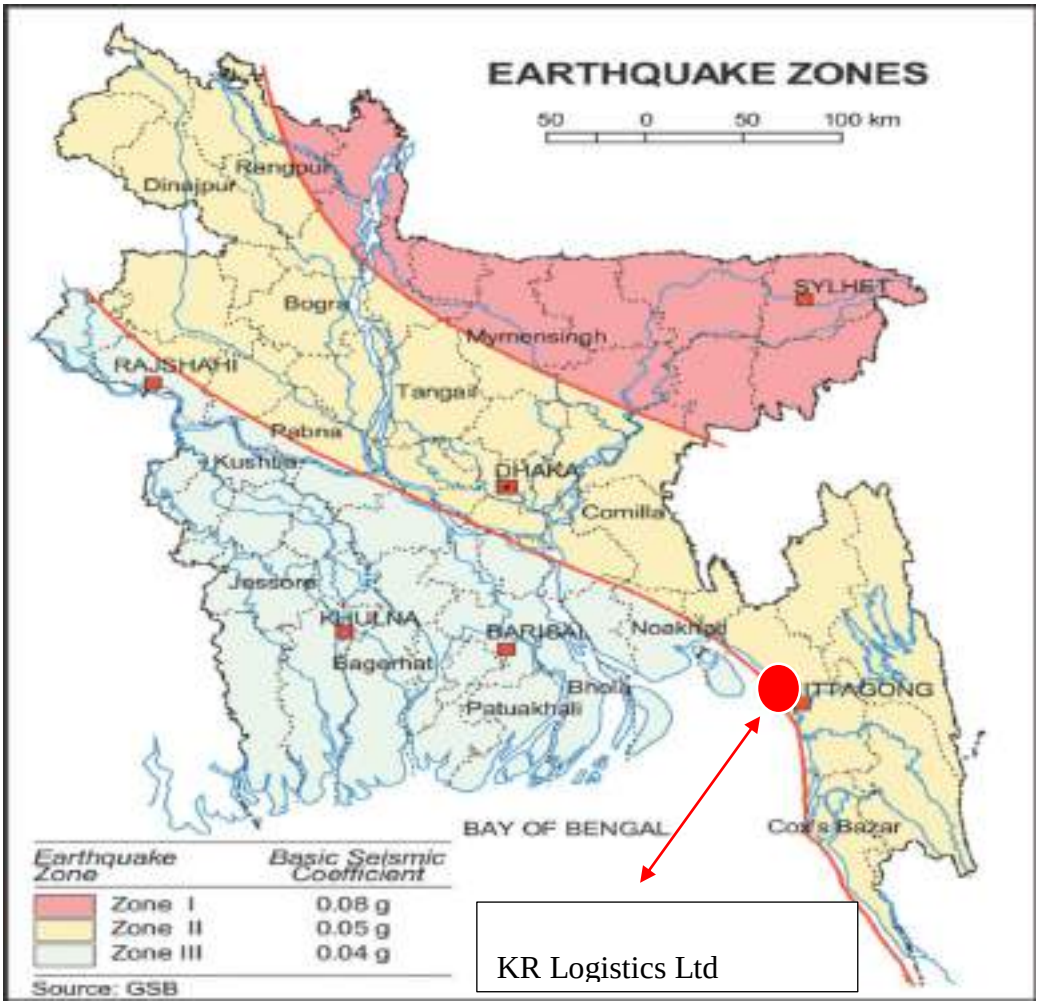


Fig. 4.4: Potential sources of major earthquakes in Ganges-Brahmaputra Delta

The most hazardous division in Bangladesh is Chittagong division. Northern and southern sections could expect to have maximum peak ground acceleration (PGA) ranging between 0.24g to 0.40g. The Chittagong Hill Tracts region can expect the highest PGA of up to 0.4g to 0.48g. In the basic seismic zoning map of Bangladesh, Chittagong and its surrounding region has been shown under Zone II with basic seismic coefficient of 0.15 (BNBC-1993), but recent repeated shocking around this region indicating the possibilities of potential threat of even much higher intensity like 0.35g than projected. If the Indian seismic zones were extended across the border into Bangladesh, the country would lie in zones IV and V. Southern Chittagong division also would lay in zone IV with a PGA of 0.4g. The seismicity Bangladesh is shown in Map. *4.11*



Map 4.11: Earthquake Zoning Map of Bangladesh

Chittagong suffered ground shaking of the order III to VIII on the Modified Mercalli (MM) scale from both teleseismic (distant) and local earthquakes during historic and recent times. Among all the earthquakes that Chittagong has suffered from, the earthquakes of 1762, 1812, 1865, 1885 and 1897 were the most severe earthquakes in recent recorded history.

Recent Seismic Activity (2025–2026): The region remains seismically active with frequent low-to-moderate tremors:

- January 11, 2026: A 3.6 magnitude earthquake hit near Chattogram at 10:03 PM local time.
- January 5, 2026: A 3.9 magnitude tremor was recorded in the Chattogram district.
- November 21, 2025: A stronger 5.5 to 5.7 magnitude earthquake shook the region, causing panic and minor structural damage in parts of Chattogram.

Geotechnical Risks and Liquefaction: The inland container terminal faces secondary seismic hazards due to its coastal soil composition:

- Liquefaction Susceptibility: The loose, silty, and saturated alluvial soils typical of the North Banshbaria coastal plain have high susceptibility to liquefaction. During an earthquake, these soils can lose strength and act like a liquid, potentially causing heavy containers and terminal machinery to sink or tilt.
- Building Vulnerability: Experts estimate that 65% to 70% of multi-story structures in the Chattogram port and industrial belts are vulnerable to collapse during a major (7.0+ magnitude) earthquake due to non-compliance with seismic building codes.

Mitigation Requirement: For terminal infrastructure, seismic design is mandatory in accordance with BNBC Zone 3 requirements. This includes deep pile foundations to bypass liquefiable soil layers and structural reinforcement of cranes and container stacking bays to withstand a minimum ground acceleration of 0.28g.

4.5 Traffic Condition:

The roadway from Chittagong to Dhaka is very important for maintaining vital communication between Dhaka and the industrial areas of inter city and other district town as well as parts of surrounding districts. It also supports the densely populated residential and commercial areas of Chittagong. The roadway is 2 lane divided and without any geometric treatment. Observation on geometric and operational conditions of the roadway shows that the corridor suffers from uncontrolled movements of pedestrians, non- motorized and motorized vehicles.

As a part of baseline study, traffic data were collected from on-spot surveys at key location of gate point of the Victoria jute mills roadway during November 2025, on a weekday (Thursday) during peak traffic hours shown in Table: 4.16 and 4.17 for daytime and night respectively. During the survey both number and type of traffic along the roadway were recorded; however, origin destination survey was not conducted. The survey was carried out for 24 hours. In general traffic along the roadway is dominated by NMT (non-motorized transport) and 3-wheelers. Other important vehicle types include mini-bus, trucks, pick-ups, motor cycle and freight vehicles shown in figure

Vehicle Name	6-7 am	7-8 am	8-9 am	9-10 am	10-11 am	11-12 am	12-1 pm	1-2 pm	2-3 pm	3-4 pm	4-5 pm	5-6 pm
Bus, Minibus	150	200	300	300	200	200	200	200	200	200	300	300
Truck, Pickup	150	100	120	120	120	150	145	168	200	250	250	180
Three Wheeler	102	142	122	101	105	90	85	78	107	200	216	138
Car, Jeep, Taxi, Micro	200	232	210	178	201	198	177	55	35	88	109	161
Freight Vehicle	131	125	24	23	75	65	57	39	78	63	92	102
Motor Cycle	128	224	132	138	231	209	242	133	117	119	237	210
Others	85	55	78	78	211	111	121	131	111	101	108	121

Traffic movement at the Dhaka-Chittagong road (6.00am- 6.00pm) : Day Time Data

4.5.1A General Traffic Condition & Historical Context:

- **Port Congestion:** The main Chattogram Port often experiences high container yard density (frequently exceeding 80% capacity) and vessel berthing delays, which creates a significant backlog that extends to the private ICDs in the surrounding areas.
- **Highway Disruptions:** The Dhaka-Chattogram highway, which serves as the primary link for container transport, has faced disruptions in the past due to events like flash floods or transport worker strikes, severely impacting normal operations.
- **Operational Factors:** Congestion at ICDs can worsen due to slow delivery of imported goods, rail infrastructure issues (e.g., locomotive shortages limiting movement between Dhaka ICD and Chattogram Port), and operational choices by the Port Authority.
- **Peak Busyness:** Facilities like the **Anchorage Container Depot Limited** in the general port area are typically busiest from Sunday afternoon to Wednesday evening, so traffic volumes are likely high around this time of day (6:23 PM).

4.5.1B Mitigation Traffic Congestion and Safety Risk:

Type	Risk Matrix	Frequency	Impact	Mitigation
Early warning and Signaling	High	Constant	Prevents High-Speed Rear-Endings: Inter-city buses and cars often don't see turning trucks until it's too late to brake safely.	Install Advanced Warning Signals & Signage starting 500m before the gate. Use solar-powered flashing LED signs.
Highway Congestion	High	Daily	Trucks waiting for entry block the National Highway, causing kilometer-long traffic jams.	Build an Internal Waiting Space for 30 trucks to keep all queuing off the public road.
Junction Blockage	High	Every Turn	Trucks "swing" into opposite lanes to turn, causing total traffic standstills in both directions.	Expand Turning Radius to 15m

4.6 AIR QUALITY

Air quality depends on substances, which are present in atmosphere. Air is called polluted when these substances are present in such concentrations that they produce undesirable effects on human beings, animal and as well as plant life. These substances include gases (SOx, NOx, CO_2, etc.), Suspended Particulate Matter (smoke, dust, fumes, etc.), Biological matters and many others. Concentration of different pollutants above allowable level can have adverse impacts on plant, animal and human life.

Up-to-date air quality data around the project site are not available. But during site visit it is observed that the apparent ambient air quality of the area is okay. The production process and services, to some extent, may produce any air emission (Green House Gas), and gaseous trace elements but considering the perimeter of the facility and presence of greenery the air emission was found not so harming at least with regard to ingestion. However, the gaseous emission can contribute to the global warming and ozone layer depletion.

4.6.1A Air Quality of Sitakunda Upozila :

Parameter	Value
PM2.5	44.4-111 µg/m
PM10	58-116 µg/m³
NO_2	3.89 ppb
SO_2	5 µg/m³
CO	5 mg/m³

Reference: **CAMS** (**Copernicus Atmosphere Monitoring Service**)

4.6.1B Particulate matter:

Particulate matter is the general term used to describe a mixture of solid and liquid particles in air including dust, soot, smoke, and dirt. PM_{10} is particulate matter less than 10 microns in aerodynamic diameter and is often called the coarse fraction.$PM_{2.5}$ is particulate matter less than 2.5 microns (about 0.0001 inch) in aerodynamic diameter and is often called the fine fraction. PM_{10} and $PM_{2.5}$ particles are small enough to penetrate into and accumulate in the respiratory system. Exposure can cause respiratory morbidity, impaired lung function and irritation. It is also carcinogenic. This pollution is sometimes referred to as "black carbon pollution". Suspended particulate matter (SPM) are finely divided solids or liquids that may be dispersed through the air from combustion processes, industrial activities or natural sources.

I. Oxides of Nitrogen

Nitrogen dioxide NOx is a noxious gas, highly reactive and it is formed when fuel is burned at high temperature. The main sources are motor vehicles, power plants and industrial boilers. Nitrogen dioxide can cause respiratory problems. It can also take part in the chemical reactions in the atmosphere to form corrosive nitric acid and can also react with sunlight to form ground level ozone. Long term exposure can decrease lung function, increase the risk of respiratory conditions and increases the response to allergens .NOx also contributes to the formation of fine particles PM} and ground level ozone, both of which are associated with adverse health effects**.**

II. Carbon monoxide

Carbon monoxide CO is a gas that is slightly lighter than air and is formed when carbon in fuel is not burned completely. In urban areas, almost all CO is produced by motor vehicles. Exposure to CO can disrupt the supply of oxygen to the body tissue, cause neurobehavioral effects and cardiovascular problems.

III. Sulfur dioxide

Sulfur dioxide $SO_2$is a gas that is often produced in the burning of fossil fuels containing Sulphur. It can cause respiratory problems and damage vegetation. Sulfur dioxide dissolves easily in water and therefore can contribute to acid rain, once it released into the atmosphere.

IV. Ozone

Ozone is a gas composed of three atoms of oxygen. Ozone occurs both in the Earth's upper atmosphere and at ground level. Ozone at ground level or ambient ozone is a harmful air pollutant and highly reactive in nature. It has adverse effects on people and the environment, and it is the main ingredient of smog.

V. Lead

In addition to its highly concentrated ores, lead is naturally available in all environmental media in small concentrations. From the atmosphere, lead is transferred to soil, water, and vegetation by dry and wet deposition. Major sources of lead in the air are ore and metals processing and piston-engine aircraft operating on leaded aviation fuel. Other sources are waste incinerators, utilities, and lead-acid battery manufacturers.

4.5.1C Methodology:

Particulate monitoring is accomplished with one set of PM 10 & PM 2.5 combo sampler coupled with fine particulate sampler. These are vacuum type device that draws air with particulate matter through filter papers. Single stage impactor matching to European Union designs has been fitted in to the sampler for PM 10 measurement. This impactor removes dust greater than 10 microns from ambient air when sucked through it at a constant flow rate of 2.3 M^3hr. For sampling of PM 2.5 pollutants, two stage impactors based on the USEPA standard designs has been incorporated.

The PM 2.5 impactor removes dust greater than 2.5 microns from ambient air in two stages (first in PM 10 impactor and second in WINS impactor fitted in series) while air passed through it at a flow rate of 1.0 M^3hr. In the RDS FPS set an additional dust cap is used to measure particulates separately. In the gaseous sampler air is bubbled through specific reagents kept in impingers where gaseous pollutants like SO_2 & NO_2 get absorbed. Later collected samples are taken to laboratory pollutant concentrations are analyzed as per standard UV-Vis Spectrophotometric method.

Principle of West Gaeke Method:

This method is based on the absorption and stabilization of SO_2 from air by a solution of Sodium tetrachloromercurate II to form the dichlorosulfito mercurate II complex.

Quantitative determination is accomplished by adding acid bleached para-rosaniline HCl and formaldehyde to the sulfite complex and measuring the color intensity by a UV Spectrophotometer.

Principle of Jacobs-Hochheiser Method :

Ambient NO_2 is collected by bubbling air through a solution of Sodium Hydroxide and Sodium Arsenite. The concentration of Nitrite ion produce during sampling is determined colorimetrically by reacting the Nitrite ion with Hydrogen Peroxide, Sulphanilamide, N-1-Naphthyl, hylenediamine, di-hydrochloride) and measuring the absorbance of highly colored azo dye at 540 nm

UV Spectroscopy:

UV spectroscopy obeys the Beer-Lambert law, which states that: when a beam of monochromatic light is passed through a solution of an absorbing substance, the rate of decrease of intensity of radiation with thickness of the absorbing solution is proportional to the incident radiation as well as the concentration of the solution. Gaseous pollutant samples are subjected to this analysis method.

Equipment Used:

Ecotech AAS 271 is fitted with one of the best brushless and noiseless non pulsating pumps of adequate capacities to generate needed sampling rates for PM10 & PM2.5 streams. Constant flow rate in both air stream is maintained throughout sampling duration with the help of critical orifices. Pump assembly is equipped with heavy duty induction motor which ensures that sampling rate are not affected due to input voltage fluctuations. AAS 271 is equipped with two flow meter which continuously display sampling flow rates of two streams controlled by orifice. Glass Micro fiber filters of 47.0mm diameter is used for PM10 sampling while PTFE membrane (46.2mm) used for PM 2.5 sampling. All components of impactor are made up of corrosion free metals fabricated with the help of CNC machines to ensure desired precision in the machine's capability & function.

Fig: AAS 271 Combo Sampler

Fig: AAS 118 Gaseous Sampler

The **AAS 118** is an independent standalone monitoring instrument, where a suction pump is installed as an integral part of the sampler, besides digital timer and time totalizer. In AAS 118 improved valve design has been incorporated which ensure that flow is not reduced significantly during sampling period due to deposition of fine particles escaping from impingers. The instrument is housed within a robust powder

coated cabinet designed for outdoor field use. This instrument could be attached with the **AAS 271** Combo Sampler.

Table - Ambient Air Quality Analysis of the project area

	Description of data collection point	**Distance from Centre**	**SPM µg/m3**	**$PM_{2.5}$ µg/m3**	**PM_{10} µg/m3**	**SO2 µg/m3**	**NOx µg/m3**	**CO mg/m3**
1	North Side of the site	120m	278	80 (24 hours)	119.1 (24 hours)	4 (24 hours)	22	4 (8 hours)
2	West Side of the site	120m	281	85 (24 hours)	100 (24 hours)	4 (24 hours)	25	3 (8 hours)
3	South Side of the site	120m	283	65 (24 hours)	50 (24 hours)	3 (24 hours)	21	4 (8 hours)
4	East Side of the site	120m	279 (24 hours)	50 (24 hours)	50 (24 hours)	2 (24 hours)	19	4 (8 hours
	Method of Analysis		Gravimetric	Gravimetric	Gravimetric	West Geake	Jacob and Hochheiser	Indicator Tube
	Test Duration (Hr)		24	24	24	Annually	Annually	24
	DoE Standard		150	65	150	365	100	1000
	WHO Standard		50	25	50	20	-	NF

Remarks
Pollution source from ongoing activities, the weather was sunny and the wind direction was from the north-west to southeast
corner.
Note: 1. Fine Particulate Matter (PM2.5). 2. Respirable Dust Content (PM10). 3. Suspended Particulate Matter (SPM).4. Oxides of Nitrogen (NOX).5. Sulphur Di-Oxide (SO2). 6. Carbone Mono-Oxide (CO). (Source BCAS, sampling has been done by Respirable Dust Sampler & Fine particulate Sampler, Instrumex, manufacture by India, USEPA certified

Map : Google image showing the points of AQM, Noise monitoring and water sample

4.7 NOISE LEVEL

Noise is unwanted sound. The difference between sound and noise depends upon the listener and the circumstances. Noise is one of the most common occupational health hazards. Noise at the workplace that exceeds the exposure standard and is not controlled is a major cause of hearing loss to workers. A significant loss of hearing contributes to social isolation and reduced quality of life, career prospects, increased absenteeism, worker turnover and lowered work performance. It can also be a contributing factor to workplace injuries and accidents. In order to determine the existing work place sound level at different sections of **KR Logistics Limited**. Sound levels at running condition were measured with a Sound Level meter. According to DoE allowable noise level in industrial zones is 75 decibles at day time respectively. The result of the sound level survey has been given below

Table shows the maximum and minimum noise level at different location of sound monitoring in the project site at day time and Table 4.10 at night time. The results reveal that the noise level in the project area and in the vicinity is higher than the DoE and

WBG EHS guideline standards. The primary reasons are high volume of road traffic in the Dhaka-Chittagong road and high density of industries in the area.

Table : Measured Noise level at the project site in different locations at day

Date of Survey	Time	Location: South Side		Location: South Side	
		Max	Minimum	Max	Minimum
Day Time	8:00 – 9:00 am	66	56	69	59
Day Time	9:00 – 10:00 am	62	55	68	58
Day Time	11:00 – 12:00 pm	65	57	67	56
Day Time	2:00 – 3:00 pm	61	56	66	57
Day Time	3:00 – 4:00 pm	66	52	65	55
Day Time	5:00 – 6:00 pm	68	52	68	52

Date of Survey	Time	Location: South Side		Location: South Side	
		Max	Minimum	Max	Minimum
Night Time	7:00-8:00 pm	65	53	63	52
Night Time	8:00-9:00 pm	64	53	54	53
Night Time	9:00-10:00 pm	55	54	56	53
Night Time	12:00-1:00 am	56	53	56	51
Night Time	2:00-3:00 am	56	54	54	54
Night Time	3:00-4:00 am	54	53	55	53

Date of Survey	Time	Location: Gate Side		Location: Central Point	
		Max	Minimum	Max	Minimum
Day Time	8:00 – 9:00 am	71	66	68	66
Day Time	9:00 – 10:00 am	70	65	72	68
Day Time	11:00 – 12:00 pm	65	65	71	66
Day Time	2:00 – 3:00 pm	65	68	64	57
Day Time	3:00 – 4:00 pm	68	52	64	57
Day Time	5:00 – 6:00 pm	67	53	66	58

Date of Survey	Time	Location: Gate Side		Location: Central Point	
		Max	Minimum	Max	Minimum
Night Time	7:00-8:00 pm	65	53	63	61
Night Time	8:00-9:00 pm	65	53	64	61
Night Time	9:00-10:00 pm	62	51	55	51
Night Time	12:00-1:00 am	53	53	56	51
Night Time	2:00-3:00 am	53	54	56	54
Night Time	3:00-4:00 am	52	51	54	53

Table 4.11: Acceptable Noise Level (Bangladesh ECR 1997.

Types of Area	Description of Area	Noise Level Day	Noise Level Night
Slient Zone	Hospital,School, Office Etc	50	40
Resident Zone	Family Housing Quater	55	45
Mixed Zone	Mixed Residential	60	50
Commercial Zone	Market, Shop , Business etc	70	60
Industrial Zone	Factories, Industries	75	70

Table : Standards of noise level of WBG EHS Guidelines 2008

Standard	Zone	Day time dBA	Night time dBA
World bank EHS Guideline 2007	Residential, institutional, educational	55	45
	Industrial, commercial	70	70
Bangladesh ECR 2023	Mixed Area	6	50
	Commercial	70	60
	Industrial	75	70

It is evident that other than in early morning, the noise level in the neighborhood of the project site (mixed -industrial-cum-commercial area) is higher than that inside the site. The noise comes from the neighboring industries, traffic through main road, loud speakers, cassette players, human gathering, activities in small factories and the bazaar on the street side, etc. Table shows the acceptable noise level as per Bangladesh gazette: September 7, 2006. According to the gazette notification, the proposed port site, at current condition, may be characterized as an industrial zone. The ongoing developments in the zone around the site will ultimately turn the area to a full-fledged industrial zone. Although the noise level within the project site appears to be within the acceptable limit prescribed by the Department of Environment for industrial area, the noise level in the neighborhood of the site is relatively higher than the limits.

4.7.1A Noise Level Mitigation Plan:

TYPE	**RISK MATRIX**	**FREQUENCY**	**IMPACT**	**MITIGATION**
Stationary Engines	High	24/7	Loud humming from generators/compressors disturbs the local community.	Place generators inside Acoustic Enclosures on anti-vibration mounts.
Heavy Machinery	Medium	Constant	Loud engine roar from reach stackers and forklifts during operation.	Equip all equipment with Hospital-Grade Mufflers (high-efficiency silencers).
Boundary Noise	High	Constant	Metal-on-metal clashing of containers carries into nearby residential areas.	Erect a 3-meter high solid barrier (sound wall) along the boundary fence.

Vehicle Alarms	Low	Continous	High-pitched reversing beeps cause significant night-time noise pollution.	Switch to "White Noise" Reverse Alarms which are quieter for the neighbors.

4.8 CLIMATIC CONDITION

The climate of this region is tropical, with monsoons, characterized by a change of four seasons: pre-monsoon (March to May), monsoon (June to September), post-monsoon (October to November) and dry season (December to February). Typical parameters of the weather elements, as recorded for the period of last few years of observations (2006-2020) at Chittagong Meteorological Station.

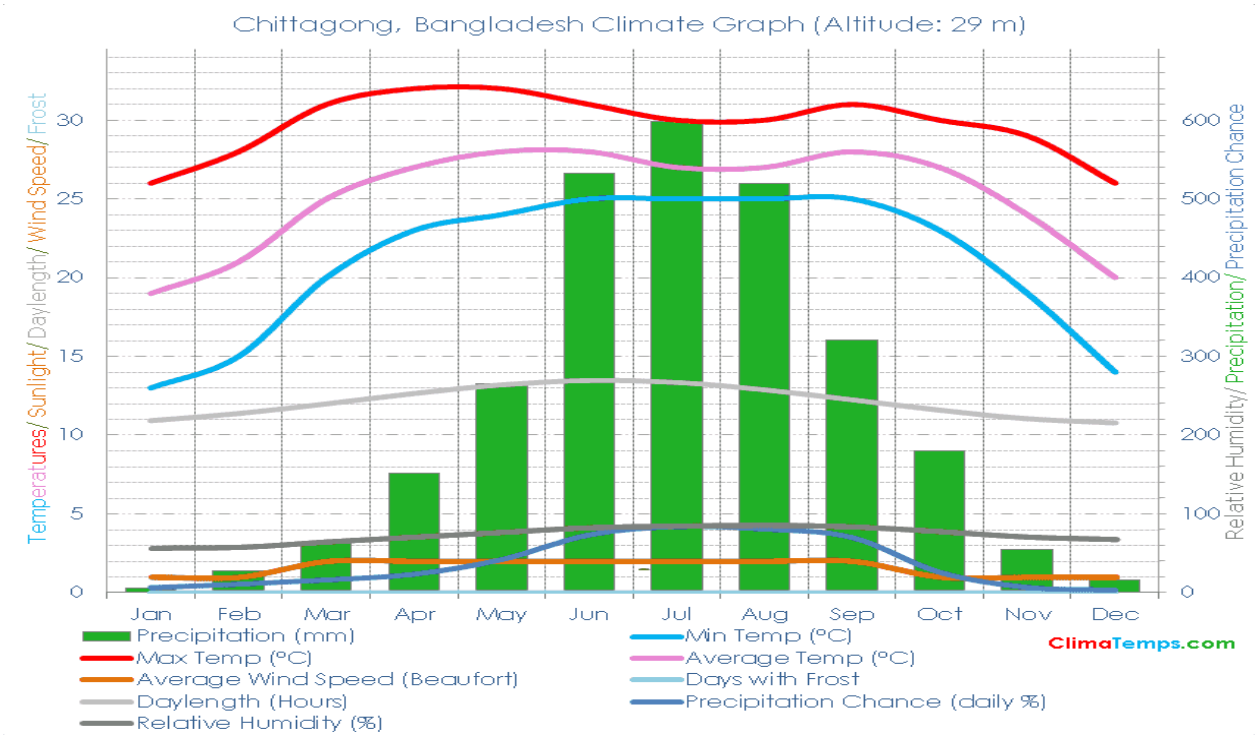


Figure : Climate graphs of Chittagong collected from

http://www.climatemps.com/

The climate of this region is tropical, with monsoons, characterized by a change of four seasons: pre-monsoon (March to May), monsoon (June to September), post-monsoon (October to November) and dry season (December to February). Typical parameters of the weather elements, as recorded for the period of last few years of observations (2006-2020) at Chittagong Meteorological Station.

4.8.1 Rainfall

The annual rainfall is about 2000mm and approximately 80% of it occurs during the monsoon. Average monthly rainfall during monsoon period varies between 300mm to 450mm. Maximum daily rainfalls during this period recorded in September 2010 is 668 mm. The rainfall follows the general climate pattern with the highest rainfall in the summer month of June to September and minimum rainfall in the cooler and drier months of November to March. Table 4.1 presents average monthly rainfall for the period of last 30 years (1990 to 2020), average number of rainy days per month and average number of days per month when rainfall is greater than 10 mm. It is evident that extreme rainfall events occurred during the monsoon (June- September). Average monthly rainfall values for Chittagong area since 2020 are presented

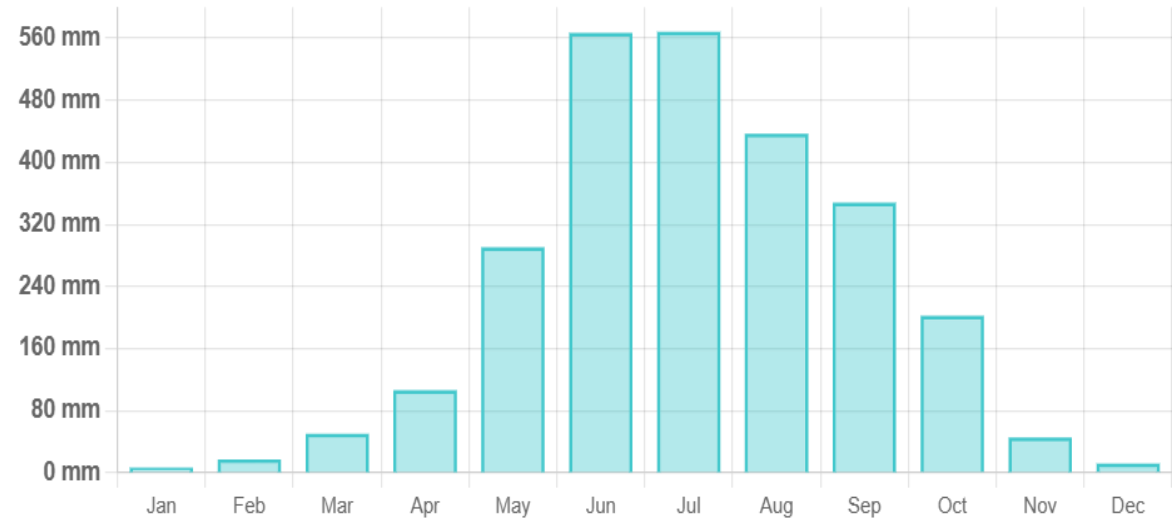


Figure : Bar Chart Shows the Average Monthly Rainfall Data of Chittagong District

Chittagong experiences significant rainfall throughout the year, averaging **2651 mm** of precipitation annually. However, this abundant rainfall is not evenly distributed, with a distinct dry and rainy season during certain months.

The average number of days each month with precipitation (> 0.2 mm)

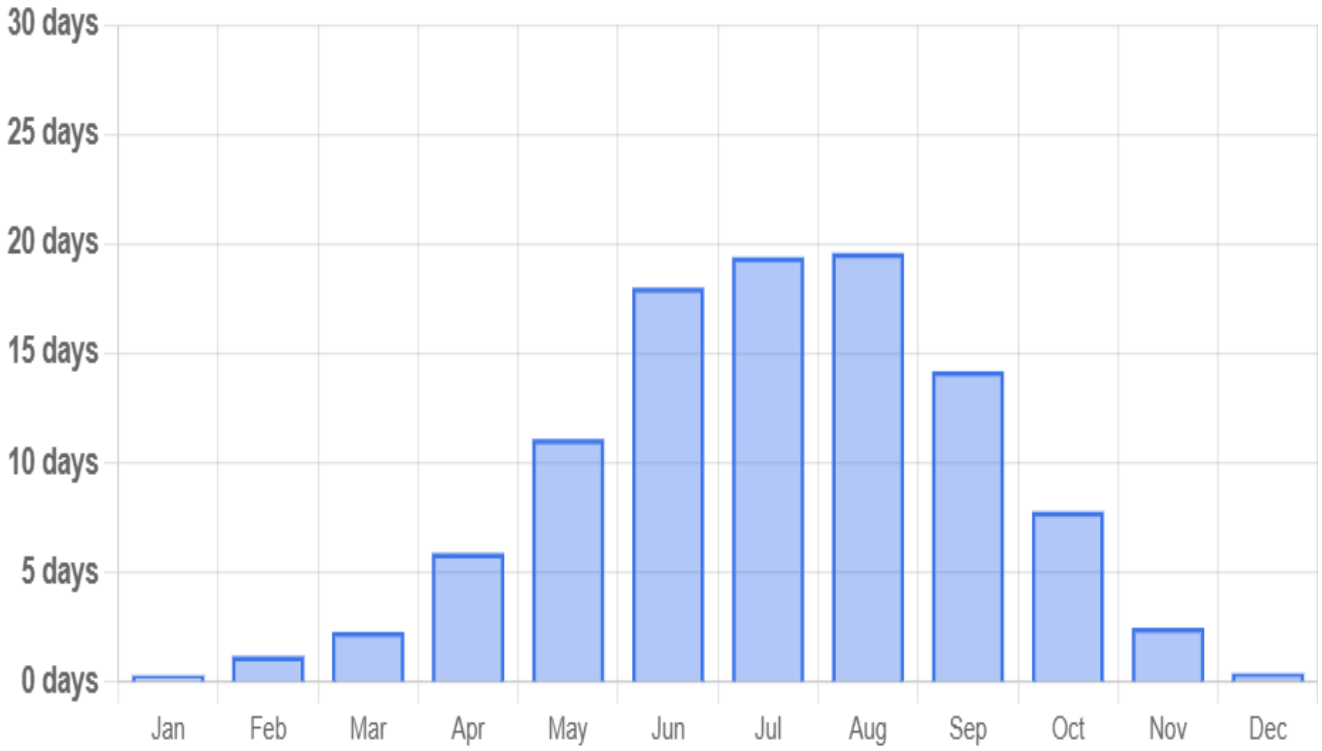


Figure : Bar Chart Shows the Average Daily Rainfall Data of Chittagong Port Area

Chittagong can be quite wet during July, receiving approximately **568 mm** of precipitation over **19 rainy days**. In contrast January, experiences much drier conditions, with **6.5 mm** of rainfall, spread across **0 rainy days**.

4.8.2 Ambient Air Temperature:

In the summer months April to September the temperature of the country varies with the amount of rainfall. During the monsoon period the temperature drops compared to the temperature between March-June. In general the winter season coincide with the period of lowest rainfall.

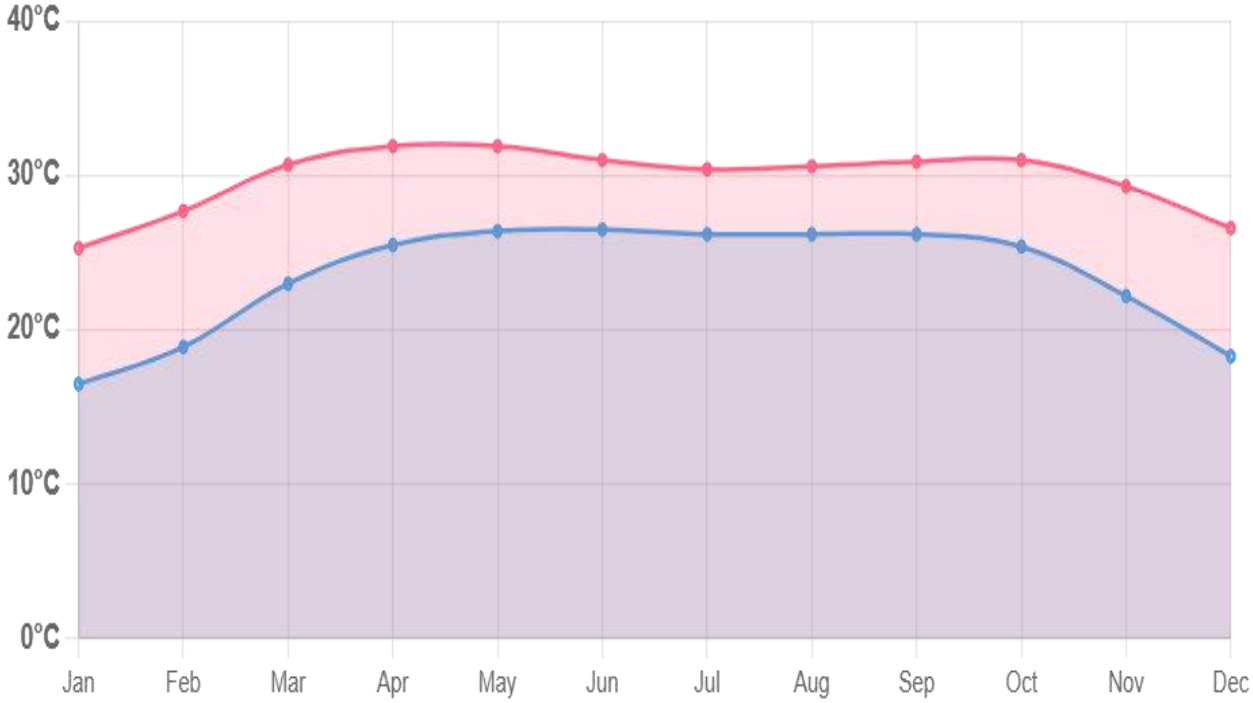


Figure: Average Temperature Graph (Monthwise)

Monthly Ambient Temperature of the Project Area in 2022, 2023, 2024

2022			
Month	Mean Temp (°C)	Max Temp (°C)	Min Temp (°C)
Jan	22.4	24.5	14.1
Feb	24.45	29.1	18.3
Mar	24.55	32.2	22.4
April	26.43	34.4	24.1
May	24.44	33.2	24.2
June	25.43	33.4	26.8
July	23.45	31.4	25.8
Aug	24.33	32	26.6
Sep	25.4	32.7	26
Oct	23.45	30.5	24.3
Nov	18.12	29	19.8
Dec	19.55	27	15.6

2023			
Month	Mean Temp (°C)	Max Temp (°C)	Min Temp (°C)
Jan	15.32	25.3	13.4
Feb	23.4	31.2	19.4
Mar	23.23	33.2	21.9
April	19.32	33.7	23.8
May	26.34	33.7	24.9
June	26.43	32.3	23.8
July	23.33	32.3	26.1
Aug	32.43	32.5	26.6
Sep	26.43	31.9	26.38
Oct	24.3	32.2	25.35
Nov	23.44	26.6	19.9
Dec	23.44	26.8	15.8

2024			
Month	Mean Temp (°C)	Max Temp (°C)	Min Temp (°C)
Jan	15.34	24.5	14.1
Feb	21.2	29.1	18.3
Mar	26.02	32.2	22.4
April	25.23	34.4	24.1
May	25.34	33.2	24.2
June	23.5	33.4	26.8
July	23.44	31.4	25.8
Aug	22.22	32	26.6
Sep	24.32	32.7	26
Oct	24.38	30.5	25
Nov	25.15	29	23.4
Dec	20.22	27	16

Figure: Monthly Ambient Temperature of the Project Area in 2022, 2023, 2024

4.8.3 Relative Humidity:

Chittagong's humidity levels vary throughout the year. The highest levels occur in July, reaching 86% (very high), while the lowest is recorded in February at 70%. Throughout the year, the average humidity in Chittagong is 79%. Humidity plays an important role in how temperatures are felt. During the warmest month, April, the maximum average temperature is around **32°C**. Combined with high humidity during this period, the temperature can feel even warmer than the thermometer shows. During the coldest month, January, the maximum average temperature is around **25°C**. This period has high humidity.

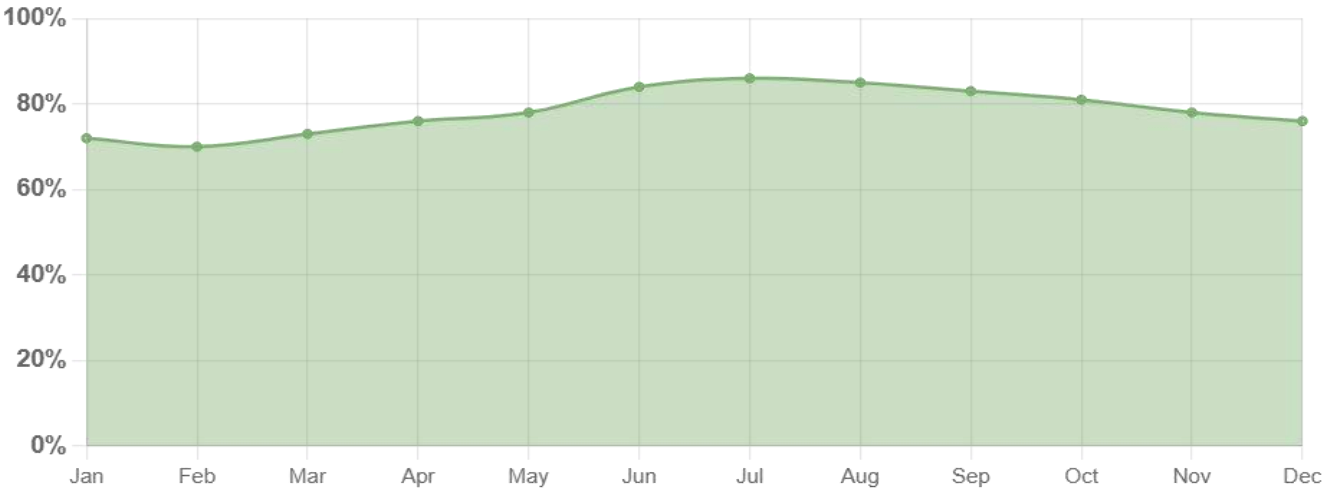


Figure: Graph about Relative Humidity Percentage

4.8.4 Wind Speed:

The mean wind speed in Chittagong over the year fluctuates between **0 m/s** and **3 m/s**. The windiest period, February, March and June has average wind speeds of **3 m/s**. This means typical days feature moderate breezes that keep small branches moving. Air flow is consistent and noticeable. The speed translates to 10.8 kilometers per hour or 6.7 miles per hour. While some days are lighter, others may experience increased winds reaching **6 m/s**.

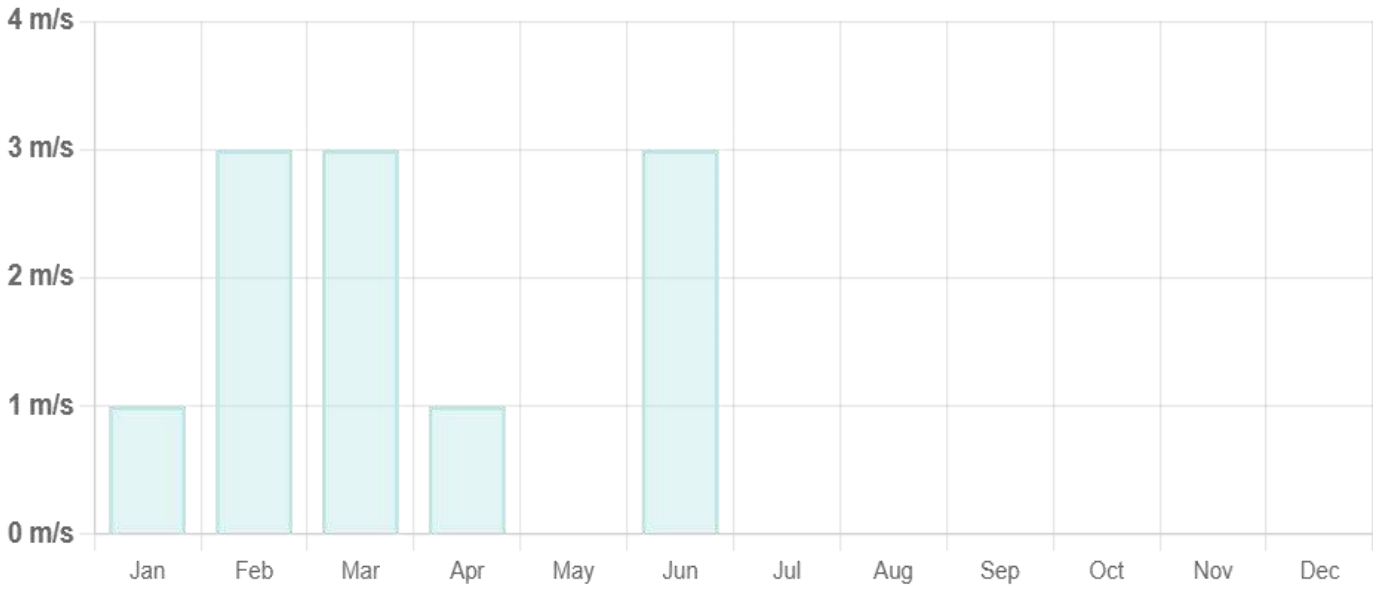


Figure: Monthly Prevailing Wind Speed of Chittagong

4.8.4A Wind roses for the proposed KRLL project area:

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

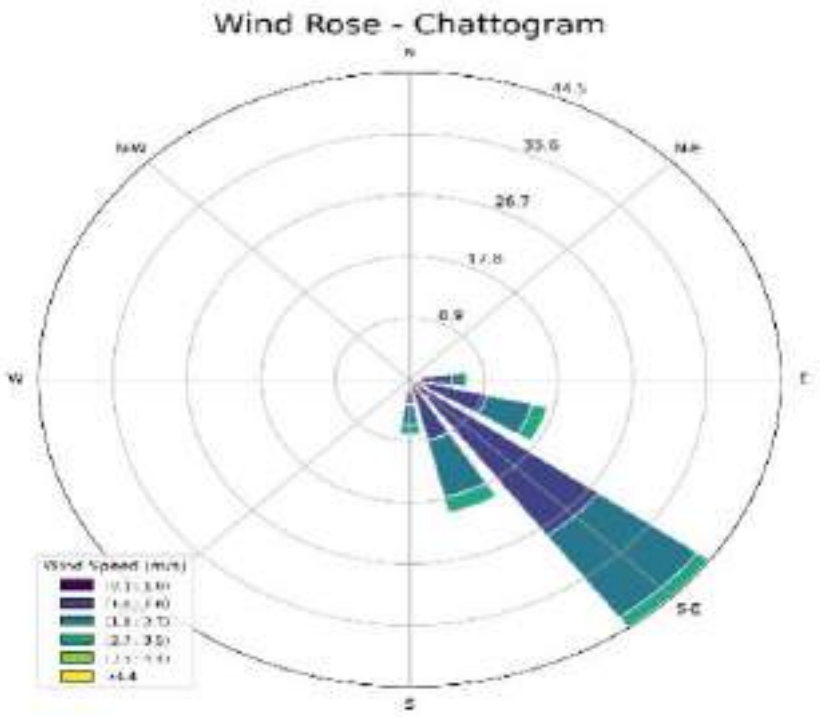


Figure: Diagram of Wind Pattern in Chittagong

4.8.5 AGRO-ECOLOGICAL SYSTEM

The proposed project site is situated in the Chittagong Airport Area (Potenga), which falls under the Agro-Ecological Zone CCP-23 (Figure 26). This zone predominantly consists of coastal plains and low-lying land with a complex landscape formed by piedmont plains and old estuarine floodplains. A major challenge in this region is soil salinity, particularly during the dry season from October to May. The soils in this area are primarily grey silt loams and silty clay loams. Overall soil fertility is moderate, though nitrogen (N) and potassium (K) are generally limiting, and organic matter content ranges from low to moderate (Banglapedia, 2006). At the Potenga project site, the land is relatively undulating with gentle slopes from northwest to southeast, and elevations vary approximately between 10 m and 30 m above mean sea level.

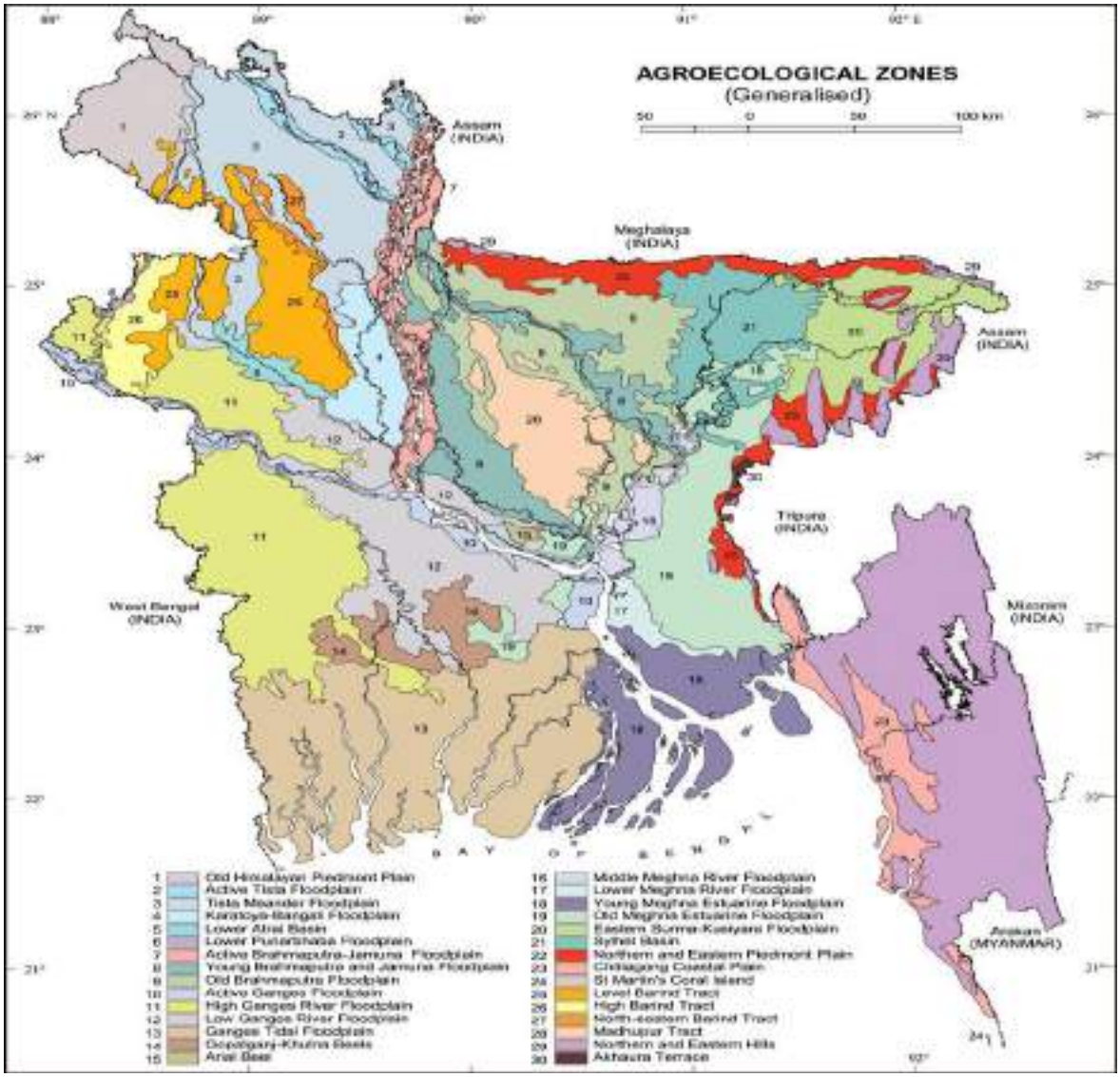


Figure 28: Map of Agro-ecological zones with the industry site (Source: Banglapedia, 2006)

4.8.6GEOGRAPHY

Bangladesh is characterized by an exceptional hydro-geographical setting. Monsoon floods are due to heavy continuous rainfall on impounded or poorly draining areas where precipitation exceeds infiltration. Like other parts of the country this area also receives sufficient amount of rainfall and the availability of ground water for drinking and domestic purpose is good. But this being a coastal area, therefore level of saline water intrusion level is high.

4.8.6A Geographical Location and Interface:

- **Highway Proximity:** The terminal is located immediately adjacent to the Dhaka-Chattogram Highway (N1), which serves as the primary artery for 80% of Bangladesh's international trade.
- **Coastal Positioning:** Situated within the Banshbaria Union, the terminal area overlooks the Sandwip Channel of the Bay of Bengal.
- **Industrial Cluster:** The site sits within a continuous industrial belt that includes ship-breaking yards, steel mills, and various other off-dock facilities such as Nemsan Container Limited in nearby Kumira.

4.8.7 GEOLOGY AND SEISMOLOGY

The area is part of the *Alluvium Deltaplain Deposits* in the Bengal Basin. It is exposed in Chattagram division as well as along the southern margin of the Jaintia hills of Assam and Bangladesh.

In northern Bangladesh the presence of the unit has been reported from a number of drill holes. The unit unconformably overlies the Tipam Group and is in turn overlain either by the Dihing Formation or by recent alluvial deposits. At Atgram, the unit overlies the Boka Bil Formation. In Sylhet, the formation consists of two distinct units. The lower part is composed chiefly of massive sandstone inter-bedded with subordinate clay-stone. The sandstone is yellow to yellowish brown, medium to coarse, cross-bedded and in places pebbly. The upper part consists of clay-stone and siltstone with subordinate sandstone.

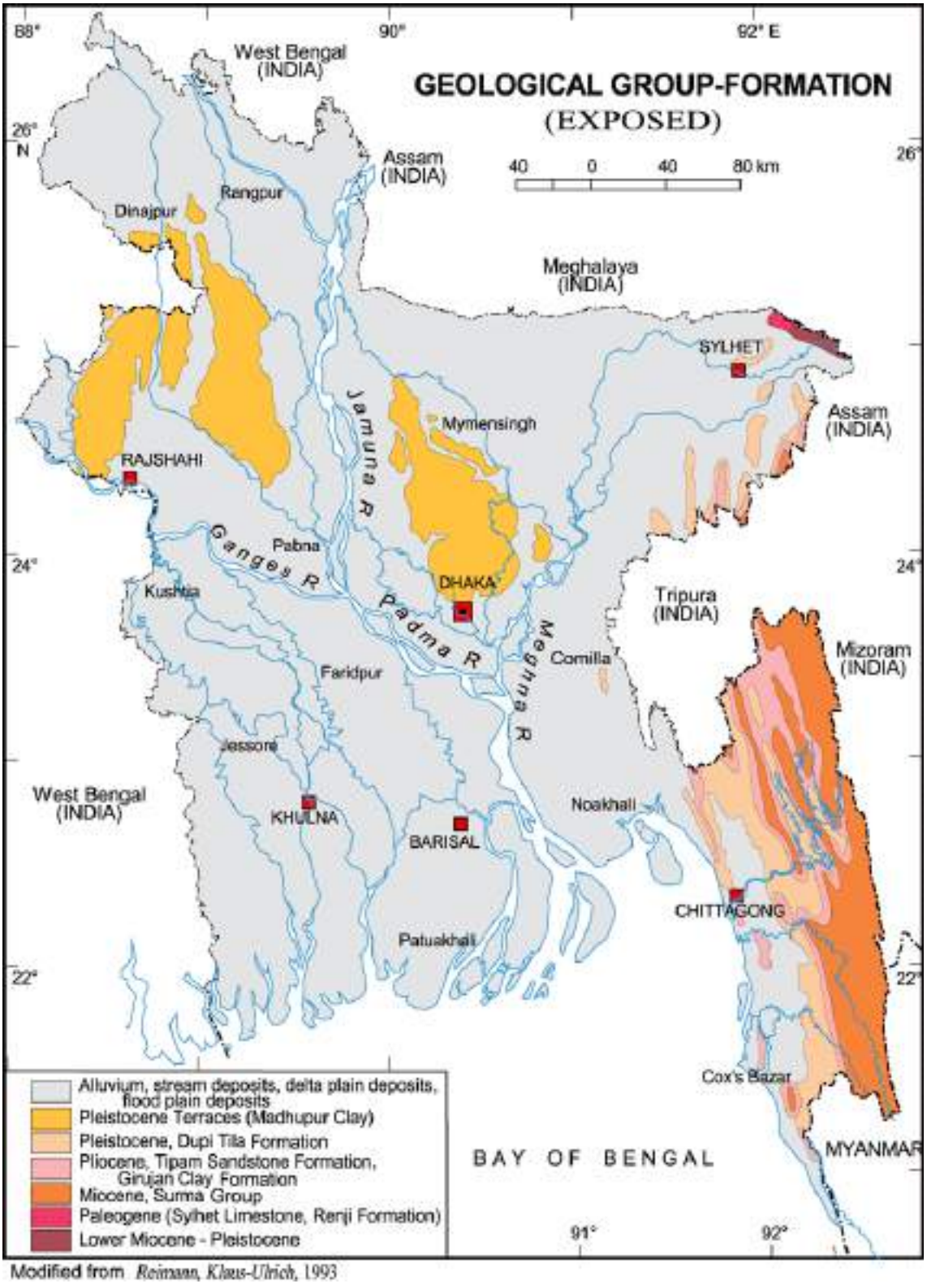


Figure 29: Map of Geological group formation with the location of the Industry site (Source: Banglapedia, 2006)

On the basis of earthquake epicentres and morphotectonic characteristics, Bangladesh is divided into three seismic zones, namely zone-I, zone-2 and zone-3 (Table 4.1). The northeastern folded regions of Bangladesh are the most active zone and it belongs to the zone-I. The zone-II consists of recent uplifted Pleistocene blocks of the Barind and Madhupur Tract and the western extension of the folded belt. The southwest Bangladesh is referred to as zone-III and it is seismically quiet zone. The Bask coefficients of these three zones are 0.08, 0.05 and 0.04, respectively.

Table 13: Seismic zones of Bangladesh

Zoning	Area Mercalli Scale
I	North and eastern regions of Bangladesh (Seismically most active)
II	Lalmai, Barind, Madhupur Tracts, Dhaka, Comilla, Noakhali and western part of Chattagram Folded belt.
III	Khulna division S-E Bangladesh (Seismically relatively quiet)

The Industry site is located in zone-II of earthquake zones (Figure 4.9) which is seismically moderate risk zone. During seismic or earthquake delineation, ground condition (firm or soft) has not been taken into consideration in Bangladesh. Though the project is located within zone- II special precaution is needed in considering the risk from earthquakes.

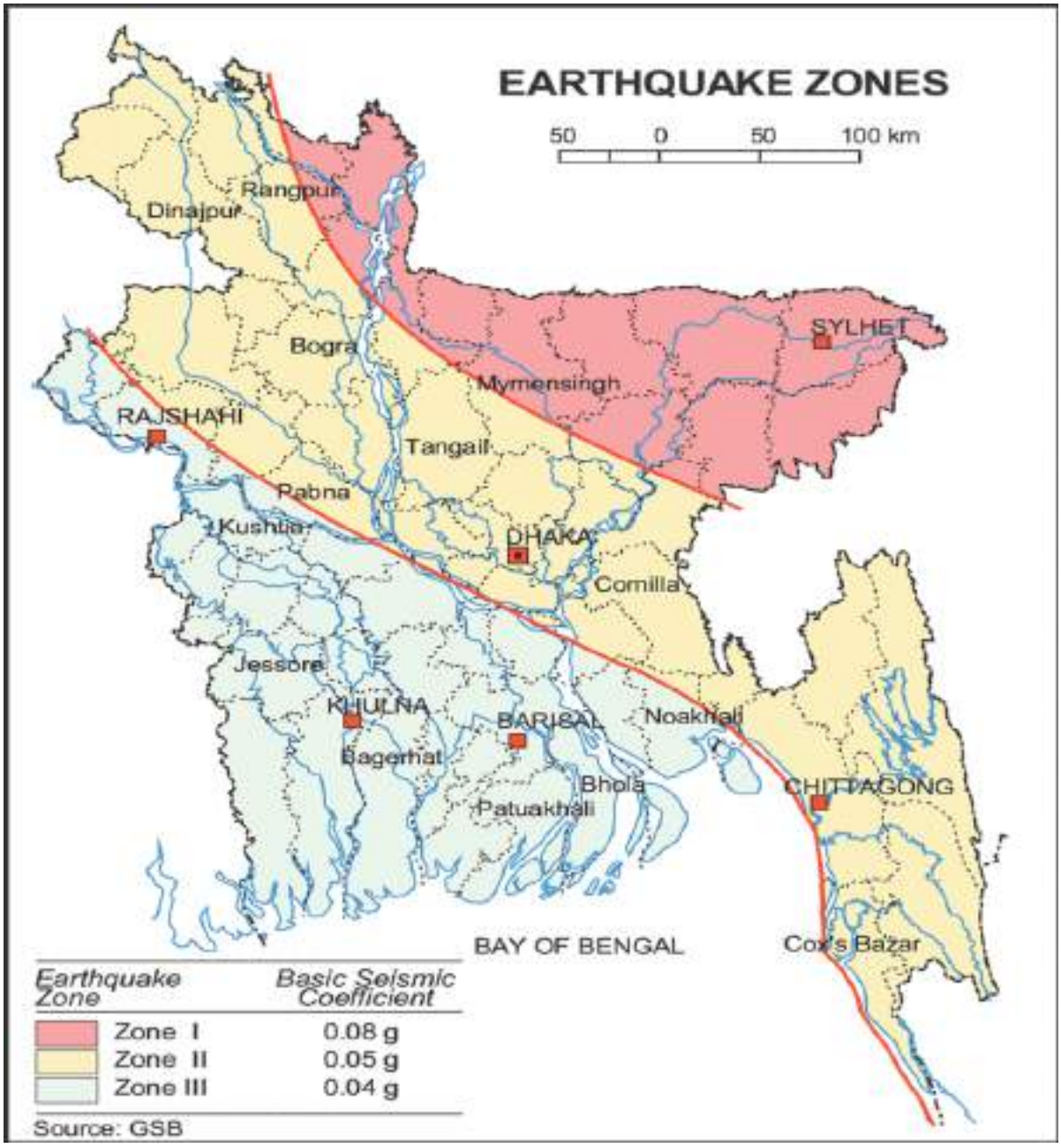


Fig 30: Earthquake zone of Bangladesh.

4.8.8 EXTREME WEATHER RISK

Cyclones occur the pre-monsoon (April-May) and post-monsoon (October-November) seasons in Bangladesh. Cyclones in their initial stages move at a rate of 5 to 10 km/hr. in their final stage they may move at a rate of 20-30 km/hr or even up to 40 km/hr. cyclone in the bay of Bengal usually move northwest in the beginning and then curve eastwards.

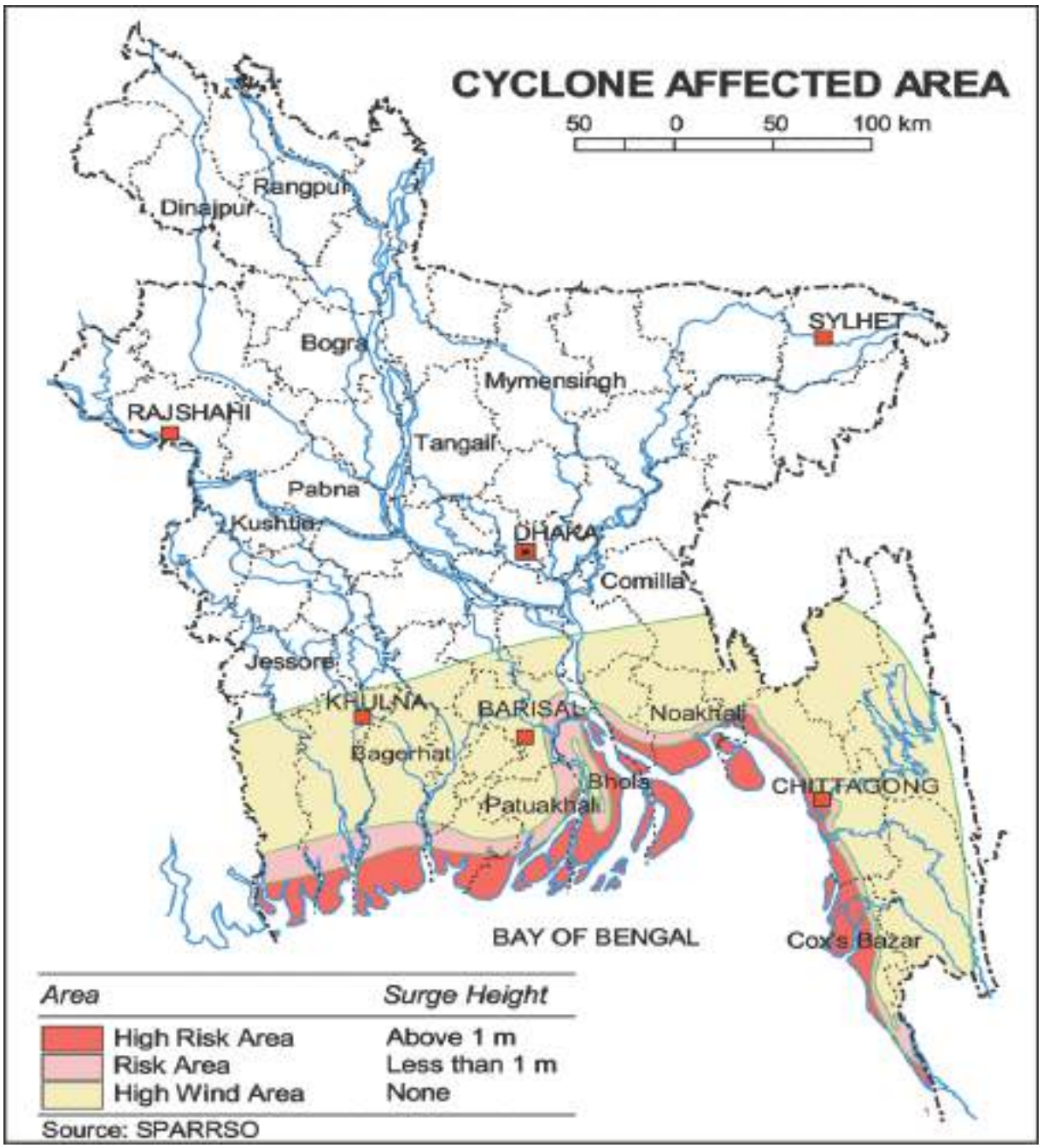


Figure 31: Cyclone affected areas of Bangladesh and location of the Project.

4.8.8A Primary Weather Risk:

Type	Risk Level	Frequency	Impact	Mitigation
Cyclones and Surges	Critical	Seasonal	Huge sea waves flood the yard and destroy expensive cranes.	Plant more tree surrounding the proposed project
Hill Water Rush	Risk	Every Rain	Fast water from sitakunda hill floods the yard and ruins foundations.	Use large box drains to move water away fast.
High Tides	High	Daily	Sea water pushes into the drains, so rain water cannot get out.	Raise the yard (+1.5m) So water always flows down to the sea.
Extreme Heat	Medium	March - June	Worker faint from heat; heavy machines and engines overheat.	Mandatory water breaks for staff

4.9 BIOLOGICAL ENVIRONMENT (FLORA AND FAUNA)

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.

The site is not similar in character with many area of alluvial delta in Bangladesh with mixed crop like rice. All kinds of seasonal vegetables are the main crops in this area. There is a mango plantation on the east side of the project area. There is a cover of low growing grasses around the project area. There are some Coconut, Akashmoni, Raintree trees in the entrance point of the area.

4.9.1 Floral Component: Almost the whole of Chittagong district lies on the meander flood plain. Most of this area is now flooded only by rain water. Only minor areas near the Bay of Bengal are affected by river water and receive fresh silt deposits. A wide variety of soils occurs in this district.

Extensive areas throughout the flood plain are occupied by broad ridges on which rather yellowish, friable, silt loams and silty clay loams predominate. Some of those have dark grey topsoil, Top soils are acid when dry, but slightly alkaline when flooded; subsoil are moderately alkaline, but non-calcareous. In the Chittagong district there are extensive deep basins which have dark grey compact clays with moderately alkaline sub soils usually overlying a yellowish, loamier substratum. Flooding depths are mainly less than 5 feet in the east but increases to 10 feet in west. Moisture is retained well in the dry season except where the soils overlie sand at a shallow depth, as frequently happen in the northern half of Chittagong district. Where they are deep, these are excellent soils, producing good crops of jute, aus, transplanted and broadcast aman as well as rabi crops in some areas. Around the ancient town of Chittagong, man-made soil platforms have been raised on which intensive cropping is practiced. On the highest platforms, banana, betel leaf, sugarcane and vegetables are major crops, together with aus, jute and transplanted aman. On lower platforms the latter are major crops in the monsoon season and vegetables in the dry season. Among rice crops boro covers the largest area followed by aman and aus . Other crops included wheat potato, pulses, sweet potato, speices, cheena, kaun Fallow lands were dominated by Common Trees and Plants in Bangladesh, provides a detailed overview of the most widely found plant species across the country. It includes essential information such as common and scientific names, family classification, plant types, and primary uses in food, medicine, timber, and environmental sustainability. From staple crops like rice and banana to valuable timber trees like mahogany and teak, the compilation highlights Bangladesh's rich botanical diversity and its integral role in daily life, agriculture, and industry.

List of available trees:

Serial No	Local Name	Scientific Name
1.	Mango	*Mangifera indica*
2.	Jackfruit	*Artocarpu*
3.	Kalojam	*Syzygium cumini*
4.	Betelnut Pulm	*Areca catechu*
5.	Coconut	*cocos nucifera*
6.	Guava	*Psidium guajava*
7.	Jambura	*Citrus decumana*
8.	Mandar	*Eeythrina Veriegata*
9.	Kadam	*Anthocephalus cadamba*
10.	Sheel Koroy	*Albizzia procera*
11.	Sajna	*Moringa obifera*
12.	Dalim	*Punica granatum*

Figure: Available Trees

List of common way side trees:

Serial No	Local Name	Scientific Name
1.	Tetul	*Tamaraindus indica*
2.	Neem	*Azadirachta indica*
3.	Hijol	*Barringtonia acutangula*
4.	Banyan	*Ficus bengalensis*
5.	Ashatha	*Ficus religlosa*
6.	Raintree	*Samanca saman*
7.	Pitraj	*Aphanamixls polystachia*
8.	Simul	*Bobbax ceiba*
9.	Krishnachura	*Delonix regia*
10.	Debdaru	*Polyalathia Longifolia*

Terrestrial Floral: In addition to the aquatic macrophysics mentioned earlier, there are few natural types of vegetation listed below

Serial No	Local Name	Scientific Name
1.	Dubla gash	*Cynodon dactylon*
2.	Hargoza	*Acanthus illicifolius*
3.	Telakachu	*Coccinea cordifolia*
4.	Bet	*Calamus sp*
5.	Akanda	*Calotropis procera*
6.	Nishinda	*Vitex negundo*
7.	Tulshi	*Ocimum canum*
8.	Venna	*Ricinus communes*
9.	Babla	*Acacia nilotica*
10.	Dummur	*Ficus sp*
11.	Gab	*Diospyros peregrina*

Figure: Tree Observe During Field Survey

4.9.2 Faunal Component: Common bird species has been found in the depot area during the survey period. During the survey tenure, a total of 22 species belongings of 15 families have been observed in the study area during survey. The highest number of families has been found four times of Sturnidae and second highest has been found in Alcedinidae family. The depressed and grass lands are the feeding and roosting ground of wild birds. All species are Least Concern (LC) according to IUCN Red List 2015.

A detail of bird's species checklist is presented in Table

SL	Local Name	Common Name	Scientific Name	Family	IUCN
1	Doyel	Oriental Magpie Robin	Copsychus saularis	Muscicapidae	LC
2	Deshi Kanibok	Indian Pond Heron	Ardeola grayii	Ardeidae	LC
3	Chhoto pankouri	Little Cormorant	Microcarbo niger	Phalacrocoracidae	LC
4	Kala Fingey	Black Drongo	Dicrurus macrocerrus	Dicruridae	LC
5	Gash Pakhi	Striated grass bird	Megalurus palustris	Locustellidae	LC
6	Telia Ghughu	Spotted dove	Spikopelia chinesis	Columbidae	LC

7	Dhan Salik	Common moyna	Acridotheres tristis	Sturnidae	LC
8	Pati Kak	House Crow	Corvus splendens	Corvidae	LC
9	Bulbuli	Red- Vented Bulbul	Pycnonotus cafer	Pycnonotidae	LC
10	Sada Bok	Little egret	Egretta garzetta	Ardeidae	LC
11	Pati Maachranga	Common Kingfisher	Alcedo atthis	Alcedinidae	LC
12	Moutusi	Sun bird	Nectarinia asiatica	Nactariniidae	LC
13	Pati Fotikjol	Common Iora	Egithina tiphia	Aegithinidae	LC
14	Bon Salik	Jungle Myna	Acridotheres fuscus	Sturnidae	LC
15	Dar Kak	Jungle Crow	Corvus levaillantii	Corvidae	LC

Table :Detail of bird's species checklist

Other Aquatic Animal Checklist:

Sl	Local Name	English Common Name	Scentific Name	Family	IUCN
1	Kono bang	Asian Common Taod	Duttaphrynus frenatus	Bufonidae	LC
2	Tiktiki	Gecko	Hemidactylus frenatus	Gekkonidae	LC
3	Guchi Baim	Striped spinyeel	Macrognathus pancalus	Mastacembelidae	LC
4	Koi	Climbing Perch	Anabas Testudineus	Anabantidae	LC
5	Taki	Tank goby	Glassogobius giuris	Anabantidae	LC
6	Shing	Stinging catfish	Heteropneustes fossilis	Heteropneustidaae	LC
7	Magur	Air breathing	Clarias batracus	Clariidae	LC
8	Rui	Rohu	Labeo rohita	Cprinidae	LC
9	Catla	Catla	Catla Catla	Cyprinidae	LC
10	Jat Punti	Pool barb	Puntius Chola	Cyprinidae	LC

11	Chola Punti	Swamp barb	Puntius chola	Cyprinidae	LC
12	Mola	Mola carplet	Ambiypharyngodon mola	Cyprinidae	LC

Fig :Faunal Component (Hen) in Project Area

Fig :Faunal Component (Cow) in Project Area

Fig :Faunal Component (Goat) in Project Area

Fig :Faunal Component (Goat) in Project Area

4.10 SOCIAL AND CULTURAL RESOURCES

4.10.1 DEMOGRAPHIC, SOCIO-ECONOMIC AND CULTURAL ENVIRONMENTS

Land Use Pattern, Status of Housing and Built-up Infrastructure

The subproject area mostly consists of medium to high densely populated residential area. The built-up infrastructure includes mainly pucca, semi-pucca and tin-shed residential houses and shops, educational institutions, industries, religious centers (Mosques and Temple), slum area, hospital and health care center, trade and commerce (Bank and Bima), community center, business centers (market and bazar, hotel and restaurant).

Education

In the project area, literacy among the population is about 68.7%. This is higher than the national average (61.5%) [UNESCO, 2015]. Literacy rate among males is still higher than females. (Ref: Population and Housing Census 2011).

Tribal Communities

There is no indigenous or tribal people settlement in the subproject influence area. Therefore, there is no measure needed for indigenous peoples' safeguard.

Land Acquisition and Resettlement

Private land acquisition is not needed. For site clearing, few road side tin shed, semi-pucca and pucca structures and boundary wall and fencing need to be removed partially and or completely. The Pourashava authority has consulted with the owners of these structures. The local people and owners of those structures have no objection regarding the implementation of the subproject. An agreement has been signed by the Pourashava and the local people regarding the subproject implementation. The local people agreed to remove their structures for their benefit. However, in case of any objection from the affected person, the DSM will investigate the actual situation. Then, measures will be taken as per rules.

Principal Livelihoods and Economic Activities

The project area is now inhabited by the mixed occupational people where major income comes from non-farm activities such as small business, enterprises, Government and non-government job, transport vehicle ownership and operation.

Cultural Heritage and Protected Areas

Within the influence area of the subproject, no real historical sites identified. Religious center (such as Mosques and Temple), community centers, educational institutions, bus terminal and train station and bazars bring cultural value for the community people.

Chandranath Hill

Sshasradhara

Fishing Boat in the bay of bengle

Eco Park

4.11 Mapping Radius for the Proposed Project:

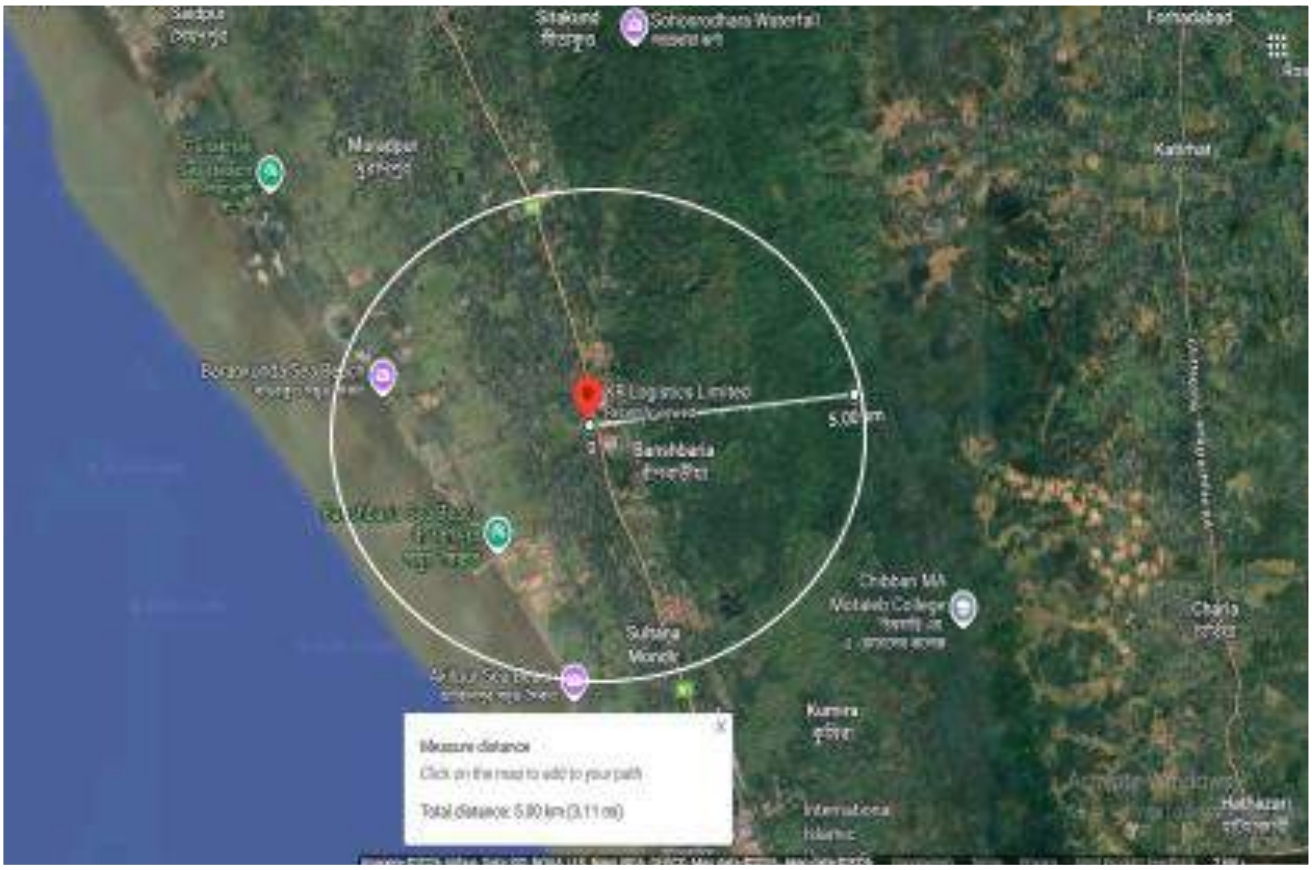


Figure: 5 Km Distance Redius for Proposed Project (22.5607188 N, 91.6741491 E)

Figure: Distance from KR Logistics Ltd to Unitex Spinning Limited CPP (488.88 M or 1603.94 ft)

Figure: Distance from KR Logistics Ltd to R.R Textile Mill (357.56 M or 1173.10 ft)

Figure: Distance from KR Logistics Ltd to PHP Float Glass Industries Ltd (311.79 M or 1022.94 ft)

Figure: Distance from KR Logistics Ltd to BN Filling Station (238.15 M or 781.34 ft)

CHAPTER- 05
IMPACT PREDICATION AND EVALUATION

5.1 General Consideration

This chapter deals with identification of key impacts, evaluate the impacts briefly and suggest mitigation measures. Checklist method is used for impact identification for both of the construction and operation-maintenance phase. Significance of impacts identified by x mark. Table 6.1 present checklist of potential impact associated with project location, construction and operation-maintenance phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities. Environmental parameters are broadly classified into three groups:

1. Physical Environment
2. Biological Environment
3. Socio-economic Environment

5.2 Public Consultation:

Stakeholders mean individual or group who may have a direct or indirect "stake" in the project – anyone who can be affected by it, or who can have an effect on the actions or decisions of the company, organization or government. The people who are simply interested in the matter, but more often they are potential beneficiaries. They can be internal people or external, such as community members or groups, investors, suppliers, consumers, policy makers, etc.

Any organized consultation with parties and persons interested in or affected by project activities, forms an important part of best practice project planning and environmental impact assessment. Early and participative engagement of stakeholders in any project planning phase increases the likelihood of approval by regulatory authorities and the implementation of project activities. Feedback from the consultation process has an important role in understanding the apprehensions and expectations from members of the public in general and stakeholders in particular. Such contribution from them helps development of a clear picture of the socio-economic and

environmental baseline survey of the project area. The importance of stakeholder engagement has also been recognized by the Bangladesh Department of Environment in its guidelines ECA '95 and ECR '97 of DOE and thus stipulated the requirement for consultation activities to be integrated into project planning and implementation phases, including during EIA of planned projects. Further, as a matter of fact, such consultation and FGD are now considered an essential pre-requisite for RAP as well.

Stakeholders contribute significantly to the decision-making and problem-solving processes as well. Moreover, They can understand the context, issues and potential impacts more fully determine their focus, scope, and objectives for solutions establish whether further research is needed into the problem. The basic communications skills are applied in stakeholder consolation include the following strategy:

1. **Effective Writing**: The consultation was written carefully during the conversations
   instantly in the field.
2. **Visual Rhetoric**: to understand or make clear all technical terms to the audience, words and graphics and poster papers were used during the consultation to make complex issues understandable to a general audience.
3. **Public Speaking/Presenting**: Local language was used while conversation with the stakeholders. Consultation with local people with their local language make the discussion more effectively.
4. **Interpersonal and intercultural skills:** The people were set in face-to-face
   situations, to make them feel comfortable and secure, and to be mindful of cultural factors that may affect interest level, accessibility, impact, values, or opinions.
1. **Active listening:** speakers and listeners were kept active and motivated during consultation. This strategy helped find out highest output from the stakeholders.

5.3 Scoping impacts

Key impacts indicate potential impacts that are unavoidable due to construction and operation of the project. Key impacts associated with the project are given below:

- Water Pollution
- Noise pollution
- Air emission
- Generation of solid waste
- Occupational health and safety risk
- Employment creation

5.3.1A Mitigation Plan for Water Pollution:

Type	Risk Matrix	Frequency	Impact	Mitigation
Oil Leaks	High	Daily	Rain washes engine oil and diesel from trucks into the local soil.	Install Oil water separator at the main drain (Proposed)
Tank Bursts	Critical	Rare	If a fuel tank breaks, thousand of liters of oil will flood the area instantly.	Build 110% containment walls around the fuel and chemical tank.
Workshop Wash	Medium	Daily	Cleaning dirty engines creates greasy water that poison the ground water	Use sealed concrete wash pads.
Staff Sewage	Medium	Constant	Waste from office and worker toilet cause smells and health risks.	Install a Modern Septic Tank.
Coastal Salt	Low	High Tide	Seawater enters the yard, via drains, causing rust and infrastructure decay.	Install one way flip fates on all drainage outlet.

5.3.1 Checklist of Potential Impact

The Checklist of potential Impact of KR Logistics LTD is given in below table 5.3.1.A

Table 5.3.1.A: Checklist of Potential Impacts

Project Phase	Action Affecting Environmental Resource	SEIs without mitigation measures				Type		Comments
		None	Minor	Medium	Major	Adverse	Beneficial	
Location Selection	Land use value depreciation	×					×	Using for more productive purpose
	Loss of and displacement from homestead land	×						No displacement issue
	Loss of agricultural land	×						No agricultural Land loss. Because the land won
	Damage to nearby operation	×						No impact anticipated as no major installation
	Disruption to drainage pattern	×						No Impact
	Encroachment into precious	×						No precious ecological issue
Construction Phase	Generation of dust				×	×		Dust generated by site clearing, civil works, cutting and filling of land
	Removal of top soil	×						Mud works, construction of internal road etc
	Soil erosion	×						Due to excavation and removal of top soil
	Siltation of nearby drainage or	×						Siltation may occur from pile up spoil soil
	Water pollution from construction waste materials				×	×		Controlled disposal required
	Air emission from construction				×	×		Unavoidable but for limited time
	Increase volume of local traffic			×		×		Medium impact will impose
	Extraction of groundwater		×					Supply from central source
	Noise generation from construction activities			×		×		Discontinuous noise
	Employment generation						×	Significant beneficial impact
	Occurrence of accidental event			×		×		Follow good housekeeping

Project Phase	Action Affecting Environmental	SEIs without mitigation						Comments
		None	Minor	Medium	Major	Advers	Beneficial	
Operational Phase	Occurrence of disturbance to near by community and resources	×						Activities will confine in its own
	Ambient air pollution from dust and gaseous emission				×	×		Impose impact on air quality, Mitigation measure needed.
	Indoor air pollution from in house activities				×	×		Chemical vapor, VOC impact on health
	Surface water/ Ground water pollution from sewage disposal				×	×		Mitigation measures are required
	Surface water/ Ground water pollution from disposal of liquid effluent from any activities				×	×		water pollution, Mitigation measures are required
	Noise Generation				×	×		Indoor discontinuous noise impact on occupational health, mitigation measure needed
	Vibration from odor machine operation	×						Heavy machinery involvement
	Solid waste generation			×		×		Mitigation measures are required
	Employment generation	×					×	Good employment opportunity
	Occurrence of accidental event and Environmental health and			×		×		Source identification needed and mitigation measure needed
	Increase volume of local traffic		×					Insignificant impact on local traffic
	Immigration	×					×	Related with employment
	Odor hazard		×					Odor may be controlled by proper management of housekeeping
	Depreciation of environmental aesthetic	×						Landscape will enhance

5.4 Environmental Impacts Identification and Mitigation Measures

Chapter 3 (Project description) identified the major activities associated with project phases. Each phase of the project has the potential to impact on the physical, biological and socioeconomic environments of the project areas. This chapter assesses the potential impacts that may arise from various project activities and identifies suitable measures to mitigate or avoid the potential adverse impacts identified and, where possible, to enhance potential beneficial impacts. KR Logistics Ltd project is a Composite textile manufacturing factory where they use diesel fuel & Gas is to produce final output. In the process it liberates heat and combustion product such as gas and diesel like NOx, SOx, CO2, CO, SPM and PM10 and PM2.5 etc to surrounding atmosphere.

During operational activities it may have impact on the locality. The study was to identify these adverse impacts, and suggest mitigation measures to reduce these if not eliminated. Accordingly, an environmental baseline survey was conducted in the project areas to identify the environmental parameters likely to be affected by the project implementation. All the major environmental parameters covering ecological, physic-chemical and human interest related aspects were considered in identifying the affected areas at different stages of the project cycle. Summary Matrix of Predicted Impacts and Mitigation Measures are shown in Table 6.2.

Anticipated environmental impacts due to project location, construction and operation of the existing Pharmaceutical Manufacturing unit has been identified. It can be seen from the checklist that the major environmental components that will be adversely affected by the project activities are air quality, water quality and noise pollution**.**
Socioeconomic environment is considered to be affected positively of the project activities that had created job opportunities for the local people and the area has developed and commercial activities has increased in the locality. All these impacts have contributed to improve the quality of life of the local community. Mitigation measures of the adversely affected parameters are discussed in the subsequent sections.

Table 5.4.A: Summary Matrix of Predicted Impacts and Mitigation Measures during construction and operation

Sl. No.	**Components**	**Potential Impacts**	**Potential Source Of Impact**	**Controls through EMP & Design**	**Impact Evaluation**	**Remedial Measures**
01	Groundwater Quality	Ground water Contamination	Sewage disposal on land	Effluent sludge to be sent For Suitable disposal	Negative impact on ground water quality envisaged. Not significant	In an unlikely event of soil and groundwater contamination remediation measures shall be implemented.
02	Groundwater Quality	Ground Water Depletion	Water during the operation phase will be met partly from underground source and partly from recycled water.	Rain & Storm water collection and Holding it in the area. SMRCTL already have the plan of Rain water Harvesting.	Significant impact on ground water quantity because withdrawal of entire water from the aquifer.	KRLL will reuse the water for different purpose of the project. KRLL Environmental Personnel will trained up the workers about reuse of water
03	Surface Water Quality	Surface water Contamination	If Discharge wastewater to surface water body.	Wastewater treatment scheme developed to treat the waste water so that it can be disposed to environment after proper treatment.	Significant impact on water quality because the facility have dyeing & washing activities.	Used ETP and In case of any event of Discharge of water from the site, the applicable water quality standards will be Maintained as per ECR 2023.

04	Air Quality	Dust Emissions like SPM, PM_{10}, SOx, NOx, CO_2, CO.	Vehicular movement within the SMRCTL, Generator , Chemical handling and operation	Fuel efficient vehicles will be used and proper record of Vehicles will be maintained. Environmental parameter testing will be done periodically and measures will be taken in case of any adverse effect.	Long term significant negative Impact.	Maintain record of vehicles Exhausts from vehicles will be minimized by use of fuel-efficient vehicles. Air filter will be used in generators, masks will be provided to workers.
05	Noise Environment	Noise pollution	Noise from vehicles movement, generator, Boiler, Compressor etc.	Generator, Boiler, Compressor will be made sound proof.	Significant as nearest receptor would be at a distance of 20 m from the noisy area.	Ear plugs and Ear muff will be provided to the workers directly affected from the noise source.
06	Land Environment	Soil contamination	Dumping of liquid sludge, effluent, domestic waste on land.	Used a functional waste Management system for waste collection, segregation and Disposal.	Since waste is handled on the site, waste dumping would not be allowed. Not Significant.	The waste should be segregated and disposed as per the solid waste management procedure.
07	Socio-Economic Environment	No displacement	Site operation	Employees will be provided direct employment opportunities. In addition employment opportunities will be provided for persons engaged in operation and maintenance and allied activities.	Beneficial Impact	-
08	Odor Hazards	Odor Pollution	Odor may be generated in the work place due to poor house keeping	Odor may be controlled by proper management of housekeeping	No significant negative Impact.	Maintain good housekeeping Practices

5.5 Evaluation of Predicted Adverse Impacts & Mitigation Measures

Environmental impacts are identified and predicted for both positive and negative impacts in terms of ecological, physio-chemical and socioeconomic parameters. Evaluation of impacts and possible mitigation measures are described in this section mentioning the sources and characteristics of impacts. Status of residual impacts is also discussed.

5.5.1 Impact due to Project Location

It was earlier mentioned that KR Logistics LtdChittagong, Bangladesh is located in their own land which was empty land previously. The site was fully vacant and then developed as required, no abundant structures has been demolished due to construction of the project. If the existing environmental situation is considered as baseline condition, there would be no significant adverse impacts due to project location.

5.5.2 Potential Impacts during Construction phase

A) Impacts on physical Environment

5.5.2.1 Air pollution Impact: Air quality is being affected due to emission of flue gases from the generator during construction. The existing project is using diesel generator. Diesel and gas burning from the operation of generator and boiler is affecting the air quality. The situation becomes aggravated when gas, chemicals, contains high percentage of impurities like sulfur, hydrocarbon, nitrogen etc.

Mitigation Measures:

- Project site is surrounded by boundary wall
- Access roads and exposed ground should be regularly wetted in a manner that effectively keeps down the dust.
- Stockpiles of fine materials should be wetted or covered with tarpaulin during windy conditions.
- Workers in the site should be issued with dust masks during Dry and windy conditions
- Use the catalytic converter for fuel burning machineries
- Vehicles and other machinery clear off mud before leaving the site
- Materials covered by tarpaulin while carrying in truck or used covered van.

5.5.2.2 Noise and vibration: Significant level of noise and vibration is being generated from the Generator, construction activities, and Different vehicle.

Mitigation Measures:

- Constructing activities that will generate disturbing sounds should be restricted to normal working hours.
- If required local residents should be given notice of intended noisy activities so as to reduce the degree of annoyances.
- Worker should use ear plug while working with noisy area.

5.5.2.3 Solid and Liquid waste generation: In construction time have some solid wastes some are hazardous and some are non-hazardous.

Mitigation Measures:

- Provided space for temporary disposal of solid waste on the site and dispose the wastes properly
- Used 3R Method for solid waste management
- Arrange adequate sanitary facilities for worker
- Monitor/follow up to ensure appropriate waste disposal and sanitation practice by contractor and construction workers.

B) Impact Mitigation on Biological Environment

The site is allocated for setting up industry so minimal impact anticipated on biodiversity.

Mitigation Measures:

- Avoid unnecessary cutting of trees
- Allocate space for greenbelt development
- Avoid noisy activities and keep limited illumination during right time

C) Impact Mitigation on socio-economic Environment

5.5.2.4 Employment

The project will generate employment, business opportunities in the form of labor, technical hand and materials suppliers etc. There is opportunity for temporary employment for the local people at construction works.

Mitigation Measures: N/A

5.5.2.5 Accident/exposure to health hazard

Accidental event may occur in construction phase.

Mitigation Measures:

- Create awareness on safety issue among workers and contractors.
- Monitor the practice of following safety guidelines by worker and contractor.
- Ensure use of appropriate PPE while working in the construction site.

5.5.3 Potential Impact during operational activities

5.5.3.1 Air pollution

Source of Impacts

Ambient air quality is being affected due to emission of flue gases from the generator. The existing project is using diesel generator. Diesel and gas burning from the operation of generator is affecting the air quality. The situation becomes aggravated when gas, chemicals, contains high percentage of impurities like sulfur, hydrocarbon, nitrogen etc. The high temperature of flue gas also produces impacts on the air quality in terms of thermal pollution. The combustion of diesel for power generation inevitably results in emission of gaseous pollutants to the atmosphere.

Gaseous pollutants to the atmosphere

The major pollutants of potential concern are sulfur dioxide (SO2), oxides of nitrogen (NOx), carbon monoxide (CO), Carbon dioxide (CO2) emissions cause greenhouse effect giving rise to global temperature.

Mitigation Measures

Use of clean fuel for generator can reduce the pollutant concentration in air emission. Proper and regular maintenance of generator should be done.

Residual Impacts

Residual impacts of air pollution can be reduced to a minimum level provided the suggested mitigation measures are undertaken and properly implemented.

5.5.3.2 Noise pollution

Significant level of noise and vibration is being generated from the Generator. "Noise and vibration" is an unwanted sound of an unacceptable intensity at a wrong time and wrong place. These pollutions are considered as one of the major dimensions that lead to the environmental degradation. These create psychological and physical effects on human health. It is difficult to assess and quantify the environmental degradation or discomfort caused by these nuisances. However, it includes auditory fatigue and reduces hearing capacity of the people working in the plant and living in the adjacent area. Noise levels depend on two major parameters – sound pressure and sound intensity. The following components of the existing unit are generating noise of various levels:

1. Generator
2. Boiler
3. Compressor
4. Some Warehouse Area.

Mitigation Measures

The noise level at the project should be reduced by putting baffle type silencers in exhaust duct to arrest noise due to flow of exhaust gases. The noise due to running of the machine will be arrested by acoustic enclosures. The generator & boiler rooms should be made sound proof by using canopy shield. Moreover, the operators of the generator & other production machineries should be provided with ear plugs & the use of the plugs should be ensured by managerial implementation.

It should be ensured that all generating equipment is noise suppressed. Tall trees are to be planted at the property line for noise attenuation particularly during operation stage. Plant foundation shall be designed to minimize vibration effect.

Residual Impacts

Residual impacts of noise pollution and vibration can be reduced to a minimum level provided the suggested mitigation measures are undertaken and properly implemented.

5.5.3.3 Water pollution

Water is a vital element for our daily activities. That is why water quality is a principal environmental concern and therefore, understanding the consumption, source and characteristics of the wastewater and selection of adequate treatment options are crucial from the management viewpoint. The main source of water pollution of KR Logistics Ltd is production unit , Domestic and sewerage water.

Mitigation Measures

Most of the measures that is required to minimize impacts of wastewater includes the following-

- Installed ETP to treat waste water (Proposed)
- Limiting overall water consumption
- Effective treatment of sewage wastewater streams by proper management.
- Regular monitoring of surface water quality.
- Installation of rainwater harvesting system at least of the office buildings.
- Reuse of process water if found viable.
- Adopt zero discharge schemes if found feasible.

5.5.3.4 Impact due to Solid Waste Generation

Significant amount of solid waste are generated from factory, which included empty Chemical drums/containers, Chemicals Dram, Sludge, kitchen/canteen wastes etc. If this solid waste is not managed properly it can impose great danger to the environment & community, which are:

Poorly disposed waste, waste paper & especially plastic waste can block drainage;

Empty chemical drums & containers if not disposed properly can pollute solid & water of the receiving environment;

Odor emanating from degradable waste especially kitchen waste can pollute local ambient air;

Poorly managed and disposed kitchen waste can attract dieses vectors;

Decomposing kitchen waste can pollute local ambient condition;

Poorly managed electrical, mechanical and chemical wastes can pollute soil, water and air.

Mitigation Measures

Solid waste needs proper handling, transportation and disposal. Disposal of solid wastes should be of the sanitary land filling type among others, which does not pose hazards to ground water pollution in any case. Container containing chemical and other chemicals of possible harmful nature may be sold to DoE approved vendors or after proper washing should be disposed of in an environment friendly manner.

The following mitigation options are generally recommended for solid waste management:

Solid waste to be handled, managed and disposed according to the waste management regulations;

- Waste handling bin to be provided, each bin should have a lid which should always be covered;
- Color code to be used to distinguished Waste bins of different waste;
- Waste to be sorted at source;
- All scrap metal and wood to put in a designated handling area which should be away from active areas, the area should also be marked and labeled appropriately and preferably have some form of enclosure;
- Paving of unpaved areas, regular sprinkling of water on dusty areas and regular sweeping of fine particles from paved areas can address the issue of dust and fine particles emanating from paved and unpaved areas within the facility;

- Daily disposal of food based waste before decomposition and production of odor;
- Plastic waste should be collected and handled separately in closed waste receptacles;
- Prompt maintenance of sewer line, appropriate location of soakage pits away from boreholes will avoid contamination of ground water resources;
- There should be no scattering of waste during transportation disposal to disposal site.

Existing management Practices

KR Logistics LTD will have sufficient numbers of cleaners who regularly cleans and collects solid wastes generated in the complex. Sufficient numbers of dustbins has been put in the place. In case of harmful waste the amount is very negligible and collected and stored in store room. The items having resale value is generally sold out to DoE approved small vendors.

5.5.3.5 Impacts on Health and Safety, Natural & Accidental Incidents

There might be hazards to plant workers, Operators, employee and technical personnel from working at the Floor level, utility sections, and store rooms. Provision need to be made by the project for protecting Occupational health, including protection of worker from hazards, fires etc. as well as protection of worker health and assurance of safe drinking water supply and sanitation.

In the finishing generally involves handling of a diverse variety of chemicals, many of which are flammable, toxic and corrosive in nature. The risk probability in Composite textile units can be broadly categorized as:

- Chemical risks
- Process risks
- Fire and explosion risks
- Electrical-associated risks, and
- Occupational risks

Mitigation Measures

Chemical Storage and Management

In case of chemical storage, proper segregation scheme should be strictly followed.

Designated storage area with spill collection system.

- Layout of the plant is important from environment and safety point of view, location of chemical storage sections should be proper & in line with the emergency management planned.
- Hazardous chemicals (such as potential to cause cancer) should be stored in closed loop.
- The qualification and addition of chemical should be computerized.
- There should be restricted entry into the chemical storage area; proper signage for restricted entry should be put in place.
- Operator involved in handling of chemical should be trained.
- Road should be wide enough to support free movement of vehicles.
- Container should have good values with tight stopping devices to avoid spilling or dripping of hazardous chemicals.
- Storage containers should have legible signs indicating the contents of the container, health hazard warning (where necessary), and spill clean-up procedures in case
- Secondary containment should be properly provided.

Occupational Health and Safety

- The layout of the project should be such that the high-risk zone (such as production, storage of chemicals/products, incinerators etc.) are separated from the low-risk zones (such as administration, laboratories, canteen etc.). Green belt development shall be at the periphery and not within the plant area- the plant area should have an open lawn.
- Road inside the plan area should be broad and spacious so that fire bridges can operate smoothly. All high risk zones must be easily accessible.
- Hazard and risk-prone area should be identified and characterized by conducting risk assessment.

- On-site and off-site risk disaster management plans, based on impact magnitude and its severity, need to be prepared.
- Pre job risk assessment must be done for new and hazardous work. This should be also followed by work permits specifying risks, management option and persons responsible to take corrective actions.
- Personal protective equipment (hand gloves, safety goggles, nose masks and helmets) to be provided to all the employees working in the plant.
- Training for employees to educate them about the hazardous nature of chemicals used in the process.
- Supervision of high risk jobs should be ensured.
- There should be provision for delegation of supervision to ensure more safety.
- Workers can be rotated within jobs so that they not face continuous noise exposure for a long period of time.
- Trained medical personnel and first aid facilities as well as safety equipment such as fire extinguisher and fire alarms to be made available at place of work.
- Medical examinations to be conducted for the workers from time to time. If significant occupational health problems are observed, the management should take appropriate measures.
- Identification and implementation of management procedures including process safety, training, management of change, incident investigation, employee participation, contractor training and oversight.
- Developing and implementing an emergency response procedures, emergency equipment, training, review and updates.

5.5.4 Impact on Indigenous People

No indigenous or tribal people were observed in the project area and therefore World Bank OP 4.10 will not be triggered.

5.5.5 Impact Due to Land Acquisition

KR Logistics LTD has constructed their buildings on their own land. No Land acquisition is required .Therefore World Bank OP-4.12 will not be triggered .So there should be no impact on the baseline condition.

5.5.6 Ecological Impact

Based on assessment of the baseline environment at different project locations (during field visits) and the nature and scale of the proposed project, it appears that ecological impacts are not likely to be significant.

5.5.7 Impacts due to Labor Influx

For projects required labor force and associated goods and services cannot be fully supplied locally for a number of reasons, among them worker unavailability and lack of technical skills and capacity. In such cases, the labor force (total or partial) needs to be brought in from outside the project area. In many cases, this influx is compounded by an influx of other people ("followers") who follow the incoming workforce with the aim of selling them goods and services, or in pursuit of job or business opportunities. The rapid migration to and settlement of workers and followers in the project area is called labor influx, and under certain conditions, it can affect project areas negatively in terms of public infrastructure, utilities, housing, sustainable resource management and social dynamics.

Potential Impacts of Labor Influx:

- Adverse social and environmental impacts on local communities;
- Increased demand and competition for local social and health services;
- Increased volume of traffic and higher risk of accidents;
- Increased demands on the ecosystem and natural resources;
- Increased risk of spread of communicable diseases;
- Increased rates of illicit behavior and crimes;
- Sexual hazards caused by migrated workers.

Mitigation Measures:

- Arrangement of labor camps as much as possible that the migrated workers have less impacts in the locality.
- Ensure better living standard of the migrated workers.
- Arrangement of training for migrated regarding impacts of labor influx.
- Recruit as much as possible from local community.
- Strong agreement arrangements with conductors and suppliers that they can manage their workers in such a way that they will not cause any hampers for local people.

5.5.8 Positive impact of the proposed project

Interview with the management and the workers reveals the results of the survey with regard to the impact of the existing project. Almost all the respondents provided positive answers regarding the operation of the project. These people showed their response by stating that they are ready to cooperate with KR Logistic Ltd for continuation of the project. Overall impact of the project is positive. It has created a lot of job opportunities for the surrounding people especially for the women. The life standard of these employees has increased because of the project operation. Positive impact has been resulted from implementation of the project which includes :-

- Creation of jobs;
- Support of local business;
- Flourish the local economic activities;
- Infrastructure development;
- Revenue of Local Municipal Council; and
- Gains to the economy.

CHAPTER- 06
MITIGATION MEASURES

6.1 General Consideration

The Environmental and Social Management Plan (ESMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures, identified in study are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of ESMP of studied industrial projects would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators
- Costing for ESMP implementation

6.2 Environmental and Social Impact Management Action Plan

Environmental Impact Management Action Plan is also called impact mitigation plan covers all environmental aspects which is the key to ensure that the environmental qualities of the area may not deteriorate due to the operation of the project. Implementation of the mitigation plan is the most important task of ESMP.

The main benefits of the impacts mitigation plan are:

- Ensuring that environmental standards are met at operational phases of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.
- Complying with existing regulations with implementation of least cost basis mitigation measures

An implementation task list is formed and the important mitigation measures are included there with time frame, assigning responsibility and approximate cost in Table 6.1 and Table 6.2 for construction and operation period accordingly. Here implementation responsibility belongs to project proponent but the project proponent may assign a representative on behalf.

Table 6.2.A: Checklist of Significant Environment Impacts

Project Phase	Action affecting environmental resources and values	Significant Environmental Impacts without mitigation measures				Type		Comments/Observations
		None	Minor	Medium	Major	Adverse	Beneficia	
Project Construction Phase	Land value depreciation	×						No significant land value depreciation anticipated
	Loss of land displacement from home stated land	×						No loss or displacement from homesteads land; no impact
	Loss of land displacement from agricultural land	×						No significant loss of land displacement from agriculture land impact
	Damage to nearby operation	×						No impact anticipated
	Disruption to drainage pattern		×					No impact anticipated
	Change in landscape		×			×		Invariably will occur
	Encroachment into precious ecological resources	×						No precious ecological resources; no impact

		Loss of habitant	×						**No impact**
	Impact on Biodiversity	**Threat to endangered species**	×						**No impact**
		Interruption to environmentally protected area	×						No impact
		Encroachment into precious ecological resources	×						**No precious ecological resources; no impact**
Project Construction Phase		**Blockage to wildlife passage**	×						**No wildlife in the area; no impact**
	Impact on human and social interest	**Increase in sanitation related diseases**	×						**No impact**
		Change in profession	×						**No impact**
		Damage of historical and cultural sites	×						**No impact**
		Disruption to navigation	×						**No impact**
Operational Stage	**Pollution from liquid discharge**			×			×		**No process liquid waste will be generated other than some sanitary waste water; Minor impact**
	Pollution from solid waste			×			×		**Solid waste should be disposed very carefully; Minor impact**
	Occupational health hazard			×			×		**Minor impact**
	Traffic Congestion			×			×		**There is sufficient space for**

								moving or parking vehicle so Minor impact
	Noise hazard			×			×	No heavy noise generation is expected at the boundary level so Minor Impact

Operational Stage	Air pollution		×						No impact
	Damage to nearby operation		×						No impact
	Disruption to drainage pattern		×						No impact
	Impact on Bio diversity	Loss of habitant	×						No impact
		Threat to endangered species	×						No impact
	Impact on human and social interest	Worker accident	×						No impact
		Change in profession		×				×	Minor impact
		EIA loyment				×		×	Major EIA loyment opportunity
		Socio economic value				×		×	Major impact

Table 6.2.B: Environmental Management Action plan for Construction Phases

Impacts	Mitigation measures	Time frame	Location	Responsibility
Air pollution	Surrounded project site by boundary wall Access roads and exposed ground should be regularly wetted in a manner that effectively keeps down the dust Stockpiles of fine materials should be wetted or covered with tarpaulin during windy conditions Use of catalytic converter for fuel burning machineries Vehicle and other machinery clear off mud before leaving the site Materials covered by tarpaulin while carrying in truck or used covered van	Throughout construction phase	Project site	Representative of project proponent
Noise and Vibration	Construction activities that will generate disturbing sounds should be restricted to normal working hours If required local residents should be given noticed of indeed noise activities so as to reduce the degree of annoyances Worker use ear plug while working with noisy device.	Throughout construction phase	Project site	Representative of project proponent
Impact on Ground Water	Ensure minimum extraction of ground water Wastage of water should be avoided through monitoring Develop rain water harvesting system Reuse of water Harvested Rainwater	Throughout construction phase	Project site	Representative of project proponent
Solid and Liquid waste generation	Provide space for temporary disposal of solid waste in the site and dispose the waste properly. Arrange adequate sanitation facility for workers Follow up to ensure appropriate waste disposal and sanitation practice by contractor and construction workers.	Throughout construction phase	Project site	Representative of project proponent

Impact on Biodiversity	□ Avoid Unnecessary cutting of Trees □ Allocate space for Green belt Development □ Avoid noisy activities and keep limited light level during night time	Throughout construction phase	Project site	Representative of project proponent

Impact on Traffic Volume	□ Control Vehicle movement in organized way and follow local traffic instruction	Throughout construction phase	Material Transport route	Driver
Fire/ Explosion	□ Establish own firefighting system and maintain collaboration with government firefighting and civil defense department locally □ Organize fire drill and training for construction staffs.	Throughout construction phase	Project site	Representative of project proponent
employment Generation	□ N/A	Throughout construction phase	Project site	Representative of project proponent
Occupational Health and safety Risk	□ Create awareness on safety issue among workers and contractors □ Monitoring the practice of following safety guidelines by workers and contractor □ Ensure use of appropriate PPE while working in the construction site and display proper safety sign in the project site □ Electrical Equipment/ wires should be properly maintained during construction	Throughout construction phase	Project site	Representative of project proponent

Table 6.2.C: Environmental Management Action plan for Operational Phases

Impacts	Mitigation measures	Time frame	Location	Responsibility
Water pollution	Septic tank and soak pit for sewage discharge. Maintain cleanliness of Industry floor and yard Proper maintenance and continuation of Mixed Effluent Treatment Plant. Waste water is treated before discharged to Nature	Throughout operation phase	Project site	Representative of project proponent
Sludge Management	Sludge will be managed as per DoE Sludge Management Guidelines and detailed action to be taken after operating the Mixed Waste Water Treatment System. Some parameter of the sludge will be test after project operation	Throughout operation phase	Project site	Representative of project proponent
Generation of Solid waste	Apply 3R method for waste management of the project. Trained employees on waste control and disposal procedures. Segregates wastes at source and store in demarcated place. Use separate demarcated bin for kitchen and office waste and develop waste disposal system. Scrap metal, packing materials, plastic, can etc. sale to scrap dealer Spent lube sell to DoE approved vendor only.	Throughout operation phase	Project site	Representative of project proponent
Noise and Vibration	Air plug will be provided to worker while near to noise generating equipment or working in noise area. Arrangement for separate generator and compressor room with canopy wall or install canopy shield for generators. Procure and use low noise generating machineries. Regulation of vehicle movement Conduct periodic maintenance of equipment, replace warn out parts lubricate rotating parts. Install stock absorber, damper/isolator (where necessary).	Throughout operation phase	Project site	Representative of project proponent

Air Pollution	□ Provide adequate ventilation and exhaust fan in the workplace. □ Spry water on bare soil. □ Maintain open-air exhaust for generator and set catalytic converter and faulty engine would be repair as soon as possible. □ Regulate movement/speed of vehicle. □ Plant tree with dense canopy on boundary line □ Use low VOC chemicals (If Required)	Throughout operation phase	Project site	Representative of project proponent
Impact on Soil or Land	□ Trained employee on spillage control □ Maintain cleanliness of the yard and store solid waste in waste bin. □ Green belt Development for enhancing natural aesthetic of the site	Throughout operation phase	Project site	Representative of project proponent
Impact on Traffic Volume	□ Control vehicle movement in organized way and follow local traffic instruction	Throughout operation phase	Project site	Representative of project proponent
Fire/ Explosion	□ Establish own firefighting system and maintain collaboration with government firefighting and civil defense department locally □ Organize fire drill and training for construction staffs.	Throughout operation phase	Project site	Representative of project proponent
Occupational Health and safety Risk	□Use of Personal Protective equipment such as Hard helmet, Musk, Boot, Eye glass etc. □Will formulate health safety measures and ensure use of safety devices □ Aware and train employees on using safety devices	Throughout operation phase	Project site	Representative of project proponent

Table 6.2.D: Environmental Monitoring Plan (EIA) during Project Construction

	Activity	What parameter Is to be monitored?	Where is the parameter to be	Frequency of monitoring as suggested in the EIA	Responsibility
1	Noise Pollution and Vibration	Sound pressure and sound intensity	Different Construction area and Inside the project	- Sound level is monitored by a Sound level meter in different noisy area. - During Construction area where the noise is exceed the standard use PPE for worker safety.	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES) and Environmental Personnel of KRLL
2	Ambient air quality	SPM, PM10 SO_2, NOx, CO		-Ambient air quality to be monitored by Respire able Dust Sampler with attachment - During Construction where the area is exceeding the standard of air quality, use PPE for worker safety, especially musk.	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES), Environmental Personnel of KRLL
3	Drinking water quality	pH, Color, Ammonia-Nitrate, Phosphate, Arsenic, Fecal Coliform, Manganese, TDS, Total Hardness Iron, Chloride Turbidity, etc.	Drinking water	- Checking water for acceptable levels of parameters according to DoE and World Bank Standard from - Drinking water should test from DoE	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES) & Environmental Personnel of KRLL

4	Surface Water Quality	pH, Color, Turbidity, Cl, DO, BOD5 COD, TDS, TSS, EC, Ammonia-Nitrogen (NH3-N) etc.	Surface Water	Few Surface water Parameter to be monitor from DOE environmental laboratory.	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES) & Environmental Personnel of KRLL
5	Solid Waste	All the wastage during construction	Inside the project area	- Training the workers on how to control and minimize the waste -Segregates wastes at source and store in demarcated place. - Solid waste to be handled, managed and disposed according to the waste	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES) , Environmental Personnel of KRLL
6	Occupational Health and safety Risk	During construction	Inside the project area	- Ensuring every worker wearing safety Equipment such as hard helmet, Musk, Boot, Eyeglass, apron etc. -All the fire extinguisher kept up to date and refill as per schedule.	Implementing: **KR Logistics LTD** Supervising/Monitoring: Project Environment Consultant- JAMS Engineering Solutions. (JES), Environmental Personnel of KRLL
7	Social Impact monitoring on Labor Influx	During construction	Outside the project area	Monitoring of labor condition -Recruit local labor as much as possible instead of influx labor. - Monitoring of health and safety issue -Monitoring of different trainings for worker	Implementing: **KR Logistics LTD**

Table 6.2.E: Probable major environmental impacts mitigation/enhancement measures

Project Phase	Project Activity	Affected Environmental Component	Mitigation/benefit enhancement measures
Operational Phase	Regular operation of the Project	Natural and accidental hazard	Proper structural design of infrastructures Develop emergency response and disaster management plan Provision of sufficient first aid facilities Effective fire fighting systems
		Solid Waste	Provision of sufficient waste handling bins Provide waste bins for waste collection Ensure that medical waste is incinerated properly Ensure timely collection and disposal of solid waste Hire a licensed waste collection firm
		Air quality	Put in place barriers to prevent dust reaching the neighbourhood Effective control of vehicular traffic Burning best quality fuel
		Traffic congestion	Sufficient parking facility should be provided Proper marking on the project site area also arrange proper signalling facilities
		Occupational health and safety	Provide appropriate PPE for the workers Provide appropriate training to the workers

			Put in place educative posters
		Noise	Proper management of vehicular traffic Noise shielding by barriers or walls Strict use of PPE inside noise areas ensuring that there is adequate sound proofing walls
		Liquid waste	Provision of sufficient liquid waste treated facility Regularly monitor settling tank around 500 square feet and septic tank Monitor drainage situation especially in wet season Ensure proper sanitation facilities Increase awareness and training & Appoint efficient staff .

CHAPTER- 7
RISK MANAGEMENT AND DISASTER MANAGEMENT

7.0 General Consideration

This study has been carried out to identify the potential hazard and risks associated with the different phases of the project, possible measures to avoid these hazards and hence provide with the safety plan for minimizing the risk. A cause and consequence analysis has been carried out to identify the root cause of such hazards and potential consequences.

7.1 Hazard categorization and potential hazard points

The potential hazards associated with the construction and functioning of the **KR Logistics LTD** has been screened and categorized based on some preliminary assessments. The potential hazard points are listed in Tables 7.1 below.

Table 1.1: Potential hazard points possessed in proposed project

Hazard Category	Hazards Points
Mechanical	Machineries which will be used during construction work
Electrical	Electrical works which will be done during construction work
Fire and Explosion	Gas pipe line, Production process during operation

7.2 Consequence analysis

The potential hazards, root causes and the consequences were identified through hazard assessment. Moreover, specific safety measures were identified for each of the identified hazards. Given the scope of this study, the findings of the hazard assessment with suggested safety plans are presented in Table 7.2 below.

Table 7.2.A: Hazard assessment for the proposed project

Hazard point	*Use*	*Potential Hazard*	*Root Causes*	*Consequence*	*Suggested Safety measures*
Machinery and equipment	Site clearance activities	Accident	Unconsciousness, Mechanical failure.	Health injury, life loss	Regular inspection and maintenance
Construction					
High Heights	Construction of building, steel structure and its foundation, painting works, drilling work, etc.	Fall during works	Unconsciousness, Equipment failure.	Health injury, life loss	Fall protection, awareness
Motor vehicle	Transportation	Noise, accident	Noise from engine running, tire friction, hydraulic Horn, unconsciousness.		Traffic safety measures, regular checking, servicing and maintenance of vehicle, awareness
Cutting and welding	For construction Purpose	Burning, electrocution	Electric failure, lack of training, exposure to workers and Passerby.	Eye injury, health injury	Proper training, PPE, awareness, warning signal for passerby and adoption of welding standard Practice.
Operation Stage					
Gas pipe line	Transports the gas efficiently over long distance	Fire hazard	Improper connection, lack Of awareness.	Health injury, loss of life, loss of Environmental quality &	Regular inspection. Installation of fire defense In addition, fighting systems.

				damage of equipment	
Generator		Noise pollution	Generator not covered by canopy		Regular inspection, continuous Monitoring.
Production process	Use many chemical in the production process	Chemical hazard	Chemical spilled and misuse, accidental release	Health injury, Loss of life, degradation of air, water and soil quality	Chemical use safety, Limited entry, use of PPE, safety shower, eye wash and first aid facilities

7.3 Hazard and Risk Management Plan

Hazard and Risk Management Plans are developed to address a range of probable hazard scenarios, emphasizing the tasks required to respond to a physical event. These plans have been developed listing various actions to be performed in a very short period in a predetermined sequence if it is to deal effectively and efficiently, in respect of major and minor accidents. The primary objective of the plan is to keep the workplace safe and to achieve zero incidents for health hazard, and to minimize the potentiality of material, machinery/ equipment damage, impacts on the environment to minimum.

The plan should include the following:

Sl. No	Plan Details	Description
1.	Fire safety plan	A management commitment to fire safety is essential to assist with archiving suitable fire safety standards in premises and in the maintenance of a stuff culture of fire safety. This chapter covers management standards that should be achieved within all premises in respect of: □ Fire safety Policy □ Emergency fire action plan □ Fire safety information & training □ Fire drill □ Maintenance of fire safety measures □ Recording information and keeping records
2.	Electrical safety plan	An Electrical Safety Plan is a comprehensive document that outlines procedures and precautions to minimize electrical hazards and ensure a safe working environment. Key Component and Best Practices for Electrical Safety Plan Involve . 1.Sigle Line Diagram (SLD) and Load distribution analysis. 2. Thermographic Inspection of Cable, MCB and other Devices. 3.Periodic check of Electronic and Electrical Devices. 4. Risk Matrix Analysis Based on thermographic report. 5. Corrective action plan. 6. Periodic checking 7.Trainning
3.	Medical emergency plan	A Production Emergency Response Plan is a crucial strategy to effectively manage and mitigate the impact of medical incidents. It outlines procedures, responsibilities, and

		resources to ensure the safety of individuals and the efficient delivery of care during emergencies. Key Components of a Medical Emergency Response Plan involve 1. Assessment 2. Emergency Contact 3. First Aid and Care 4. Communication 5. Documentation 6. Resource Management 7. Training and Preparedness
4.	Hazardous material management plan	A Hazardous Materials Management Plan (HMMP) outlines how a facility will safely handle, store, use, and dispose of hazardous materials. It's a comprehensive document that details procedures to minimize risks to personnel and the environment, and ensures compliance with relevant regulations Key Components of a Hazardous material management Plan involve 1. Hazard Identification and Risk Assessment 2. Regulatory Compliance 3. Inventory Management. 4. Storage and Handling Procedures. 5. Training and Education 6. Ensure PPE.
5.	Emergency Response and Disaster Management Plan	1.Promote inter-departmental Communication to ensure "Company wide" Co-ordinate emergency response. 2. Minimize the effects that disruptive events can have on company operations by reducing recovery time

		and costs. 3. 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

7.4 Emergency Response and Disaster Management Plan

Environmental emergencies are incidents or events that threaten public safety, health, and welfare and include hurricanes, floods, wildfires, industrial plant explosions, chemical spills, acts of terrorism, and others. While these events range in size, location, cause and effect, most have an environmental component. Emergency response is the organizing, coordinating, and directing of available resources in order to respond to the event and bring the emergency under control. The goal of this coordinated response is to protect public health by minimizing the impact of the event on the community and the environment. Purpose of 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.
- Notify the next-to-kin of accident victims.
- Promote inter-departmental Communication to ensure a "Companywide" Co-ordinate emergency response.
- Minimize the effects that disruptive events can have on company operations by reducing recovery time and costs.

- Respond to immediate requirements to safeguard the subtending environment and community.

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

1. People
2. Property
3. Environment

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

I. Emergency

- Fire
- Explosion
- Medical Emergency

II. Natural Disasters

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

III. External Factors

- Food poisoning/water
- Sabotage, and War.

7.5 Six Steps in emergency response

Step 1:

a) Determine the potential hazards associated with the incident, substance or circumstances and take appropriate action to 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 this 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 and remedies.
Step 4:
Initiate redress procedures.
Step 5:
Report the incidence its nature cause impact applied redress procedures and any further assistance required etc. to the appropriate company, government and/or landowner.
Step 6:

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

7.6 Emergency procedures in case of fire

1. Sound the alarm by activating the nearest fire alarm pull station and call the Fire Department from a safe location. You can also call the Fire Department, and other key personnel.

2. Alert your neighbors only if you can do so without delaying your exit.

3. Leave the building immediately, close doors behind you as you exit the building and proceed to the designated emergency evacuation meeting location.

4. If you have information on how the fire started or how the alarm was activated, report it to the Fire Department.

Do not try to put out the fire. Use your common sense. Your safety is more important than property.

7.6.1 Fire Extinguishment and Confinement

Fire Extinguishment is the responsibility of the fire department. Only after ensuring that the fire alarm has been activated and the fire department are notified, should an attempt be made to extinguish a small fire.

If a small fire cannot be extinguished with the use of a portable extinguisher or a fixed extinguishing system, or the smoke presents a hazard to the operator, then

leave the fire area, ensure the fire department has been notified and wait in a safe area for the fire department.

Attempting to extinguishers a fire is a voluntary act. Only person who are properly trained and feel confident in the use of a portable extinguisher should contemp late their use. Improper use of a portable extinguisher can lead to severe injury or death.

7.6.2 Portable extinguisher Instructions

A fire extinguisher, or extinguisher, is an active fire protection device used to extinguish or control small fires, often in emergency situations. It is not intended for use on an out-of-control fire, such as one which has reached the ceiling, endangers the user (i.e., no escape route, smoke, explosion hazard, etc.), or otherwise requires the expertise of a fire department. Typically, a fire extinguisher consists of a hand-held cylindrical pressure vessel containing an agent, which can be discharged to extinguish a fire.

Figure 8.1: Different parts of portable extinguisher

7.7. Types of Fire
There are 5 types of fire such as:

	Class A: Class A fires are fires in ordinary combustibles such as wood, paper, cloth, trash, and plastics.
	Class B: Class B fires are fires in flammable liquids such as gasoline, petroleum oil and paint. Class B fires also include flammable gases such as propane and butane. Class B fires do not include fires involving cooking oils and grease.
	Class C: Class C fires are fires involving energized electrical equipment such as motors, transformers, and appliances. Remove the power and the Class C fire becomes one of the other classes of fire.
	Class D: Class D fires are fires in combustible metals such as potassium, sodium, aluminum, and magnesium.
	Class K: Class K fires are fires in cooking oils and greases such as animals fats and vegetable fats.

7.8 Fire Safety Risk Assessment

A fire risk assessment is an organized and methodical look at your premises, the activities carried out there and the likelihood that a fire could start and cause harm to those in and around the premises.

The aims of the fire risk assessment are:

- To identify the fire hazards.
- To reduce the risk of those hazards causing harm.
- To decide physical fire precautions and management arrangements are necessary to ensure the safety of people in your building if a fire does start.

The 5 Steps Guide to Fire Safety Risk Assessment

1. Identify the fire risks
- Sources of ignition

- Sources of fuel
- Sources of oxygen

2. Identify people at risk
3. Evaluate, remove, reduce and protect from risk
4. Record, plan, inform, instruct and train
    - Record significant findings and action to be done
5. Review
    - Keep assessment under review
    - Review where necessary

7.9 Managing Fire Safety

A management commitment to fire safety is essential to assist with archiving suitable fire safety standards in premises and in the maintenance of a stuff culture of fire safety. This chapter covers management standards that should be achieved within all premises in respect of:

- Fire safety Policy
- Emergency fire action plan
- Fire safety information & training
- Fire drill
- Maintenance of fire safety measures
- Recording information and keeping records

Figure 8.2: Fire Safety Equipment

Fire is spread by three methods:

1. Convection

2. Conduction

3. Radiation

Fig : Lead Practice of Generator Operator & Electrician as per NFPA Standard

Figure : Flow Diagram of Planning and management Fire Safety System

7.10 :Safety training

In order to reduce the risks associated with accidents, internal and external threats, and natural disaster a safety training program is essential for workers in plant operation. There should be a regular training program on safety for the workers to increase their awareness and also to reduce the risks. Provision of yearly professional training for health and safety would enhance the effectiveness of safety. Safety training should be planned for the local people living around the project area so that they can be aware about the risk and can take appropriate preparation.

7.11: Environmental safety management team

There should be provision of environmental safety management team with responsibility of implementation, inspection, documentation, and reporting of the safety plans. The team will also be responsible for implementing emergency plans under the Directorate of Environment, Health and Safety. The team should be a combination of multidisciplinary professionals. The team composition could be as follows:

Environmental Quality and Safety Manager (Team Leader)
One Emergency Manager

- One Fire Safety Manager
- Two Safety Managers
- One Chief Security Officer
- Five Security Officers
- One Chief Medical Officer
- Five Medical Officers
- Ten Rescue Officers

7.12: Disaster Management Plan

The project authority will have to take necessary disaster management plan to protect the properties from water logging / flood etc. In this regard all construction works should be undertaken at a higher level taking the highest flood level into consideration. Disaster may occur if the environmental protection equipment fails works at normal condition. This situation may arise any of the following causes-

➢ When plant run abnormal situation such as emission level increases than its normal level.

➢ If liquid waste over flow and pollute the surrounding

Disaster management plan should consist of preventing measures including among others, the following-

- Formulation and strict implementation of safety codes and measures
- Periodic inspection of safety relief valves provided with pressure vessels and equipment's
- Preventive maintenance
- Aware the workers about electric shock
- Declaring factory No Smoking zone
- Mock drills by the fire fighting cells
- Provision and inspection of fire fighting cells
- Proper training of employee about fire and other disaster
- Training the employee and the residence of the surrounding villages about the action to be taken during an accident or disasters.

7.13 : Environmental Health and Safety (EHS)

Environmental, health and safety (EHS) departments, also called SHE or HSE departments, are entities commonly found within companies that consider environmental protection, occupational health and safety at work as important as providing quality products, and which therefore have managers and departments responsible for these issues. An Environmental, health and safety (EHS) register is essential for monitoring of performance of the entire facility community in relation to the environment. The management will use this as self auditing tools.

This register should includes-

➢ Fire extinguisher servicing records

- EHS meeting schedules and training records
- Electrical instillation
- Generator inspection and maintenance record
- Waste disposal records
- Inventory Records
- Emergency response procedure.

7.14: Statement of Grievance Redress Policy, Procedure and Mechanism

- The purpose of this statement is to define the procedure for managing stakeholder concerns and complaints (referred to as "grievances") in a planned, timely, and respectful manner. This grievance mechanism helps KR LOGISTICS LIMITED fulfill the requirements of:
- • Environmental and Social Impact Assessment (ESIA) process
- • Operational Excellence Management System (OEMS)
- • Human Rights Policy
- • Labor Law, 2006
- • Labor Rules, 2015
- • Bangladesh Environment Conservation Act, 1995
- • Periodical Public Consultation Meeting Minutes held at project
- This grievance mechanism also ensures KR LOGISTICS LIMITED alignment with best practices in stakeholders engagement.

Internal Grievance Mechanism

- Internal Grievance Mechanism will be applicable for all KR LOGISTICS LIMITED workers and staff members (Internal Stakeholders) working at project.

External Grievance Mechanism : External Grievance Mechanism will be applicable for all external stakeholders of the project including the local government, contractors or other community members, wherever operations might impact people.

7.15: Internal Grievance Mechanism

- KR LOGISTICS LIMITED will be always careful about its workers complaint in an utmost care. The management will always keep in mind towards receive any complaint and find an appropriate solution to make a harmonious relationship between labor and management. In this case, countries existing labor Act and organization own policy will be followed properly.
- In the respective project there will be a Workers Participatory Committee (WPC) to avoid any mishandling and deprivation of workers and employee. There will be a meeting of WPC every month to discuss about the working environment and future development of workers and employees. Complaint boxes will be kept in toilets that workers can submit their complaints in secrecy. After every meeting the complaint boxes will be opened in front of the Internal Grievance Committee and the committee will take the proper steps after investigations and analysis. The Internal Grievance Committee will be formed as under:
- 1. 2 (two) members from Workers Participatory Committee
- 2. Project Head
- 3. Head of Human Resource

7.16: External Grievance Mechanism

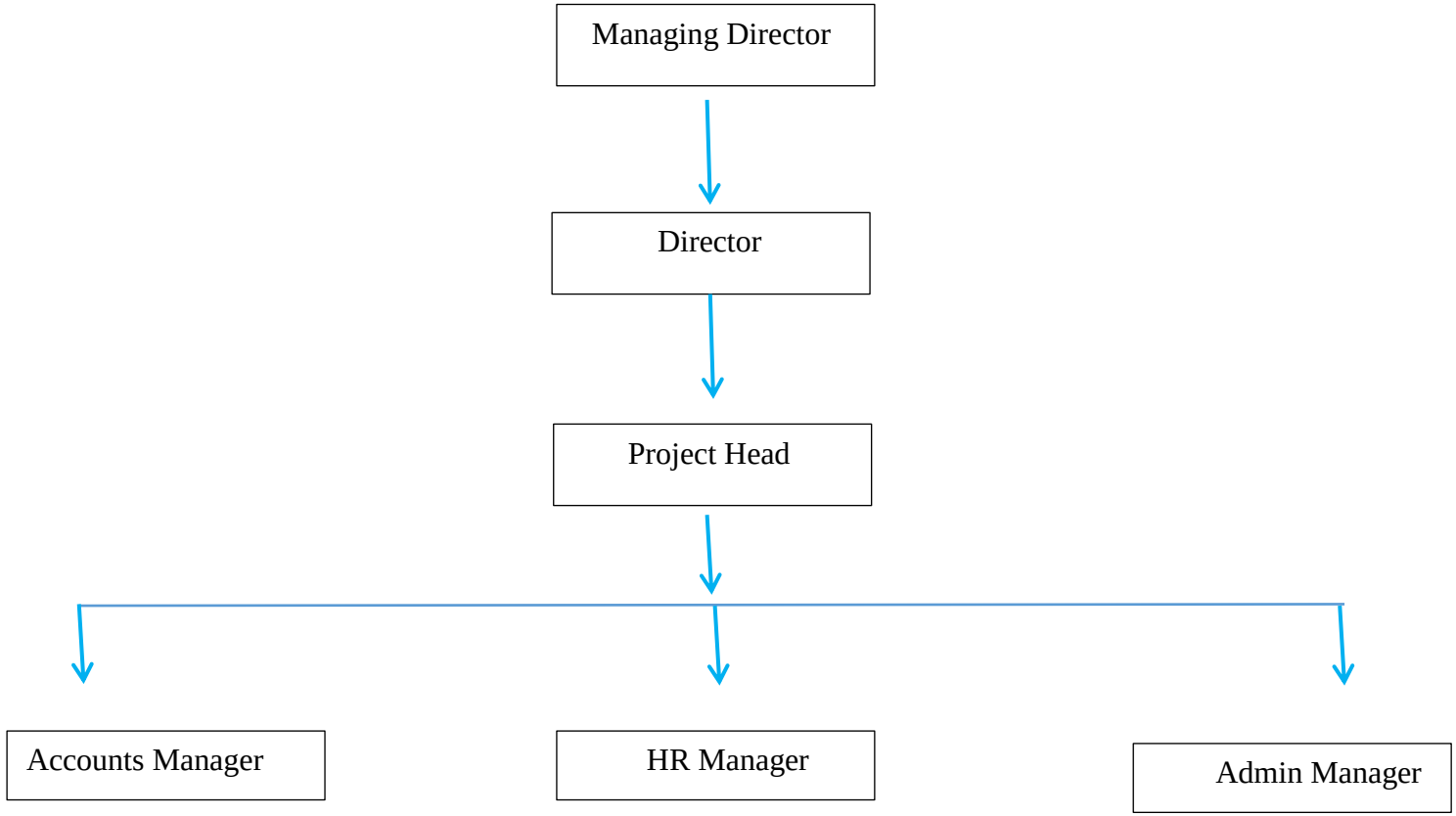
- KR LOGISTICS LIMITED will administer the external grievance mechanism by providing resources to handle correspondence, manage a log, and report to deal with the external stakeholders of the project in need. There will be created an External Grievance Committee, the complaints or any other issues related to external grievance will be submitted to this committee. After discussion with the relevant external stakeholders the committee will take proper measures to solve the issues raised by external stakeholders. The External Grievance Committee will be formed as under:
- 1. Project Head
- 2. Head of Admin
- 3. Compliance Manager
- 4. Ward Councillor
- 5. One teacher from local school
- 6. Imam of local mosque

CHAPTER- 8
ORGANIZATIONAL STRUCURE

8.1 Environmental Regulation Monitoring System.

Team Leader of Environmental Regulation Monitoring System :	Md. Taslim Uddin (Managing Director) Cell: +88 01730 328570; E-mail: taslim_iiuc@yahoo.com

Sl. No	Utility/Equipment/ Item	Act, Rules, & Regulation	Monitoring Procedure	Update Frequency	Responsible Persons/Dept.	Remarks
1.	Boiler	The Boiler Act, 1923 The Boiler Regulation, 1951[Amended- 2007] The Boiler Attendants Rules, 1953 ,Boiler Rules, 1961	Phone/Website/ Press Note/Letter	Quarterly	Manger (Engineering & Utility)	Updated In 2019
2.	Generator	BERC-2003	Phone/Website/ Press Note/Letter	Quarterly		Updated ,2018
3.	Environment	Waste water	পরিবেশ সংরক্ষণ বিধিমালা-২০২৩	Phone/Website / Press Note/Letter	Asst. Manager (Hr & Compliance)	Updated In 2023
4.		Sound	ECR-1995, বায়ুদূষণ (নিয়ন্ত্রণ) বিধিমালা-২০২২ BEPA-1995			Updated In 2022
5.		Air				Updated In 1995
6.	Diesel	Petrolium Act,1934	Phone/Website/ Press Note/Letter	Quarterly.		Updated.
7.	Acid	ACA-2002, ACR-2004	Phone/Website/ Press Note/Letter	Quarterly.		Updated.
8.	Waste Management	Bangladesh Sludge Management Guideline , কঠিন বজ্য ব্যবস্থাপনা বিধিমালা-২০২২	Phone/Website/ Press Note/Letter	Quarterly.	Executive (EHS)	Updated.


Managing Director
Director
Project Head
Accounts Manager
HR Manager
Admin Manager

CHAPTER- 9
BUDGET & IMPLEMENTATION PROGRAM

9.1 Environmental Impact Assessment (EIA)

The purpose of the EIA is to ensure that social and environmental impacts, risks and liabilities identified during the construction, operation and closure of the proposed project. The EIA specifies the mitigation and management measures to which the Proponent is committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The EIA also shows how mitigation and management measures will be scheduled in Table 6.2.D,6.2.E and 7.2.A The key objectives of the EIA are to:

- Formalize and disclose the program for environmental and social management; and
- Provide a framework for the implementation of environmental and social management initiatives.

Best practice principles require that every reasonable effort is made to reduce and preferably, to prevent negative impacts while enhancing the benefits. In many cases, potential negative impacts have been avoided through careful design and location of facilities. Potential impact associated with the operation of the existing facilities has been identified in the previous sections.

External Monitoring of EIA : The project is in process to achieve LEED Citification. For achieving compliance standards the project will go through periodical certifications for environmental, health, safety and social issues. In the process of these certifications, there will be audit, checking and assessments before certifications and monitoring after certifications. Moreover, the buyers also perform various audits in compliance issues of working environment regularly. These will help the project to practice the EIA in better way.

After execution of the project and start of commercial operation at full phase, the project has plan to arrange external monitoring of the EIA implementation of the project after every six months.

9.2 Environmental and Social Monitoring Cost

Environmental and Social Monitoring requires a set of indicators that could be conveniently measured, assess and evaluate periodically to establish trends of impacts. A comprehensive checklist must be developed for operational usage. The basic activities for a sound-monitoring program should be least include:

- Collection and analysis of relevant environment data of the project area;
- Preparation of proper effluent monitoring program; and
- Proper Risk Assessment programs.

Environmental Monitoring Cost details (Yearly Budget)

Sl No.	Sector of Monitoring	Budget (BDT)
1.	ETP Implementation and Operation Cost	1000,000/-
2.	Environmental Monitoring Cost	100,000/-
3.	Solid Waste Management Cost	100,000/-
4.	Occupational Health and Safety related cost	100,000/-
5.	Tree Plantation Cost and Environmental Friendly Decorations cost .	100,000/-
6.	Fire Safety Training.	500,000/-
7.	Disaster Management System.	500,000/-
8.	Yearly Machinery & Equipment Calibration.	500,000/-
9.	Boiler, Generator, Compressor & Utility Monitoring	1500,000/-
10.	License and Monitoring.	500,000/-
11.	Miscellaneous Expenses	1000,000/-
	Total Budget (BDT)=	5900,000/-

9.3 Institutional Arrangements

KR Logistics Ltd shall develop an EHS management cell namely, environmental health and safety Management cell in order to manage all environmental and safety related activities on the Project site. A Manager Environmental Compliance along with supporting staff and their related background will may head this cell. The company organogram are included in Annexure XXIV. KR Logistics Ltd shall develop an ETP laboratory during operation of the project. With the existing manpower KR Logistics LTD could easily form environmental management cell. Each individual will have his responsibility and together the cell will perform the following functions:

- Identification of Environmental and Social Management Needs.
- Prioritize development and monitoring needs.
- Develop management, implementation and monitoring plans according to the needs.
- Budget allocation and timely implementation of management actions.
- Continued monitoring and assessment of Environmental parameters.
- To work for continuous & regular improvement in environmental performance.
- To ensure systematic and routine housekeeping to reduce generation of pollutants inside the plant core area.
- To develop & maintain green belt and plant nurseries.
- To keep close liaison with environmental regulating authorities.
- To conduct monthly, quarterly and yearly monitoring and submit statements

9.4 Information and disclosure

EIA monitoring report of KR logistics LTD will be shared with Bangladesh Bank on a quarterly basis. The EIA report of of KR logistics LTD will be disclosed in the website of of KR logistics LTD and Bangladesh Bank.

CHAPTER- 10
CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions :

No projects can be expected without any adverse impact on environment. The beneficial impacts on the nation as well as human beings would only be meaningful and sustainable development would only be possible if the adverse effects are minimized through strict maintenance and control measures as recommended for this project.

Based on the available information and environmental reconnaissance survey conducted in the project area, it is found that the proposed composite Industry will not adversely affect the environment of the project area and its surroundings as long as certain mitigation measures are taken. Mitigation measures have been formulated and will be adopted during implementation and operation to ensure that the residual environmental impacts of the project are within acceptable levels. The negative environmental impacts identified can be overcome by undertaking various mitigation measures as suggested in this Environmental Impact Assessment (EIA) report.

Thus, the Environmental Impact Assessment (EIA) has not identified any comprehensive, broad, diverse or irreversible adverse environmental impacts caused by the project. It is, therefore, concluded that

(i) the project will have few low to moderate adverse environmental impacts.

(ii) These adverse impacts will be small

(iii) They can be easily mitigated.

(iv) The project has a net positive environmental impacts.

It appears from the above assessment that KR logistics Ltd is not a major pollution potential industry/intervention as it is manufacturing medicine for human.

Finally it can be concluded that the location of the project is environmentally acceptable and it is expected that these Project will follow all environmental compatible steps during operation and maintenance by which it sets a positive example as an environment friendly recreational facility. No follow-up study is required for the existing facilities of the project and Environmental Clearance certificate could be issued

in favour of the project. Based on the findings of the EIA , issuance of environmental clearance in favour of the Medicine Reagent Project may favourably be considered.

10.2 Recommendations:

It is recommended that the EIA be followed in the construction, operation and decommissioning phase of the project. The plans and procedures that have been specified in the EIA report should be elaborated by the of KR logistics LTD for management of smooth and safe operation of the plant. It is also recommended that the environmental monitoring plan be effectively implemented in order to identify any changes in the predicted impacts and take appropriate measures to off-set any unexpected adverse effects.

Apart from risks associated with emissions, noise generation, solid waste, hazardous waste and wastewater disposal as a result of construction and operation activities, An emergency response plan (ERP) for the proposed of KR logistics LTD manufacturing project has been developed listing various actions to be performed in a very short period of time in a pre-determined sequence if it is to deal effectively and efficiently with any emergency, major accident or natural disaster.

Based on the Environmental and Social Impact Assessment (ESIA) conducted for the project following recommendations is suggested:

- KR logistics LTD should continuously (Preferably annually and half yearly) monitor the air, noise, and temperature and water quality to cope up with their environmental vision.
- KR logistics LTD should undertake and expanded the tree plantation program inside the project area and surrounding environment.
- KR logistics LTD workers to be given appropriate personal protective equipment (PPE) especially risky area
- All solid waste to be collected, handle and dispose properly in accordance to applicable waste management regulation.

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16. **Bangladesh Standard Sludge Management Guideline.**
17. **Annexure.**

ABBREVIATION

1.	BB	-	Bangladesh Bank
2.	BBS	-	Bangladesh Bureau of Statistics
3.	BMD	-	Bangladesh Meteorological Department
4.	BNBC	-	Bangladesh National Building Code
5.	CDA	-	Chittagong Development Authority
6.	CM	-	Carbon Monoxide
7.	CMDP	-	Chittagong Metropolitan Development Plan
8.	DAP	-	Detailed Area Plan
9.	DoE	-	Department of Environment
10.	ECA	-	Environmental Conservation Act
11.	ECC	-	Environmental Clearance Certificate
12.	ECR	-	Environmental Conservation Rules
13.	EHSMS System	-	Environmental, Health and Safety Management
14.	EIA	-	Environmental Impact Assessment
15.	EQS	-	Environmental Quality Standards
16.	ESIA	-	Environmental & Social Impact Assessment
17.	FGD	-	Focus Group Discussions
18.	GDP	-	Gross Domestic Product
19.	GLCs	-	Ground Level Concentrations
20.	GoB	-	Government of Bangladesh
21.	IEE	-	Initial Environmental Examination
22.	IFC	-	International Finance Corporation
23.	ISO	-	International Organization for Standardization
24.	MoEF	-	Ministry of Environment and Forest
25.	NEMAP	-	National Environmental Management Action Plan
26.	NOC	-	No Objection Certification
27.	NOx	-	Oxides of Nitrogen
28.	PPE	-	Personal Protective Equipment
29.	SEI	-	Significant Environmental Impacts
30.	SOx	-	Oxide of Sulphur.
31.	WB		World Bank
32.	CAMS	-	Copernicus Atmosphere Monitoring Service
33.	IUCN	-	International Union for Conservation of Nature
34.	LC	-	Least Concern

LICENSE AND ATTACHEMENT

Sl. No	***Particular***	***Status***	
1.	MUJA MAP and Khotian	Yes √	NO ☐
2.	NOC from Local Councillor	Yes √	NO ☐
3.	FireLicense from Fire Service & Civil Defense	Yes √	NO ☐
4.	Trade License	Yes √	NO ☐
5.	Industrial Licesne	Yes √	NO ☐
6.	Memorandum & Articles of Association	Yes √	NO ☐
7.	Income Tex Certificate	Yes √	NO ☐
8.	Machinary List	Yes √	NO ☐
9.	Chamber of Commerce Certificate	Yes √	NO ☐
10.	Land Agreement	Yes √	NO ☐
11.	Certificate of Incorporation	Yes √	NO ☐
12.	BIDA Registration	Yes √	NO ☐
13.	Fire License	Yes √	NO ☐
14.	Bank Solvency Certificate	Yes √	NO ☐