



ENVIRONMENTAL IMPACT ASSESSMENT (EIA)- 2024 OF
BANGLADESH JW ANIMAL PROTEIN CO. LTD. (DRAFT
COPY)

PREPARED BY GLOBAL ENVIRONMENTAL AND TEXTILE
TECHNOLOGICAL SERVICES (GETTS)



Declaration

This Environmental Impact Assessment (EIA) report has been prepared for the proposed **Bangladesh JW Animal Protein Co. Ltd.** by Global Environmental and Textile Technological Services (GETTS). This report contains different types of management plans for environmental issues for the industry. It indicates the effects on the environment due to the settlement of the factory and also the mitigation measurements for it.

The report has been guided by Engr. Md. Golam Kibria, Chief Executive of the said consultancy firm. Shumya Jannat is the prime author of the said report. The full team of GETTS has been assisted and coordinated to complete the EIA report successfully.

The Board of Directors of the project has been assisted with various data and information. We acknowledge all of them.

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Acronyms

BOD	Biochemical Oxygen Demand
CHCMP	Chemical and Hazardous Chemical Management Plan
CO	Carbon Monoxide
CO₂	Carbon Di-oxide
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DoE	Department of Environment
EC	Electrical Conductivity
ECMP	Emission Control and Management Plan
ECR	Environmental Conservation Rules
EFMP	Emergency and Fire Management Plan
EHSMS	Environment, Health and Safety Management System
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
ERDMP	Emergency Response and Disaster Management Plan
ERP	Emergency Response Plan
ESIA	Environmental & Social Impact Assessment
ETP	Effluent Treatment Plant
GETTS	Global Environmental and Textile Technological Services
GHG	Green House Gasses
GM	General Manager
H₂SO₄	Sulfuric Acid
ID	Inter Disciplinary
(L_{Aeq}) dBA	Equivalent continuous sound level in decibels
NO_x	Nitrogen Oxides
NMP	Noise Management Plan
OHSMP	Occupational Health & Safety Management Plan
pH	potential of Hydrogen
PM	Particular Matter
PPE	Personal Protective Equipment



SDG	Sustainable Development Goals
SFT	Square Feet
SO_x	Sulphur Oxides
SPM	Suspended Particular Matter
SWMP	Solid Waste Management Plan
TDS	Total Dissolved Solids
WHO	World Health Organization



Chapter 1: Executive Summary

Gelatine has demonstrated its versatility in applications for the pharmaceutical industry and medicine. It can be used in the production of capsules or tablets or as a constituent of wound dressings, hemostatic sponges, or blood volume substitutes.

Industrial gelatin cannot be eaten by humans. The raw material is different from the edible or pharmaceutical gelatin. Although it is not edible, it can play an important role in the technical area. Generally speaking, industrial gelatin does not have too many requirements as edible gelatin except photographic film. The main function is the stickiness and filming. The glue and photographed film is the main application.

Bangladesh JW Animal Protein Co. Ltd. is going to be a registered gelatin manufacturer in Bangladesh, specializing in providing capsules for pharmaceutical and health product companies. The company has always attached importance to environmental protection and knows that the development of the enterprise should combine economic, social and environmental benefits to be an environmentally friendly enterprise. The company plans to implement the wastewater treatment project, which is completed and put into operation together with the new plant as a three-time project.

Bangladesh JW Animal Protein Co. Ltd. intends to build a gelatin manufacturing factory at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka. The total land area of the proposed project will be 100 decimals. The project is determined to provide the people of Bangladesh with best quality halal gelatin for pharmaceutical capsule production. Moreover, it will provide huge job opportunities for a large population from the local community also help to the economic growth of the country.

Bangladesh JW Animal Protein Co. Ltd. initially intends to produce 900 tons of gelatin from cow skins annually. The raw material will be collected from local tannery industries that are used to be disposed into environment as tannery solid waste. All the project activities will be conducted under a single production shade. The project cost will be approximately 6,71,03,610/- BDT. The proponent of Bangladesh JW Animal Protein Co. Ltd. has requested '**Global Environmental & Textile Technological Services (GETTS)**' for preparing an EIA report on this project as per the DoE guideline. Accordingly, this EIA report has been prepared.

Bangladesh JW Animal Protein Co. Ltd. already got ToR approval from DoE vide memo number 22.02.2600.137.71.136.23.173, dated- December 27, 2023.

Basic information about the project are as follows-

Basic Information about “Bangladesh JW Animal Protein Co. Ltd.”		
S.N.	Particulars	Information
01	Name of the Project	Bangladesh JW Animal Protein Co. Ltd.
02	Project Type	Edible gelatin manufacturing industry
03	Nature of Investment	Foreign (China)
04	Project Proponent	Mr. Yu Qingyuan
05	Designation	Managing Director
06	Project Address	Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka
07	Project Area	100 decimals
08	Product	Edible gelatin
09	Production Capacity	900 Ton/Year
10	Raw Materials	Salted cow skin, cutting pieces, leather waste without chemicals
11	Raw Material Quantity	5400 Ton/Year
12	Source of Raw Material	Local tannery industries
13	Project Cost	BDT 6,71,03,610/=
14	Power Requirement	600 kVA
15	Connected Load	REB
16	Fuel Type	Natural gas, Diesel
17	Fuel Quantity	20,000 CFT gas, 100-150 liters diesel
18	Source of Fuel	Titash, diesel from local petrol pumps
19	Generator	2 Nos (500kW/ 600kW)
20	Boiler	2 Nos (2ton & 8ton)
21	Sources of Water	Own deep tubewell
22	Total Water Requirement	160 m ³ /day approximately



23	Wastewater Generation	150 m ³ /day
24	ETP Capacity	6.3 m ³ /hr
25	Solid Waste	4-5 kg domestic solid waste e.g., plastic, packaging waste, food waste. The solid by-products from production will be used for animal feed and soap production.
26	Employment	120 persons
27	Factory Running Time	24 hours- 3 Shifts
28	Surroundings of the project	North: Vacant area around 250m, Kaizen Metal Industries Bd. Ltd., Dhaka Aricha Highway South: Khal, Nabinogor Textile Ltd., Aaron Denim Limited, Uzzal Fabrics ltd. East: Berger Becker Bangladesh Limited West: Vacant area, Semi Pacca Road, Local residents

Production Process: The production for 1 Ton of gelatin requires 6 tons of raw material Cow Skin. Among the raw material 20% water, 40% skin hair is normally enter into ETP during production, 20% is produced gelatin and the rest 20% by products is used for animal feed, soap etc. production.

It will cut and put into the pool, adding 10 to 15 tons of water for the first-time cleaning and keeping the temperature of the water between 20 to 25 °C. After cleaning, discharge the dirty water into the ETP. And then add another 10 to 15 tons of water for stirring, after that, adding 1% hydrogen peroxide for 10hours soaking. During soaking time, need 10mins stirring in every 3hours. After 10 hours soaking, stir for half hour and then waste water drain into ETP. Add another 10-15 tons of water and clean it again, and then adding 1% proportion of sulfuric acid, soak for 12 hours. During this soaking time, need 15mins stirring every 3 hours. After this soaking, need twice time cleaning with new water. The cleaning water not discharged into the ETP, it will send into the second pool for recycling use.

After washing and cleaning, pH value of the material will be 6.5, and then put into the cooking pot, the gelatin solution will come out after 6 hours cooking, and then stored in the glue tank. It



will be filtered by the filtering machine, ion exchange, through the film concentration and stored in the storage tank. Autoclave, and take into the extrusion glue cooling machine, cooling by the long net machine, drying, crushing and finally finished product packaging.

The proposed project will generate very limited solid waste, liquid effluent, and gaseous emissions. Proper mitigation measures will be taken to reduce waste generation and mitigate environmental pollution. The project proponent is very concerned about the environment and building an environmentally sustainable project.

Solid Waste: The operation of the project will produce domestic solid waste and production by product. The waste will include food packages, empty water bottles, used tissues, paper waste, food remains, etc. This solid waste will be collected in waste bins and will be transferred to Savar municipality.

The solid by products from the project will be sold to other industrial components for reusing that is 20% of the raw material and will be used in animal feed production, fatty acids from the skin will be used for soap manufacturing.

When wastes are not treated separately and carefully, it will have significant impact. For the case of project, the estimated domestic waste generation of solid waste will be minimal and as low as 1 kg (full occupancy) in final stage after reuse and composting. Based on this scenario, the issues related with management is concerned with waste collection system.

Liquid Waste: Significant amount of liquid waste will be generated from the production process of the proposed factory. Around 150m³/day wastewater will be generated from the raw material washing sections, and will be treated with 6.3 m³/hr ETP. Additionally, 5 m³/day of wastewater will be produced from domestic purposes. The sewerage water will be treated by type Septic Tank & Soak well caused from the sanitation purposes and discharged to the public drainage in compliance with the discharge norms.

Air Emission: Air emission will only occur from the generator smoke which will not impact the air significantly. The factory will have a chimney for flowed-out generator smoke.

Offensive Odor: Some unavoidable odor will be generated during the production of gelatin from cow skins. But it is anticipated that the offensive odor will not spread to the locality and only could be smelled in the production section. The proponent will provide proper PPE e.g., mask, gas masks to the workers to prevent themselves from odor during work. The productions shade should be enclosed properly to prevent the odor from spreading in the locality.



The proposed project will have its own environmental monitoring unit/cell with trained manpower with the necessary equipment and other logistics along with the required budget. Bangladesh JW Animal Protein Co. Ltd. is planning to develop a working relationship with the Department of Environment (DOE) by undertaking a joint monitoring program to monitor water quality discharged from ETP.

The project authority will also have a well-planned fire safety and disaster management plan. They are obligated to have an expert team for executing the plan and train people in emergency response actions for fire, earthquake, and other natural and manmade disasters.

Approval of Environmental Clearance from the DoE is anticipated for the proposed project because the proposed Bangladesh JW Animal Protein Co. Ltd. will be constructed creating minimal disturbance to the environment.



Chapter 2: Introduction

2.1 Background

Gelatin is a protein made from animal collagen, usually from cows and pigs. It's commonly used to make capsules, cosmetics, ointments, and foods. Collagen is one of the materials that make up cartilage, bone, and skin. Taking gelatin might increase the production of collagen in the body. People use gelatin for aging skin, osteoarthritis, osteoporosis, brittle nails, obesity, diarrhea, and many other conditions, but there is no good scientific evidence to support these uses.

Food gelatin is a protein hydrolyzed from the collagen part of connective or epidermal tissues of animals and is widely used as jelly, emulsifier, stabilizer, binder and clarifier in the food industry. Industrial gelatine is widely used in various products of plate, furniture, match, feed, packaging, paper, textile, silk, printing and dyeing, printing, ceramics, petroleum, daily chemical, coating, metallurgy and other industries, and mainly plays the role of thickening, stabilizing, cohesion, blending, varnishing, sizing, bonding and water fixing in them. The industrial gelatin produced from wet blue leather trimmings is a by-product of tanning industry, and its application is of great importance to reduce environmental pollution and maintain the sustainable development of tanning industry. Gelatin production wastewater has high pollutant concentration, high oil content, high suspended matter, high salt content, the main pollutants are COD, BOD₅, NH₃-N, SS. The enterprises have no fixed regular production due to factors such as market demand, seasonal characteristics and upstream and downstream correlation, and the water quality fluctuates greatly. These wastewaters, if discharged directly into the nearby water bodies and farmland without any treatment, will cause pollution to the water bodies, deteriorate the water quality of the discharged water bodies and cause the soil of farmland to be slabbed, which will bring great difficulties to industrial and agricultural production and residents' life. Thus, the treatment of this wastewater is of great significance to protect the environment, prevent the pollution of water bodies and safeguard people's health.

Gelatine has demonstrated its versatility in applications for the **pharmaceutical industry and medicine**. It can be used in the production of capsules or tablets or as a constituent of wound dressings, hemostatic sponges, or blood volume substitutes.

Industrial gelatin cannot be eaten by humans. The raw material is different from the edible or pharmaceutical gelatin. Although it is not edible, it can play an important role in the technical area. Generally speaking, industrial gelatin does not have too many requirements as edible gelatin except photographic film. The main function is the stickiness and filming. The glue and photographed film is the main application.

Global Capsules Limited (GCL) was the only manufacturer of Halal Gelatin and Empty Hard Gelatin Capsules in Bangladesh and one of the leading capsule and gelatin manufacturing companies in South Asia with a uniquely broad spectrum of innovation.

Bangladesh JW Animal Protein Co. Ltd. is going to be a registered gelatin manufacturer in Bangladesh, specializing in providing capsules for pharmaceutical and health product companies. The company has always attached importance to environmental protection and knows that the development of the enterprise should combine economic, social and environmental benefits to be



an environmentally friendly enterprise. The company plans to implement the wastewater treatment project, which is completed and put into operation together with the new plant as a three-time project.

Bangladesh JW Animal Protein Co. Ltd. intends to build a gelatin manufacturing factory at **Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka**. The total land area of the proposed project will be **100 decimals**. The project is determined to provide the people of Bangladesh with best quality halal gelatin for pharmaceutical capsule production. Moreover, it will provide huge job opportunities for a large population from the local community also help to the economic growth of the country.

Mr. Yu Qingyuan, Managing Director of **Bangladesh JW Animal Protein Co. Ltd.** has proposed to set up this project. According to the ECR 2023, the project is categorized as **RED** as per schedule 1, therefore the project requires an EIA study for its Environmental Clearance Certificate. The proponent of Bangladesh JW Animal Protein Co. Ltd. has requested '**Global Environmental & Textile Technological Services (GETTS)**' for preparing an EIA report on this project as per the DoE guideline. Accordingly, this EIA report has been prepared.

Every physical development project directly or indirectly interacts with various components of the environment in a complex manner and it has a significant impact on the environment. It is very important to assess the direction and magnitude of the impacts of a development project to avoid unforeseen harmful consequences which would be affected desired benefit and sustainability of the project. EIA is a useful tool for estimating potential Environmental Impacts of a proposed project with provider of mitigation measures and Environmental Management Plan (EMP) within a very short period based on the information from both primary and secondary sources.

This document is the Environmental Impact Assessment (EIA) has been prepared for **Bangladesh JW Animal Protein Co. Ltd.** to address environmental impacts resulting from the project. It is based on review and updating of the environmental impact assesses, mitigations and management plans. This will allow the integration of environmental provisions and management measures in the document.

In accordance with the Government of Bangladesh's (GOB) Environmental Conservation Rules (ECR, 2023), the project is classified as **RED**, requiring EIA for the environmental clearance certificate.

2.2 Need of the Project

Safety, effectiveness, and quality of products are extremely important factors in the pharmaceutical industry. Each manufactured product must undergo strict validation tests to prove its effectiveness and reduce any health risks. This is why industries need reliable, clean, and safe components to work with. There are a wide range of components that are essential to creating medications, and gelatin is one of them, thanks to its many properties and benefits.

Gelatin is derived from collagen, a protein found in cattle tissues and bones. In the pharmaceutical context, gelatin is used to encapsulate medications, producing capsules that are easy to ingest and dissolve by the body. Nevertheless, as it is a neutral component that offers various health benefits, gelatin is also widely used in other industrial sectors, such as cosmetics, food, and photography,



among others. Using gelatin means adding all of its benefits without altering the main characteristics of the final product due to gelatin's neutral nature. This is why gelatin is of great importance.

Gelatin offers a number of benefits in the pharmaceutical sector. As mentioned before, it is a widely used and safe option for encapsulating medications, providing an effective and convenient way to administer precise doses. Besides, gelatin is known for its biocompatibility factor, meaning that it is easily accepted by the human body. De combining all these aspects, we have an excellent solution for the industrial sector, which is constantly seeking new advances and easiness in its daily manufacturing processes.

Encapsulation of medication

Technically speaking, gelatin acts as a shell for medications, protecting them from external factors such as humidity and light, which can affect the stability of pharmaceutical products. In addition, gelatin can quickly dissolve in the digestive system, releasing the medication so that the body can absorb it.

As we explore the significance of gelatin in the pharmaceutical industry, it becomes clear that it is an almost mandatory ally in the production of top tier medications. Its animal collagen origin makes it a safe and biocompatible option for encapsulation and manufacturing of medications. But gelatin is not just an empty capsule. It plays an active role in protecting medications from external factors that can damage their stability. Its quick-dissolving properties allow medications to be efficiently absorbed by the body. Gelatin thus continues to be a vital part of the advancement of science and medicine, ensuring that patients are given safe and effective treatments to improve their health and quality of life.

Bangladesh is in great need of gelatin capsule to fill up the growing demand in pharmaceuticals. Global Capsules Limited (GCL) was the only manufacturer of Halal Gelatin and Empty Hard Gelatin Capsules in Bangladesh. Setting up **Bangladesh JW Animal Protein Co. Ltd.** will help to meet the demand and accelerate economic growth of the country.

2.3 Introduction to EIA

Environmental impact assessment (EIA) is an environmental decision support tool, which provides information on the likely impacts of development projects to those who take the decision as to whether the project should be authorized. The purpose of an EIA is to determine the potential environmental, social, and health effects of a proposed development, so that those who make the decisions in developing the project and in authorizing the project are informed about the likely consequences of their decisions before they take those decisions and are thereby more accountable. It is intended to facilitate informed and transparent decision-making while seeking to avoid, reduce or mitigate potential adverse impacts through the consideration of alternative options, sites, or processes.

An EIA is conducted in response to a project proposal and therefore, the assessment procedure is project-centered. That is, the procedure is molded around the normal project planning process. This concept is called integrated project planning. Integrated project planning requires the project planner to assess and evaluate his planning decisions taking into account the technical, economic,



social, and environmental factors. It implies that EIA should be a continuous process throughout the course of project planning.

EIAs and environmental management tools effectively complement other main planning tools such as economic analysis and feasibility studies, as they assist decision-makers (regulatory bodies, Project Proponents, etc.) to ensure their project plan is economically, environmentally, and socially sound and sustainable. Since project planning and development involve various stages of different scales, it is important to understand the role of each stage in the project planning and development cycle.

2.4 Steps in EIA Process

The EIA process comprises six key steps:

2.4.1 Screening

The first step in the process, screening helps to decide whether an EIA is required for a project. An appropriately designed screening system can, thus, prove to be an effective tool for preventing the squandering of time and money on assessing projects with insignificant environmental impacts.

2.4.2 Scoping

This step begins after screening has decided on the requirement for an EIA. Scoping is considered the backbone of the EIA process and is ideally undertaken at the project planning stage. The main objective of the scoping process is to establish the environmental and social priorities and set the boundaries for the study and define the Terms of Reference (ToR) for the impact assessment. Systematic and well-planned scoping forms the basis for an effective and efficient EIA process. It also helps avoid unfocused and voluminous reports.

2.4.3 Baseline data generation:

Baseline data provides a detailed description of the existing status of various environmental and social components in the study area. Both primary and secondary data is collected to describe this status.

2.4.4 Impact assessment

In this step, the characteristics of potential impacts are identified, evaluated, and predicted using the baseline information on one hand and the features of the project on the other (cause-effect relationship). Impact predictions are normally done by using common methodologies and models. However, models can be used with care and prudence, as most of them are designed keeping in mind the requirements of the developed world; also, in most developing countries, the quality of data used to design these models is not always adequate.

2.4.5 Mitigation of impacts

At this stage, the possible preventive, remedial, and compensatory measures for each adverse impact are determined and recommended. The application of mitigation hierarchy (avoidance, minimization, mitigation, compensation/ offset) is adopted.

2.4.6 Environmental Management Plan

An environment management plan (EMP), also referred to as an impact management plan is prepared as part of the EIA reporting process. It translates recommended mitigation and monitoring measures into specific actions that have to be carried out by the proponent. Depending upon specific requirements, the plan may be included in the EIA report or can be prepared as a separate document.

EIA steps are shown in the flowchart:

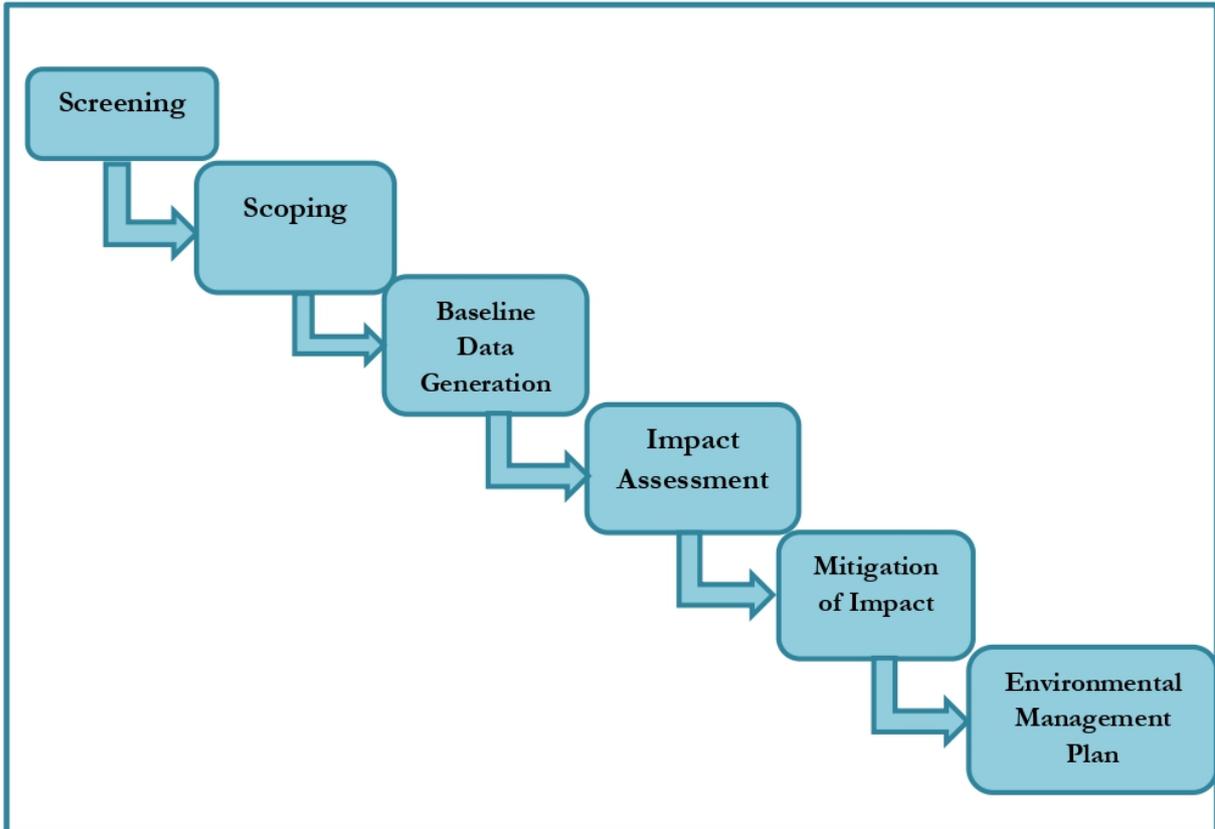


Figure 2:1 Flowchart of EIA Steps

2.5 Need for an EIA

The environment is composed of Biotic & A-biotic components. There is a dynamic equilibrium between these components. When a project is undertaken, it tends to disturb the environmental equilibrium. To maintain the quality of the environment it is essential to study the perspective impacts of the project on the natural environment on time and remedial measures are taken to promote the sustainable and holistic development of the project. Environmental Impact Assessment (EIA) is a process that identifies both the positive and negative environmental effects of significant developments before planning permission is considered. The EIA process is a method of ensuring that planning decisions are made with the full knowledge of the environmental effects and with full engagement of statutory bodies, local interest groups, and members of the public.



An EIA should allow decision-makers to assess a project's impacts in all its phases. It should also allow the public and other stakeholders to present their views and inputs on the planned development. Furthermore, to be truly effective, an EIA must contribute to and improve the project design, so that environmental, as well as socioeconomic measures, are core parts of it. Information used in the EIA needs to be based on good data, use accepted methodological approaches, and be summarized in plain language that is understandable for decision-makers.

Finally, the EIA does not end with the granting of a license to operate. It is critical that the approved practices and design are followed during the project operations and construction and that ongoing monitoring is in place during the lifetime of the project.

1. Identification of potential environmental impacts
2. Studying the significant environmental impacts
3. Assessing the probability of these impacts to be mitigated
4. Recommending preventive and corrective measures to reduce the negative impacts
5. Informing decision-makers and stakeholders on the environmental consequences
6. Giving opinion (council) on whether the development of the relevant investment proposal should continue (M. Sabeva, 2015).

2.6 Ideal EIA System

An Ideal EIA system would be

- Apply to all projects that are expected to have a significant environmental effect and address all impacts that are expected to occur due to that project.
- Compare alternatives to a proposed project, management techniques, and mitigation measures.
- This results in a clear EIS (Environmental Impact Statement) which conveys the importance of the likely and their specific characteristics to non-experts in the field.
- Include broad public participation and stringent administrative review procedures.
- Be timed to provide information for decision-making.
- Be enforceable.
- Include monitoring and feedback procedures.
- Therefore, the purpose of EIA is to help design projects which enhance the quality of the environment by examining alternative and remedial measures throughout the entire course of planning and designing of the development projects.

An ideal EIA system should be containing some necessary issues given in the following figure-

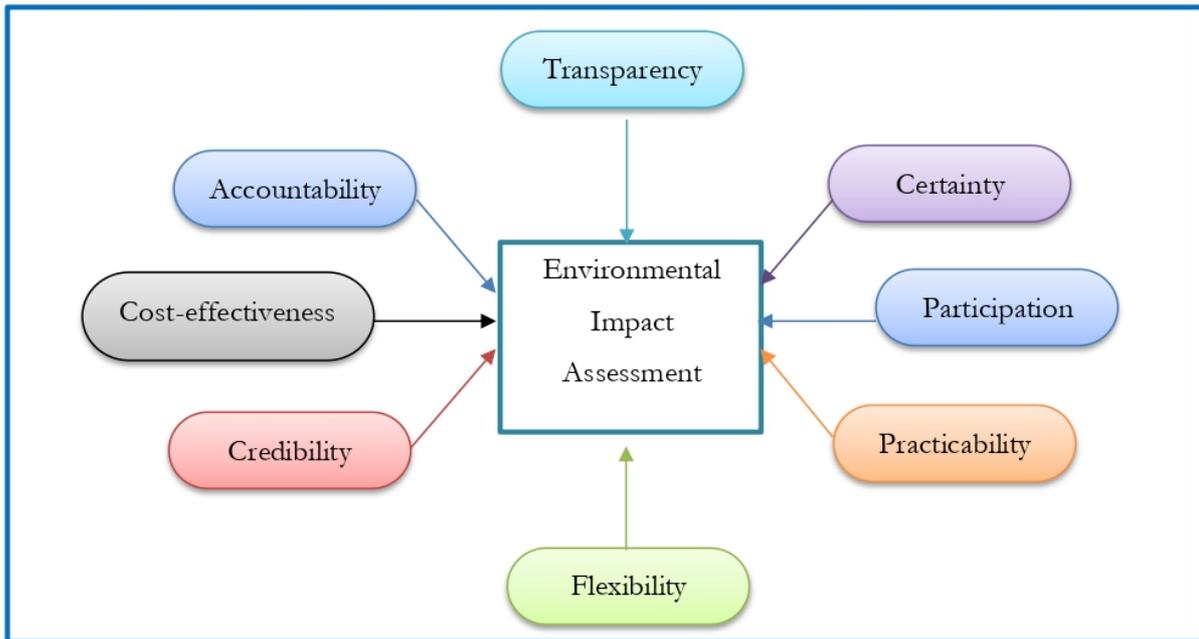


Figure 2:2 Components of an Ideal EIA

2.7 Aims and Objectives of the EIA

The objective of the study is to produce a report on the EIA study based on which Environmental Clearance from the Department of Environment (DoE) will be obtained.

The objective of this EIA study towards **Bangladesh JW Animal Protein Co. Ltd.** is to identify and evaluate the potential impacts (beneficial and adverse) and prepare of impact statement following the existing guidelines of DoE. The study provides information on the environmental implications, which could be used for environmental safeguards.

The EIA report is a document for getting environmental clearance from statutory agencies. The EIA report also presents the existing environmental setting, contribution of pollutants, and other factors from the proposed facilities.

The specific objectives of this EIA are to:

- Present a general description of the project and its activities;
- Present a description of the pre-project environment, the physical and biological environment, Delineate the significant environmental issues found and believed to be involved in the project;
- Identify the environmental impacts of the project activities and quantify them to the extent possible;
- Suggest the plan for the management of the environment, during the implementation and operation stages of the project.



- Provide information and recommendations on procedures, processes, and practices that must be implemented to attain Environmentally Sound Management (ESM) in the project area.
- Assisting and facilitating the improved management of occupational health and safety issues in or about the workplace.
- Assessment of the socio-economic impacts due to the construction of the said 5-Star Hotel of the proposed project;
- Preparation of a detailed Environmental Management Plan (EMP) for the proposed projects to reduce the negative impacts and ensure sustainable development.
- Provide recommendations or guidelines on the successful implementation of the EMP.

The aims and objectives of the EIA study on the proposed '**Bangladesh JW Animal Protein Co. Ltd.**' are as follows:

Immediate Objectives:

- Modify and improve the Environmental design of the proposal
- Ensure that resources are used appropriately and efficiently
- Identify key measures for mitigating the potential impacts of the proposal
- Facilitate informed decision-making and set the environmental terms and conditions.

Long-Term Objectives:

- Protect Human Health and Safety
- Avoid irreversible changes and serious damage to the environment
- Safeguard valued resources, natural areas, and ecosystem components; and
- Enhance the social aspects of the proposal

2.8 Performance of the Assessment

This report has been prepared on the following basis.

- (a) **Site Visit:** The members of the compliance team of the factory and the consultant team have been visited to determine the possible environmental impacts of the existing factory and recorded the prevailing conditions of the environment as it exists before the implementation of the project.
- (b) **Identification and Evaluation:** The adverse and beneficial effects of the existing factory on the environment have been evaluated.
- (c) **Discussion of Alternatives:** Various possible alternatives have been discussed.
- (d) **Preparation of Checklist:** A checklist has been prepared to ensure complete coverage of all the possible consequences of the Existing factory so that it can be determined what administrative actions should be taken.



- (e) **Developed of Environmental Impact due to the project:** For identifying the impact of the factory on the environment, a checklist of the environmental attributes has been developed that reflects the impact on the environment resulting from a particular action.
- (f) **Set mitigation measures and Environmental Management Plan:** After identifying the Environmental Impacts, the expert team of the consultant has identified mitigation measures and detailed environmental management set for the factory.

2.9 Limitations of the Report

The impact assessment report (study) that has been prepared for the proposed project is largely based on the project information from the client, discussion with the local community and other stakeholders, and observations from various surveys and investigations undertaken in the project area. Professional judgment and subjective interpretation of facts have been applied for this study. Any change in the project location, orientation, proposed factory components, proposed project activities is likely to result in variation in the impacts. It is to be noted that, any technological advances during the course of construction and Operation may change the impacts. EIA report is prepared based on hypotheses and proved the impact of similar activity. Although the time & resource limitations claim for more integration of report in future. Some limitations will be remaining after all efforts because of the following reasons.

First, it is difficult to predict which, if any of the potential environmental and social issues identified will become actual problems in the future, environmental regulations continually change, as do the enforcement priorities of the applicable governmental agencies involved.

Second, even for problems currently identified, it is often difficult and sometimes impossible to accurately estimate the liabilities that may be involved in mitigating the problem(s), for the legal and technological standards for evaluating, mitigating, and allocating liability for environmental issues are in a constant state of change. Moreover, the liability for mitigating environmental problems tends to be highly dependent upon agency negotiations and the sometimes arbitrary and unpredictable nature of agency officials charged with such negotiations.

2.10 Bangladesh JW Animal Protein Co. Ltd. Commitments

We follow the rules and regulations of land use as well as guided by the government and various codes. We always uphold the basic code of conduct that is stated below-

- Child labor is strictly prohibited;
- Providing pure drinking water to the customers;
- No Discrimination for hiring people;
- First aid treatment and legal minimum wages;
- Strictly maintained overtime hours and payments also safety;
- Deliver the social-economic benefits to employees and our dependents to uplift their livelihood;
- Complying with applicable environmental legislation and regulations;
- Conservation of natural resources through responsible management of energy and water use;



- Adopting cost-effective measures in the prevention of pollution from our processes;
- Motivating and preparing all employees to take personal accountability for protecting the environment;
- Planning, implementing, and reviewing environmental objectives and targets;

2.11 Consistency with DoE Guidelines

Environmental Conservation Act 1995 (ECA'95) is currently the main legislative document relating to environmental protection in Bangladesh. Under this act, 'No industrial unit or project shall be established or adopted without obtaining environmental clearance, in the manner prescribed by the rules, from the Director General (DG). A set of the relevant rules to implement the ECA'95 has recently been promulgated (March, 2023). The rules mainly consist of:

- Categorized list (green, yellow, orange, and red) of the project;
- Application format to take environmental clearance;
- Ambient standards in relation to water pollution, air pollution, and noise, as well as permitted discharge/emission levels of water and air pollutants and noise by industries.

The Rules incorporate "inclusion lists" of projects requiring varying degrees of environmental investigation e.g., all the raw projects under the red category generally will require a two-steps assessment procedure, firstly an Initial Environmental Examination (IEE) for site clearance, and secondly, if warranted, a full Environmental Impact Assessment (EIA) for technical clearance.

2.12 Scope of the Work in Future

Based on the limitation, the scope of work in the future is the following:

- Further consultations with the local community and other key stakeholders of the project to understand public perception and their expectations from the project;
- Collection of additional secondary environmental, social and demographic information;
- Collection of information about flora and fauna that required conservation/scientific interest through a primary ecological survey of the study area;
- Identification and review of the applicable standards and identification of key issues;
- Evaluation of potential social impacts of the Project and its components (including associated facilities as per the details available);
- Suggest appropriate institutional arrangement and capacity-building needs for proper implementation of environmental and social management plans during the pre-construction, construction, and operation phase.

2.13 Methodology

The Environment and Social Impact Assessment study for the project has been carried out as per the requirements of the Environment Conservation Act and Rules, 1997. The environmental impact assessment study considers an area of 5 km around the project site as study area. Reconnaissance surveys were conducted to identify environmental and social issues in the project area. A detailed desk-based literature survey was also undertaken and relevant information was collected for environmental and social baseline assessment.



Social surveys were also conducted by Global Environmental & Textile Technological Services (GETTS) and the project-affected village was visited to collect information on the socio-economic and cultural aspects of the local community. Various government departments and other agencies were contacted to gather information relevant to the project or the project area.

Based on the proposed activities, impact analyses were carried out where potential direct and indirect impacts of the project activities have been considered. A detailed Environmental and Social Management and Monitoring Plan (ESMMP) have been formulated for the Project where measures are proposed to mitigate adverse impacts along with recommended good practices.

The following plans have been developed for the project along with impact assessment and mitigation measures identification.

- Construction Labor-Management Plan;
- Solid Waste Management Plan;
- Liquid Waste Management Plan;
- Gaseous Waste Management Plan;
- Occupational Health and Safety Plan;
- Emergency Response & Fire Management Plan;
- Environment Monitoring Plan;

The schematic diagram of the methods of the report is given in the following figure.

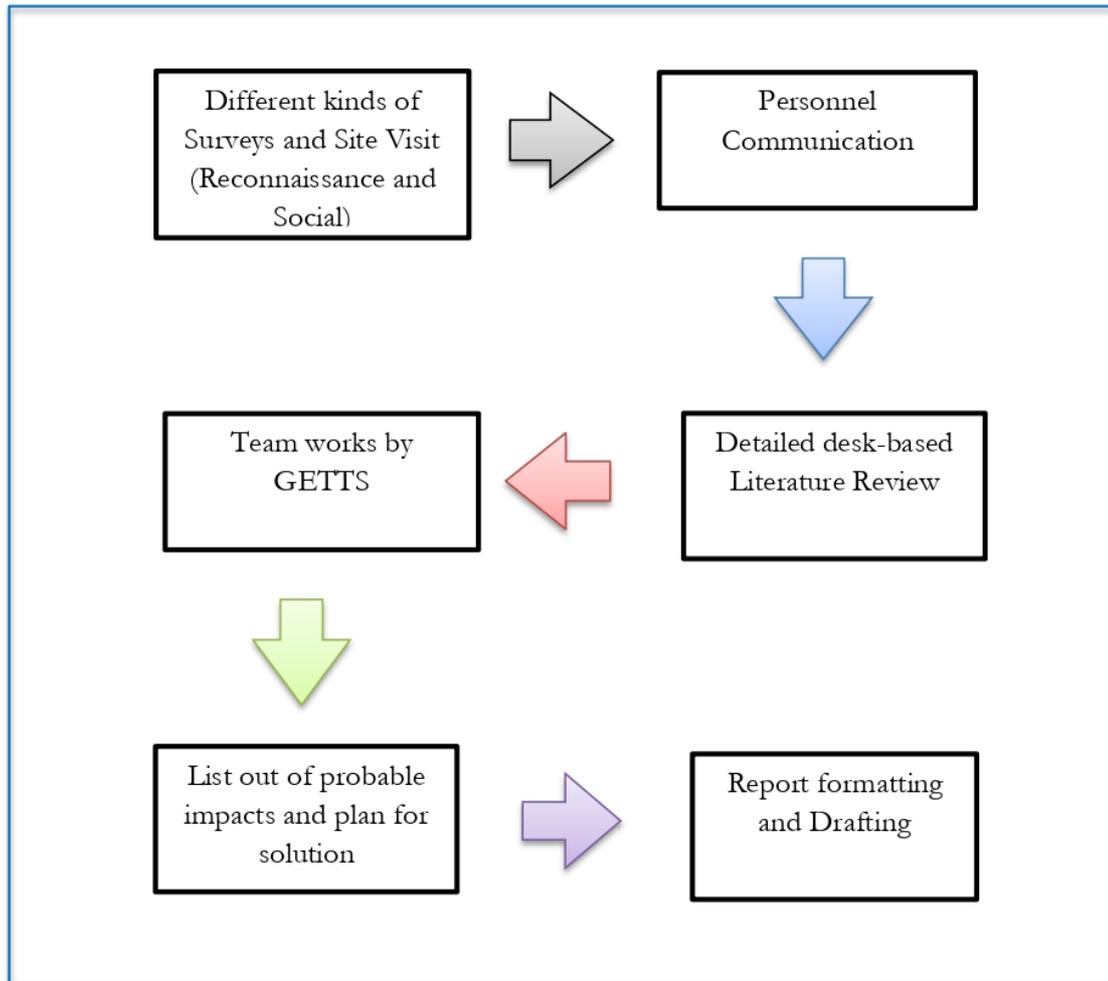


Figure 2:3 Schematic Diagram of the Methodology

2.14 About Project Proponent

Project Proponent	Responsible person for Environmental Management
Mr. Yu Qingyuan	Md. Nur Nobu
Managing Director	Country Co-ordinator
Address: Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka	Address: Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka
Contact Number: 01309997749	Contact Number: 01755101027

E-mail: bangladeshjwanimalproteincoltd@gmail.com	E-mail: mdnobi444@gmail.com
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2.15 EIA Team

A good qualified, knowledgeable, and energetic team of Global Environmental and Textile Technological Services has participated to make this EIA report. They are experts in different fields of engineering, science, and sociology. During the preparation of this report, they have sat together, round table meetings, field visits, conversations with clients and people near the project, etc.

Table 2:1 EIA Team

S. L.	Profile	Details		Objects
	Engr. Md. Golam Kibria 	Designation	Chief Executive	Obtain a challenging leadership position applying creative problem-solving and fine management skills with 15 years of experience in this field. Passionate to achieve optimum utilization of its resources and maximum profits.
		Title	Supervisor	
		Qualification	B.Sc. Tech (Textile)	
		Experience	15 years	
		Institution	Bangladesh Textile University, Tejgaon	
	Contact No.	01552360199		
		Mail ID	engr.kibria_2010@yahoo.com	
	SK. Abdul Latif	Designation	Mechanical Engineer	Dedicated individual with verse knowledge. Exceptionally good mechanical competence ·Excellent expertise in using CAD to explain and present the blueprints of the final structures
		Title	Team Member	
		Qualification	Dip. in Mechanical Eng., KPI	
		Experience	10 years	
		Institution	Khulna Polytechnical institute, Khulna	
		Contact No.	01716537361	
		Mail ID	latif_pintu@yahoo.com	
	Md. Mizanur Rahman	Designation	Civil Engineer	An excellent academic record, ability to understand and work knowledge Civil Structure, and a strong field
		Title	Team Member	
		Qualification	Dip. in Civil Engr. PPI	

S. L.	Profile	Details		Objects
		Experience	10 years	experience in ETP Installation
		Institution	Pabna polytechnical Institute, Pabna	
		Contact No.	01716765329	
		Mail ID	mizanglobal14@gmail.com	
	Md. Shaik Hassan Ashik	Designation	Team Member	Experienced chemist with strong math and data analysis skills. Seeking to utilize a working knowledge of chemistry and experience in the position of a Chemist.
		Title	Environmental Chemist	
		Qualification	MSc. In Chemistry	
		Experience	2.5 Years	
		Institution	Jagannath University, Dhaka	
		Mail ID	ashik111955@gmail.com	
	Shumya Jannat	Designation	Environmental Executive	Performance-driven and motivated Environmental Engineer recognized for conducting professional site inspections and detailed project field assessments.
		Title	Team Leader	
		Qualification	B.Sc. & M. Sc. in Environmental Sciences	
		Experience	2.5 years	
		Institution	Jahangirnagar University	
		Mail ID	shumya.getts@gmail.com	
	Farzana Yasmin Nupur	Designation	Junior Environmental Executive	To provide environment-related report writing, site inspection and performing project-related tasks.
		Title	Team Leader	
		Qualification	MS in Environmental Sciences	
		Experience	Fresher	
		Institution	Jahangirnagar University	
		Mail ID	nupur.getts2024@gmail.com	
	Arifa Khatun	Designation	Environmental Engineer	Motivated problem solver with a bachelor's degree in engineering and a background in technical seeking
		Title	Team Member	
		Qualification	Dip. in Env. Technology	



S. L.	Profile	Details		Objects
		Experience	3 years	Environmental Executive position
		Institution	Pabna polytechnical Institute, Pabna	
		Mail ID	arifakhatun1997a@gmail.com	

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Chapter 3: Legislative, Regulation, and Policy Considerations

3.1 Overview

Effective project planning requires not only good technical expertise but also proper understanding of government policies relevant to environmental protection and management. An understanding of these policies is useful to ensure that development projects are undertaken in a manner that does not conflict with stated policies but ideally complements them. Additionally, the legal and administrative requirements and procedures that affect a project are important considerations, especially during the stage of planning approval.

Various national policies and legislations that are prescribed in the country are of relevance to environmental protection and management. While there are those that are of direct relevance to environmental pollution control, many of the other policies and legislations relate to resource protection and conservation, and these include forest, fisheries, land, mineral resources, community and occupational safety & health, and others. Although these environment and social-related legislations fall within the responsibilities of other agencies and authorities, they nevertheless need to be understood as EIA requires a holistic approach to be adopted in order that a comprehensive assessment to be achieved.

It is good EIA practice to make it a point to review statutory and non-statutory requirements for a project, as this will provide a clear understanding of how best an EIA can proceed. Clearing the legal and administrative requirements of authorities is as important in project planning as does clearing the technical and financial concerns. A summary of the legal and administrative requirements for the project within an EIA report will assist the Project Proponent and the authorities keep into focus on environmental objectives during the EIA review process.

This chapter highlights some of the more important statutory and non-statutory requirements that may directly or indirectly affect the planning and development of a project in the industrial sector. It is, however, incumbent on the Project Proponent, and the Consultant/ assessor engaged to undertake an EIA, to review these and other legislation and authority requirements each time a project is undertaken, as changes in the form of new legislation or amendments to older ones may be made from time to time.

3.2 Legal Enforcement Agencies

The responsibility for formulation, implementation, and modification of national-level environmental laws in Bangladesh lies with the Ministry of Environment, Forests and Climate Change (MoEFCC). The Department of Environment (DoE) was established under the Environmental Pollution Control Ordinance, 1977 which functions under the MoEFCC. It is responsible for carrying out the purposes and provisions of the Environment Conservation Act, 1995 as amended till 2010 (hereinafter referred to as ECA) which is the umbrella legislation regulating environmental issues in the country. A brief description of the relevant legal enforcement agencies has been described below-

3.2.1 Ministry of Environment, Forests, and Climate Change (MoEFCC)

The MoEFCC is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, coordination, and overseeing the implementation of environmental and



forestry programs. It oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council.

It plays a pivotal role as a participant of the United Nations Environment Programs (UNEP). Its principal activities include:

- Conservation & survey of flora, fauna, forests, and wildlife;
- Prevention and control of pollution; and
- Forestation & regeneration of degraded areas and protection of the environment in the framework of legislation.

3.2.2 Department of Environment (DoE)

An Environment Pollution Control Board was set up under the Environment Pollution Control Ordinance, 1977. It underwent a series of subsequent restructuring and was finally renamed as Department of Environment in 1989. It is headed by a Director-General appointed by the Government.

The DoE through its head, divisional, and district-level offices conduct the following principal activities:

- Advising the Government to avoid such manufacturing processes, commodities, and substances which are likely to cause environmental pollution;
- Advisory and issuing directions to the concerned person regarding the environmentally sound use, storage, transportation, import, and export of a hazardous substance or its components;
- Conducting inquiries and research activities on conservation, improvement, and pollution of the environment and helping any other authority/organization regarding the same;
- Collection and publication of information about environmental pollution;
- Conducting programs for observation of drinking water quality and issuing directives if necessary for adherence to drinking water quality standards;
- Formulation of environmental guidelines;
- Prescribing and modifying environmental quality standards regarding air, water, noise, vehicular emissions, etc.;
- Issuing Location Clearance and Environmental Clearance Certificates to projects; and
- Implementation of provisions of ECA and rules made thereunder.

3.2.3 Bangladesh Forest Department (BFD)

It was established under the MoEFCC and is responsible for identifying and declaring certain areas as reserved or protected or private forest lands. It implements the provisions of the Forest Act, 1927 and National Forestry Policy, 1994. It's also responsible for wildlife preservation and protection through the implementation of the Wildlife (Preservation & Security) Act, 2012.



3.2.4 Bangladesh Power Development Board (BPDB)

It is a statutory body created on May 1, 1972, and is responsible for the major portion of the generation and distribution of electricity mainly in urban areas except for Dhaka and the West Zone of the country.

It has undertaken a massive capacity expansion plan to add about 10500 MW generation capacities in the next 5 years to achieve 24000 MW Capacity according to Power System Master Plan (PSMP) 2021.

3.2.5 Bangladesh Energy Regulatory Commission (BERC)

It was established under the Bangladesh Energy Regulatory Commission Act, 2003. Some of its key functions include:

- The issue, cancel, amend and determine conditions of licenses, exemption of licenses, and determine the conditions to be followed by such exempted persons;
- Regulation of generation, storage, supply, and transmission of energy;
- Determine tariff for electricity distribution etc.;
- Ensure control of the environmental standard of energy under existing laws;
- Extend cooperation and advice to the Government, if necessary, regarding electricity generation, transmission, marketing, supply, distribution, and storage of energy.

3.2.6 Ministry of Labor and Employment (MoLE)

It was established with the following objectives:

- Creation of employment opportunity;
- Creation of semi-skilled and skilled manpower;
- Enhancement of productivity of factories by creating friendly working environment between workers & employers;
- Ensuring the welfare of workers in different industrial areas;
- Implementation of labor laws;
- Fixing up minimum wages of labor; and
- Ensuring justice through Labor Court.
- It has been divided into four departments, viz:
 - Directorate of Labor
 - Chief Inspector of Factory and Establishment
 - Minimum Wages Board



- Labor Appeal Tribunal

3.2.7 Ministry of Law and Parliamentary Affairs

This ministry is divided into the Law and Justice Division and the Parliamentary Affairs Division for functional purposes.

The Law and Justice Division of the Ministry of Law, Justice, and Parliamentary Affairs has the responsibility of providing legal advisory services to other ministries, divisions, departments, and organizations of the Government.

The parliamentary affairs division is assisted by the law commission and the human rights commission and its main function lies in formulating, scrutinizing, and preparing legislation. When needed, it provides legal opinions and translations for other ministries.

3.2.8 Ministry of Land

The ministry of land is in charge of land administration, management, and development for the overall growth of the nation. The Ministry manages Government-owned lands, vested properties, and abandoned properties. It is responsible for the collection of land development tax, land surveying, and record-keeping and updating. Land Acquisition and requisition fall under the responsibilities of this ministry.

3.2.9 Bangladesh Investment Development Board (BIDA)

The Board of Investment was established in 1989 by the Investment Board Act. The specific functions of the board are:

- Implementation of all provisions as lay down under The Investment Board Act, 1989.
- To promote domestic and foreign investment as well to enhance the international competitiveness of Bangladesh;
- To identify the hindrance of investment and provide necessary facilities and assistance in the establishment of industries.

3.2.10 Union Parishad

Union Parishad (UP) currently is the only elected statutory local government body for rural Bangladesh. A UP consists of a chairman and twelve members. They are elected based on adult franchises. Each UP has a full-time Secretary, appointed by the Deputy Commissioner (DC). The functions of UP are:

- Maintenance of law and order and conduction of censuses of all kinds.
- Registration of births, deaths, blind people, beggars, and destitute.
- Planning and implementation of development schemes in the field of agriculture, forestry, fisheries, livestock, education, health, small and micro enterprises, communications, irrigation, and flood control.



- Protection and maintenance of public property such as roads, bridges, canals, embankments, markets, telephones, and electricity lines.

3.3 Project Background

The emerging environmental scenario calls for attention on conservation and judicious use of natural resources. There is a need to integrate the environmental consequences of the development activities and to plan suitable measures in order to ensure sustainable development. The environmental considerations in any developmental process have become necessary for achieving sustainable development. To achieve such goals the basic principles to be adopted are:

- To enhance the quality of the environment in and around the project area by adopting proper measures for the conservation of natural resources;
- Prevention of adverse environmental and social impact to the maximum possible extent;
- To mitigate the possible adverse environmental and socio-economic impact on the project-affected areas.

The proposed project, the **Bangladesh JW Animal Protein Co. Ltd.**, is covered under several environmental policies & legislations pertained with the Government of Bangladesh. All the policies or legislation aimed at the conservation and protection of the environment. The existing policies and legislation, which are relevant to the environment, are described in the following sections.

3.4 Applicable Environmental and Social Laws, Regulations, and Policies

The requirements for compliance with environmental regulations are laid down by the policy, legal & regulatory framework in the country. A large number of laws are related to environmental issues. Some dating based on the 19th century exist in Bangladesh. The most important of these are the Environmental Conservation Act, 1995 (ECA95) and the Environmental Considerations rules (under the ECA, 1995), ECR 1997 (ECR97), and ECR 2023.

The provision made in the Environment Conservation Act 1995 and Environmental Conservation Rules 1997 are adopted procedures in carrying out the task of Environmental Impact Assessment (EIA) study for the RED Category industry/factory. Including these, other Policies, Acts, and Regulations applicable and consulted for the preparation of the EIA study during the accomplishment of the assignment areas are given below:

3.4.1 National Environmental Policy 1992

In 1992 the Bangladesh Government developed the National Environmental Policy (NEP) which defines the overall environmental framework and assigns responsibility for regulatory development, administration, and enforcement. This responsibility has been given to the Department of Environment (DOE) which is under the Ministry of Environment, Forest and Climate Change. The National Environment Council, with the head of the government as chairperson, provides the overall policy direction.

In 26 years since the adoption of the Environment Policy, 1992, the nature and level of environment and ecological degradation have been changed. In order to address all those changes



and with a view to protect and conserve the environment and ecosystem in a rigorous, pragmatic and sustainable manner as well as to bring the climate change to the mainstream of the environment and development, the government has revised the National Environment Policy, 1992 and adopted the revised National Environment Policy, 2018.

Following are the key subject matters covered under the National Environment Policy, 2018:

- Ensuring sustainable development through reducing human pressure on nature and natural resources
- Considering environmental protection as an integral part of the development programs planned to meet the need of the present and future generation
- Making natural resources extraction, use, environmental conservation, etc. to be based on science
- Considering environmental impacts and risks in extracting and using natural resources
- Evaluating the economic contribution of ecosystem services simultaneously to that of natural resources
- Giving priority to poor and underprivileged group of people in order to ensure their participation, equity, justice, accessibility to the use of natural resources, and getting ecosystem services on which, they are dependent
- Taking initiatives to prevent misuse and ensure the optimum of water, land, natural gas, and other natural resources in the production process as well as for day-to-day purposes
- Encouraging sustainable use of new and renewable resources
- Enhancing long-term poverty alleviation and food security through conserving biological diversity
- Realizing compensation from persons and institutes those who are liable for environmental pollution through applying the polluter pay principle
- Including environmental conservation and preservation in all national policies and ensuring implementation of the environment policy at both government and non-government levels
- Giving priority to preventive measures over curative measures in environmental conservation
- Including adaptation and mitigation programs in all development projects in order to address the adverse impacts of climate change
- Ensure sustainable utilization of ecosystem goods and services
- Implementation of the 3R principle in the utilization of resources
- Strengthening the institutional and legal capacity of institutions (Government, local, private, and technical) relevant to the enforcement and implementation of rules and regulations relating to environmental policy and environment conservation
- Ensuring considerations of climate change and challenges of calamities in all kinds of infrastructure projects
- Reducing all SLCP (Short-Lived climate pollutants) that are harmful to health and the environment
- Taking development programs considering sustainable production and consumption as an integral part of environmental conservation to meet the need of present and future generation



- Allocating necessary funds to all areas of environmental conservation, preservation, and control
- Taking up programs in favor of a flourishing environment-friendly economy
- Including environmental and ecological conservation particularly to introduce the environmental and ecological concept in the environmental academic curriculum and textbooks of schools and colleges

The policy has provided sector-wise policy coverage for 24 different sectors along with their plan of implementation, identification of respective implementing agencies, legal and institutional framework, and directives on compliances.

3.4.2 National Environmental Management Action Plan -1995

The National Environmental Management Action Plan (NEMAP) is a wide-ranging and multi-faceted plan, which builds and extends the statements, set out in the National Environmental Policy NEMAP was developed to address Issues and management requirements during the nod 1995 to 2005 and set out the framework within which the recommendations of the National Conservation Strategy are to be implemented.

- Identification of key environmental issues affecting Bangladesh,
- Identification of actions necessary to halt or reduce the degradation;
- Improvement of the natural environment;
- Conservation of habits and bio-diversity,
- Promotion of sustainable development,
- Improvement of the quality of the life of the people.

One of the key elements of concerns of NEMAP is that the sectoral environmental concerns are adequately identified. In outline, the environmental issues of the industrial sector include-

- Pollution arising from various industrial processes and plants throughout the country causes varying degrees of degradation of the receiving environment (air, water, and soil),
- A general absence of pollution abatement in terms of waste minimization and treatment,
- Low level of environmental awareness amongst industrialists and entrepreneurs,
- Lack of technology appropriate for efficient use of resources and waste minimization, leading to unnecessary pollution of the environment,
- Economic constraints on pollution abatement and waste minimization such as the cost of the new technology, the competitiveness of labor, and intensive production methods as compared to more modern methods,
- The concentration of Industry and hence pollution in specific areas exacerbate localized environmental degradation and exceed the carrying capacity of the receiving bodies,
- Unplanned Industrial development has resulted in several industries located within or close to the residential area, which adversely affects human health and the quality human environment,
- Establishment of industries at the cost of good agricultural lands and in a residential area,
- Lack of incentives for industrialists to incorporate emission/discharge treatment plants in their industries.



3.4.3 Bangladesh Environment Conservation Act 1995

Environment Conservation Act 1995 (ECA-95) is currently the primary legislative framework document related to environment protection in Bangladesh, which repeated the earlier environmental pollution control ordinance of 1977.

The main strategies of the act can be summarized as:

- Declaration of ecologically critical areas, and restriction on the operation and processes which can be caped out or cannot be initiated in the ecologically critical areas,
- Regulation concerning vehicles emitting smoke harmful to the environment,
- Environmental clearance
- Regulation of the industries and provision of other development permits;
- Promulgation of standards for quality of air, water, noise, and soils for different areas for different purposes;
- Promulgation of standard limit for discharging and emitting waste
- Formulation and declaration of environmental guidelines

The first sets of rules to implements the provisions of the Act have been promulgated in 1997 The Department of Environment (DoE) is implementing the Act. A Director General (DG) heads DoE. The DG has complete control over the DoE. The power of DG, as given in the Act, may be outlined as follows:

- Identification of different types and causes of environmental degradation and pollution;
- Instigating the investigation and research into information regarding environmental conservation, development, and pollution,
- Power-to-close down the activities considered harmful to human life or the environment. The operator does have the right to appeal, and procedures are in place for this. However, if the incident is considered an emergency, there is no opportunity for appeal,
- Power to declare an area affected by pollution as an ecologically critical area. DoE regulates the type of work or process which can be undertaken in such an area.
- Similar to the aforementioned clause, if any part of the environment is polluted/damaged by operations, the Director-General can request or force the operator to take remedial measures,

In the event of an accidental (pollution) event, the Director-General may take control of an operation, and the respective operator is responsible for costs incurred (and possibly compensation).

Before any new project can go ahead as stipulated under the rules, the operator must obtain an Environment Clearance from the Director-General. An appeal procedure does exist for those promoters who fail to obtain clearance.

3.4.4 National Conservation Strategy, 1992

The national conservation strategy-1992 was endorsed to balance a country's economic development with the conservation and use of its natural resources. The strategy has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources.



The NCS recommended 14 core program areas for priority implementation:

- Maintaining soils in croplands
- Increasing irrigation efficiency;
- Protecting watersheds;
- Supporting forestry and plantations;
- Restoring rangelands and improving livestock;
- Protecting water bodies and sustaining fisheries;
- Conservation of biodiversity;
- Increasing energy efficiency;
- Developing and deploying renewable;
- Preventing/abating pollution;
- Managing urban waste;
- Supporting institutions for common resources;
- Integrating population and environment programs;
- Preserving the cultural heritage.

3.4.5 Environment Conservation Rules, 1997

These are the first set of rules, promulgated under the Environment Conservation Act 1995, among other things, these rules set-

- The National Environmental Quality Standards (NEQS) for ambient air, various types of water, Industrial effluent, emission, noise, vehicular exhaust, etc.
- Requirement for and procedures to obtain environmental clearance
- Requirement for IEE according to categories of industrial and other development interventions.

The proposed project falls presently under the Orange Category of Environmental Conservation Rules, 1997. According to the rules, all Red category industry has to submit an EIA before the project operation along with detailed Environmental Management Plan.

3.4.6 The Environmental Conservation Rules (ECR), 2023

The Environmental Conservation Rules, 2023 are the first set of rules promulgated under the Environment Conservation Act, 1995. ECR, 23 provides additional guidance for specific components of the Act. The rules mainly consist of:

- The National Environmental Quality Standards (EQS) for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise, and vehicular exhaust;
- Categorization of industries, development projects, and other activities based on pollution activities of the existing or proposed industries/development projects/activities.
- Procedure for obtaining environmental clearance;
- Requirement for undertaking IEE and EIA as well as formulating EMP according to categories of industries/development projects/activities;



- Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.

The Rules incorporate “inclusion lists” of projects requiring varying degrees of environmental investigation.

5 | Classification of industrial establishments and projects for the purpose of granting location and environmental clearances. - (1) For the purpose of granting locational and environmental clearances by the Department, considering the extent of activities of the industrial establishments or projects and the scope, extent and possible harmful effects on the environment and human health caused by the same. Industrial establishments and projects shall be divided into the following categories, namely: -

- (A) **Green**;
- (B) **Yellow**;
- (C) **Orange**; And
- (D) **Red**.

Explanation: - as mentioned in this rule –

(A) Green class industrial establishments or projects shall mean all such industrial establishments or projects which have relatively little impact on the environment and human health and there is an opportunity to take environmental pollution mitigation measures for such industrial establishments or projects;

(B) Yellow class industrial establishments or projects shall mean all such industrial establishments or projects which have a moderate impact on the environment and human health, and to avoid such impacts, these industrial establishments or projects need to take environmental pollution mitigation measures;

(C) Orange class industrial establishments or projects shall mean all such industrial establishments or projects which have significant impact on the environment and human health, which need to be avoided for the purpose of environmental protection and the environmental impact of these industrial establishments or projects must be reduced by adopting appropriate environmental pollution mitigation measures. And

(D) In the red category, all the industrial establishments or projects that have severe impact on the environment and human health, which need to be avoided to an appropriate extent for environmental protection, and significant environmental pollution mitigation measures must be taken to reduce the environmental impact of the industrial establishments or projects of the said category.

- (2) The list of various categories of industrial establishments and projects mentioned in sub-rule (1) shall be determined as per Schedule-1:



Provided that any industrial establishment or project which is not included in the Green, Yellow, Orange and Red categories mentioned in Schedule-1 shall be classified as per Schedule-14.

3.4.6.1 Procedure for granting locational clearance to red category industrial establishments and projects

- (1) Red category industrial establishments or project promoters shall apply to the relevant office of the Directorate by filling the applicable sections as per Form-3 for location clearance.
- (2) In the case of making an application mentioned in sub-rule (1), the application processing fee mentioned in schedule-6, related documents, details, draft terms of reference of environmental impact assessment should be submitted and applicable mentioned in schedule-9 Guidelines must be followed.
- (3) The draft terms of reference for environmental impact assessment should be formulated as per the guidelines mentioned in Schedule-10.
- (4) After receiving the application, the relevant office of the directorate shall conduct a site visit to the proposed site of the relevant industrial establishment or project and after reviewing the documents and all relevant matters, a report with an opinion on the rationale of issuing the site clearance and the draft environmental impact assessment (terms of reference) of the head office of the directorate Clearance will be forwarded to the Committee and copies thereof to the Regional and Divisional Offices, as applicable.
- (5) After receiving the documents under sub-rule (4), the concerned office of the directorate shall evaluate and consider all the contents and submit the related report to the Director General for approval.
- (6) After receiving the report under sub-rule (4), if the Director General is satisfied, within 15 (fifteen) working days, he shall grant the positional clearance in favor of the concerned applicant.
- (7) With the approval of the Director General, the concerned industrial establishment or the project promoter shall be given approval of the draft terms of reference for environmental impact assessment from the concerned office within 30 (thirty) working days of receiving the application:

Provided, however, that if any additional information or documents are required, the applicant may be directed to submit the same within seven (7) working days:

It is further provided that if the application is rejected after reviewing the overall aspects, the applicant shall be informed in writing stating the reasons within not more than 7 (seven) working days of taking the said decision.

- (8) After obtaining the locational clearance, the concerned industrial establishment or project promoter can start related activities including land development, construction of infrastructure or facilities, and opening of Letters of Credit (L, C).



3.4.6.2 Environmental Impact Assessment (EIA) Survey

(1) A red-category industrial establishment or promoter of a project shall prepare an environmental impact assessment report by conducting an environmental impact assessment survey by a registered environmental consultant in accordance with the guidelines laid down by the Department:

Provided that the environmental impact assessment guidelines of any international or development aid organization shall be followed for conducting the environmental impact assessment survey of those sectors for which the department does not have environmental impact assessment guidelines and in this case considering whether it is contrary to the plans, policies or decisions adopted by the government. have to do

(2) Enrolled environmental consultants shall carry out their activities independently and impartially in consultation with all concerned in conducting environmental impact assessment studies;

Provided, however, that the entrepreneur shall be consulted and consulted in formulating the environmental management plan and monitoring program.

(3) The Enlisted Environmental Consultants shall follow the guidelines set out in Schedule-11 in preparing the Environmental Impact Assessment Report and the Environmental Management Plan Report as part of this report.

(4) All the activities, steps, plans or monitoring programs mentioned in the environmental management plan of a red class industrial establishment or project shall be properly followed to the concerned entrepreneur shall be given a declaration in accordance with Form-6.

Certain criteria and conditions have also been established by the DoE for an industrial plant or project. These are as follows:

- The location of the industry should be in an area that is/will be designated as an industrial zone, under the town and country planning regulations.
- While selecting sites for red and orange categories, a few considerations are to be kept in mind environmentally/otherwise sensitive areas: nearest human settlement, highway/railway boundary, and high tide line (coastal regions) or natural/modified flood plain boundary.
- Forest land and prime agricultural land should be avoided as far as practicable.
- The plant should adequately provide for storage of solid wastes, treatment of wastewater, use of treated wastewater (if feasible), and a green belt around the perimeter.
- Highly polluting industrial plants should not be located in the vicinity of a recharge area/aquifer, catchment areas prone to floods/earthquakes, and areas of frequent inversions.
- Other factors also need to be considered like induced growth around the industrial site, views of the likely project-affected people, effects on the availability of existing



infrastructural facilities to the local population, and assimilative capacity of the receiving body of water.

- It is advisable to shortlist a few potential sites keeping in mind the above criteria, and then select a site with minimal environmental impacts.

Environmental standards in operation in Bangladesh are also promulgated under the Environment Conservation Rules 2023. There are standards prescribed for varying water sources, ambient air, noise, odor, industrial effluent, emission discharges, vehicular Emission, etc.

The Bangladesh standards intend to impose restrictions on the volume and concentrations of wastewater/solid waste/gaseous emission etc. discharged into the environment. In addition, a number of surrogate pollution parameters like Biological Oxygen Demand, Chemical Oxygen Demand; Total Suspended Solids, etc. are specified in terms of concentration and/or total allowable quality discharged in case of wastewater/solid waste. Additionally, specific parameters depending on the manufacturing process are specified such as phenol, cyanide, copper, zinc, chromium, etc. Air emission-quality standards refer mostly to the concentration of mass emission of various types of particulates, sulfur dioxide, and oxides of nitrogen and in some cases volatile organic compounds and other substances.

The Bangladesh standards in general are less stringent compared to the developed countries. This is in view to promote and encourage industrialization in the country. The Bangladesh standards are not for any specific period. There is no provision for partial compliance too.

Standards for water, ambient air, noise, etc. are shown in Table.

3.4.7 The Ground Water Management Act, 2018

The Ground Water Management Act, 2018 has repealed the previous Ground Water Management Ordinance, 1985. This Act is to manage the groundwater resources for agricultural production. This document describes the effects of the law that are inconsistent with the ordinance, Upazila irrigation committee, license for tube well and existing tube well, suspension and revocation of license, cancellation of license, supply of tube well by corporation, power to make rules and power to exempt.

But this Act has no provision related to civil society participation. The Act does not address industrial, commercial and other abstraction, protection of groundwater (e.g. recharge, conjunctive use of surface and groundwater, rainwater harvesting, long term planning, punishment of water mining, etc.), integrated use of ground and surface water, absence of central monitoring/regulation mechanism, safe and sustainable abstraction of groundwater monitoring of quantity and quality of groundwater, water pollution, and water safety issues.

3.4.8 Water Supply and Sewerage Authority Act, 1996

Water Supply and Sewerage Authority Act, 1996 was enacted to develop water supply and sanitation systems and to deliver water supply, sewerage, and stormwater drainage services. It provides for autonomous corporate management structures of Water Supply and Sewerage Authority (WASAs) which are answerable to their respective Boards of Directors representing a range of stakeholders. No person can abstract, treat, pump, preserve or supply of water or



construct sewerage, pumping, and treatment plant within its jurisdiction. But the authority is not at all concerned about the industrial effluents. The matter of ensuring water quality has been neglected in this act. There is no provision for monitoring the water table, collecting data, maintaining databases, and long-term planning for sustainable use and management of water resources.

3.4.9 National Energy Policy 1995

The National Energy Policy (1995) addresses both energy conservation and environmental issues. The National Energy policy suggests the utilization of energy for sustainable economic growth, supply to different zones of the country, development of indigenous energy sources and ensuring environmentally sound and sustainable energy development programs causing minimum damage to the environment.

The Environment Policy and the Energy Policy have seven recommendations; three of these are relevant to the proposed project:

- Environmental Impact Assessment should be made mandatory and should constitute an integral part of any new energy development project.
- Use of economically viable environment-friendly technology is to be promoted.
- Popular awareness to be promoted regarding environmental conservation.

3.4.10 Solid Waste Management Regulations, 2021

The **Solid Waste Management Regulations 2021** were published in Bangladesh on December 23, 2021, under the Bangladesh Environmental Protection Act, 1995. The Regulations define the responsibilities of businesses involved in solid waste management and impose collection, recycling, and disposal obligations according to **Extended Producer Responsibility (EPR)** on manufacturers of non-biodegradable products such as glass, plastic, and bottles. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery.

The main provisions of the Regulations are as follows.

- When recovering resources from waste, the principles of management that consider the waste hierarchy, such as the 3Rs, segregation, and reduction, must be followed at all stages from waste generation to final disposal.
- Responsibilities of waste generators, consumers, and users:
 - a) Dispose of waste in accordance with the regulations of authorities including local government.
 - b) Dispose of waste separately.
 - c) Do not dump, store, or burn waste outdoors.
- Responsibilities of manufacturers (*not defined) and importers of products
Collect non-biodegradable products such as glass, plastic, polyethylene, multi-layered packaging, bottles, and cans from consumers and recycle or dispose of them if appropriate.
 - a) Determine work plans and implementation procedures for recycling and disposal.
 - b) Ensure that EPR is properly implemented.



c) Submit an annual report to the Department of Environment (DOE) on the amount of plastic recycled.

- Raise public awareness of proper waste management.

Any violation of the above provisions shall be subject to imprisonment for not more than two years or a fine not exceeding 200,000 taka (approximately 270,000 yen), or both. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery.

3.4.11 Hazardous Waste (e-waste) Management Rules, 2021

Bangladesh's Department of Environment (DOE) published the Hazardous Waste (e-waste) Management Rules, 2021 under the Bangladesh Environmental Protection Act, 1995. The E-waste rule covers the products listed in the Schedule (home appliances, monitoring and control equipment, medical equipment, automatic machines, IT and communication equipment), and establishes obligations for manufacturers, assemblers, collectors, sellers, and consumers of the products. The rule also sets provisions to limit the use of the 10 substances covered by the EU RoHS Directive. This regulation entered in force upon publication.

The main provisions of this regulation are as follows.

- Manufacturers, traders, sellers, transporters, repairers, collection centers, recyclers, dismantlers, etc. of the subject products are required to register with a prescribed form to the DOE. When applying for registration, they shall also submit WEEE management plan.
- Registered manufacturers, recyclers, etc. shall obtain environmental clearance in accordance with the Bangladesh Environmental Protection Rules, 1997.
- Manufacturers have to establish individual or joint collection centers and set aside funds for the management of WEEE.
- For fluorescent lamps and mercury incandescent lamps, if they cannot be recycled, they need to be handed over to collection centers for storage and disposal.
- Manufacturers, importers, etc. shall meet the collection targets for WEEE as specified in the Schedule (10% in the first year of the implementation, 20% in the second year, 30% in the third year, 40% in the 4th year, and 50% in the fifth year and thereafter).
- In order to facilitate the proper management of WEEE, the name, address and contact information of the trader or seller as well as the information on the registered collection center shall be displayed on the product or on the product label, or this information shall be provided to consumers or large consumers.
- Traders, sellers and collectors of WEEE shall receive them from consumers at designated points and transport them to collection centers.

In case of violation of the provisions of these rules, the offender shall be liable to imprisonment for a maximum period of two years or to a fine of up to two hundred thousand taka, or to both, in accordance with Section 15(1) of the Bangladesh Environmental Protection Act, 1995. In case of repeat offenders, they shall be punished with imprisonment for a term ranging from two to ten years or a fine ranging from Taka 200,000 to Taka 1,000,000 or both.



3.4.12 Noise Pollution Control Act, 2006

Noise Pollution (Control) Rules 2006 were adopted under Section 20 of the Bangladesh Environment Conservation Act 1995 with a view to laying down the specific guidelines regarding noise pollution and the degree of allowable noise in different areas.

The rules categorize noise levels for five types of areas, those are silent areas, residential areas, mixed areas, commercial areas, and industrial areas. This Act also permitted a certain level of noise for these areas.

The permitted noise level for residential areas is 55 decibels at day and 45 decibels at night.

In industrial areas, the limit is 75 decibels at day and 70 decibels at night. 6 am and 9 pm is considered as daytime while the remaining hours are considered as night-time. However, these rules do not apply to religious events, Mosques or Temples.

The Rules also mentioned that no construction machines used to process and break down building materials (bricks, stones, etc.) shall be used within 500 meters of any residential areas and such types of machinery cannot be used between 7 pm and 7 am except without the permission of the concerned authorities.

Violation of these Rules is a punishable offense, with imprisonment up to 1 month and/or fine up to 5,000 BDT. For repeated offense, one may be imprisoned up to 6 months and/or fined up to 10,000 BDT. Loud horns and excessive honking is not yet punishable but it should be, it is one of the major cause of excessive noise.

This Act defined a set of regulations for controlled noise in some ways, but it is largely ignored by most of the people in our country, as we are seeing a gross violation of this Law everywhere in Bangladesh.

3.4.13 Air Pollution Control Rules, 2022

The Ministry of Environment, Forest and Climate Change (MoEF) of Bangladesh released the draft Air Pollution Control Rules 2021, which aims to manage air pollution for environmental conservation and sustainable development on March 18, 2021 and is inviting public comments. The draft Rules are regarded as subordinate regulations of the Bangladesh Environment Conservation Act, 1995 and its main provisions are as follows.

- The Rules stipulate environmental air quality standards (general standards), emission standards for vehicles, emission standards applicable to industries or projects, and odor standards.
- After the promulgation of the Rules, the Department of Environment (DoE) shall prepare a National Air Quality Management Plan that includes an organizational working framework and efficient management of indoor air quality. When preparing the National Air Quality Management Plan, the standards and methods specified in the Rules shall be followed.
- The DoE shall prepare and publish a list of industries, projects, and activities that are harmful to the environment and human health. For the industries and activities included

in the list, the DoE shall establish emission standards and conditions for management as appropriate.

- In order to control air pollution from motor vehicles, the regulatory authority for motor vehicles shall comply with the standards and control methods specified in the Rules and follow the work procedures recommended in the National Air Quality Management Plan.
- The DoE may inspect the emissions of motor vehicles and restrict the movement of old motor vehicles that give off emissions exceeding the standards. The DoE may also regulate and prohibit certain engines in order to enforce the standards and control methods specified in the Rules.
- Local government organizations, construction management authorities, and other relevant organizations shall comply with the standards and control methods specified in the Rules and follow the work procedures recommended in the National Air Quality Management Plan.

The Rules also provide for the prevention of air pollution from hazardous waste, excessive emissions of air pollutants, air quality monitoring and warning, data management, establishment of a national executive committee for air pollution control, measures to prevent damage to ecosystems caused by air pollution, awards for contributions to air pollution control, and penalties for violations.

3.4.14 Standing Orders on Disaster, 2010

The Standing Orders on Disaster is designed to enhance capacity at all tiers of government administrative and social structures for coping with and recovering from disasters. The document contains guidelines for construction, management, maintenance, and use of the cyclone shelter center. Accordingly, to the guideline, geographical information system (GIS) technology will be applied at the planning stage to select the location of cyclone shelter considering habitation, communication facilities, and distance from the nearest cyclone center.

The advice of the concerned District Committee is to be obtained before the final decision. The cyclone shelters should have easier communication facilities so that in times of distress delay does not occur to go there. For this reason, the road communication from the cyclone shelters should not only link up with the city or main road but also with neighboring village areas. Provision of emergency water, food and sanitation, and shelter space for livestock during the period should also be kept in view for future construction of shelters.

3.4.15 National Land-Use Policy, 2001

The Government of Bangladesh has adopted the national Land use Policy, 2001. The salient features of the policy objectives relevant to the proposed are as follows:

- To prevent the current tendency of gradual and consistent decrease of cultivable land for food production to meet the demand of explaining populations.
- To ensure that land use is in harmony with the natural environment,
- To use land resources in the best possible way and to play a supplementary role in controlling the consistent Increase In the number of landless people towards the elimination of poverty and the increase of employment,
- To protect natural forest areas, prevent river erosion and destruction of hills;



- To prevent land pollution, and
- To ensure the minimal use of land for construction of both government and non-government.

3.4.16 Acquisition and Requisition of Immovable Property Ordinance, 1982

The 1894 Land Acquisition Act and the 1948 East Bengal (Emergency) Requisition of Property Act were replaced by the comprehensive 1982 acquisition and requisition of Immovable Property Ordinance (Ordinance □ of 1982). This 1982 Ordinance governs all cases of acquisition and requisition of immovable property by the Government for any public purpose or Public Interest.

Salient features of Acquisition and Requisition of Immovable Property Ordinance of 1982.

Matters to be considered in determining compensation include,

- The market value of the property;
- Damage to standing crops or trees due to acquisition,
- Damage due to severance of acquired property from other property at the time of the actual taking of permission by concerned authorities;
- Damage due to lowering of profit to the property acquired between the serving of acquisition notice and actual acquisition.

3.4.17 Property (Emergency) Acquisition Act, 1989

Following the devastating floods of 1987 and 1988, the Government passed a new land acquisition law entitled Property Emergency Acquisition (Act ix of 1989). This 1989 Act was promulgated to expedite land acquisition in an emergency for flood control purposes and to prevent river erosion. The 1989 Ordinance is only in special content. The 1989 Act was meant to remain in force for five years. There are no additional provisions in the 1989 Act to ensure fair payment of compensation. However, stricter time limits may be applied under the 1989 Act to enable the prompt payment of compensation monies.

Salient features of Acquisition and Reacquisition of Immovable Ordinance of 1982 the relevant points of the 1982 law are as follows:

- Property means only immovable property (land and buildings) and includes any right in such property.
- Owners include the occupiers.

Matters to be considered in determining compensation include;

- The market value of the property.
- Damages to standing crops or trees due to acquisition.
- Damages due to severance of acquired property from other property at the time of the actual taking of permission by concerned authorities.
- Damage due to other properties or earnings.
- Expensed for relocating of residence.
- Damage due to lowering of profit, the property to be acquired between the serving of acquisition notice and actual acquisition.



3.4.18 ECA (Ecologically Critical Area) Provision

An Ecologically Critical Area (ECA) is an environmental protection zone in Bangladesh. In 1995, specific areas in Bangladesh could be deemed Ecologically Critical Areas as a result of the Environmental Conservation Act. There is a multitude of areas that have been considered ECAs. Cox's Bazar is on the border of Bangladesh and Myanmar in the southeast corner of Bangladesh. The Teknaf Peninsula is 80 km of sandy beach and holds a variety of species as one of the longest beaches in the world. The Sonadia Islands are home to some of the last mangrove forests that house distinct species that can tolerate the high salinity of the mangrove forests in this area. The Sundarbans also contain mangrove forests and was named an ECA because it continues to suffer from over-exploitation and illegal urban development. St. Martin's Island is known for its coral algal that overwhelms its rocky reefs. The island is a refuge for globally threatened marine species. Finally, the Hakaluki Haor found in greater Sylhet is an ECA because it has an extensive amount of wetland habitats that support a wide variety of life.

3.4.19 Investment Board Act, 1989

Board of Investment, established under this act, is the principal private investment promotion and facilitation agency of Bangladesh which is responsible for the implementation of provisions of the above-said policy.

Under the provision of this act as per Schedule 11, All industries established in non-governmental sectors licensed by the Board shall be registered in the prescribed manner.

As per Schedule 15 of this act, any industrial undertaking licensed transgresses any provision of this Act or any rule made thereunder or breaks any condition relating to the license, the Board may, in such manner as may be prescribed, cancel the license of the industrial undertaking.

3.4.20 Convention on Biological Diversity (CBD)

Fifth National Report of Bangladesh (2015) to the CBD has been considered while preparing this IEE report. The coastal and marine ecosystems along with aquatic biodiversity (aquatic flora and fauna) have been emphasized in conducting this IEE report.

3.4.21 Environment Court Act, 2010

In 2010 the Environment Court Act, 2010 has been passed and the Act of 2000 has been repealed. The present Act is aimed to establish one or more Environment Court/s in each district & to establish Environment Appellate Court. It defines the jurisdiction of the Environmental Court for trial of offence or for compensation under environmental law (ECA 1995). The enacted ECA and ECR did not appear to be suitable for traditional Court (Adalat) system in Bangladesh where huge number of cases needed to be disposed in quick time.

Guiding legislations: ECA1995, ECR1997, The Code of Civil Procedure 1908, The Code of Criminal Procedure, 1898, Penal Code 1860.

Salient Features of the Environment Court Act

- Environment court constitutes one Judge of the rank of Joint District Judge.



- Provides for the establishment of one or more Special Magistrate Court/s with the Magistrates of the first class or Metropolitan Magistrates in each District to deal with offences punishable with less than 5 (five) years imprisonment or 5 (five) lac taka as fine or both
- DG, DoE can file the case directly with the special magistrate's court or file a complaint with the police station under criminal procedure.
- DG, DoE or anyone directed by the court can enter any place for inspection, search, collect evidence or seizure.
- Investigation carried out by an Inspector or any officer subordinate to the DG, DoE. He will have the same powers as an OC of a police station.

3.5 Local Government Laws

Corporations shall make adequate arrangements for the removal, collection, and proper disposal of refuse (Section 77 of the Chittagong City Corporation (CCC) Ordinance, 1982; Dhaka City Corporation sec. 78; Rajshahi City Corporation sec. 77; Khulna City Corporation sec. 75; Barisal City Corporations sec. 85 and Sylhet City Corporation sec. 85).

- Local Government (Union Parishad) Act 2009 (Lowest level of local government). This Act has given Union Parishad a few tasks of water management in its 2nd schedule.
- Local Government (Pourashava) Act 2009 (District Level Local Government). By the Act Pourashava has been given some of the authority of water management. Article 11 of the 2nd schedule of the Act says about permission for personal source of water in Pourashava area. Discharge of water is discussed in Article 12 and provision of government water body is mentioned in Article 16.
- Local Government (City Corporation) Act 2009. City Corporation has been entrusted with some of the authority of managing water resources in the areas under its jurisdiction.
- Upazila Parishad Act 1998. Upazila Parishad is entitled under 2nd schedule of the Act to manage water resource to a small context.
- District Council (Zila Parishad) Act 2000. District Council has been authorized to manage water resources (water supply, discharge of water, conservation of water and water resources etc.) in the areas under its jurisdiction by this Act.

As local public representatives are included in the IWRM committees under Water Rules 2018, they should be more empowered by law.

3.6 Procedure for Obtaining Site/Environmental Clearance

3.6.1 Requirement for Environmental Impact Assessment (EIA) Report

All industries and projects in the Red category have to conduct EIAs which help in understanding the potential extent of environmental changes and in finding mitigation measures by considering the available information of past experience or standard operating practices. The steps for conducting EIA are:

- Collection of baseline information in respect of the project and the environmental setting of the project and its site.
- Setting of boundaries of an EIA by identifying the significant issues.



- Impact assessment suggesting mitigation measures, Environmental Management Plan (EMP) or alternative sites or other project modifications.

3.6.2 Procedure

After completion of the EIA Report the project proponent should apply to the DOE in the prescribed format for site/ environmental clearance. The application for environmental clearance for the project classified in the Red Category should be accompanied by the following documents:

- Feasibility Study Report of the industry (project)
- EIA report
- An NOC (No Objection Certificate) from the local authorities concerned
- Pollution minimization plan including an emergency plan for mitigation of adverse environmental impacts
- Outline of relocation plans (where applicable)
- Other information as deemed necessary

It is also mentioned in the Environment Conservation Rules that the Director General of the Department of Environment can issue environmental clearance directly without issuing any site clearance to any industry or project if he (the Director General) finds an appropriate reason for doing so. As the proposed Construction of gelatin production falls under the "RED" category, all necessary requirements mentioned above will be adopted for the project.

Environmental Conservation Rules-2023 ensures the right of any aggrieved party to appeal against the notice order or decision to the appellate authority. The appeal should be made to the appellate authority with clear justification and the attested copy of the DoE office against, which the appeal is to be made. The focus of the ECR, 2023 lies with the classification of industries into three main categories, i.e., Green, Yellow, Orange, and Red, based on their pollution potential. Documents require by respective DoE divisions for different categories are as follows:

For Green Category:

- General information about the industrial unit or project;
- The exact description of the raw materials and the manufactured product;
- No objection Certificate from the local authority.

Orange listed industries fall under two sub-categories:

For Yellow Category:

- General information about the industrial unit or project;
- The exact description of raw materials and manufactured products;
- No objection Certificate from the local authority;
- Process flow diagram;
- Layout Plan (showing location of Effluent Treatment Plant);
- Effluent discharge arrangement;



- Outline of the plan for relocation and rehabilitation (if applicable)
- Other necessary information (if applicable).

For Orange Category:

- Report on the feasibility of the industrial unit or project (applicable only for proposed industrial unit or project)
- Report on the Initial Environmental Examination (IEE) of the industrial unit or project, and also the process flow diagram, Layout Plan (showing the location of Neutralization Treatment Plant), design of the Neutralization Treatment Plant (NTP) of the unit or project (these are applicable only for a proposed industrial unit or project);
- Report on the Environmental Management Plan (EMP) for the industrial unit or project, and also the Process Flow Diagram, Layout Plan (showing the location of Neutralization Treatment Plant), design of the Neutralization Treatment Plant, and information about the effectiveness of NTP of the unit or project, (these are applicable only for an existing industrial unit or project);
- No objection certificate from the local authority;
- Emergency plan relating adverse environmental impact and plan for mitigation of the effect of pollution;
- Outline of the relocation, rehabilitation plan (where applicable);
- Other necessary information (where applicable).

For Red Category:

- Report on the feasibility of the industrial unit or project (applicable only for proposed industrial unit or project);
- Report on the Environmental Impact Assessment (EIA) relation to the industrial unit or project, and also the terms of reference for the Environmental Impact Assessment of the unit or the project and its Process Flow Diagram; or Environmental impact Assessment report prepared based on terms of reference previously approved by the Department of Environment, along with the Layout Plan (showing the location of Neutralization Treatment Plant), Process Flow Diagram, design and schedule of the Neutralization Treatment Plant of the unit or project, (these are applicable only for a proposed industrial unit or project);
- Report on the Environmental Management Plan (EMP) for the industrial unit or project, and also the Process Flow Diagram, layout Plan (showing the location of Neutralization Treatment Plant), design, and information about the effectiveness of the Neutralization Treatment Plant of the unit or project (these are applicable only for an existing industrial unit or project);
- No objection Certificate of the local authority;
- Other necessary information

The process of getting Environmental Clearance is given in the following figure-

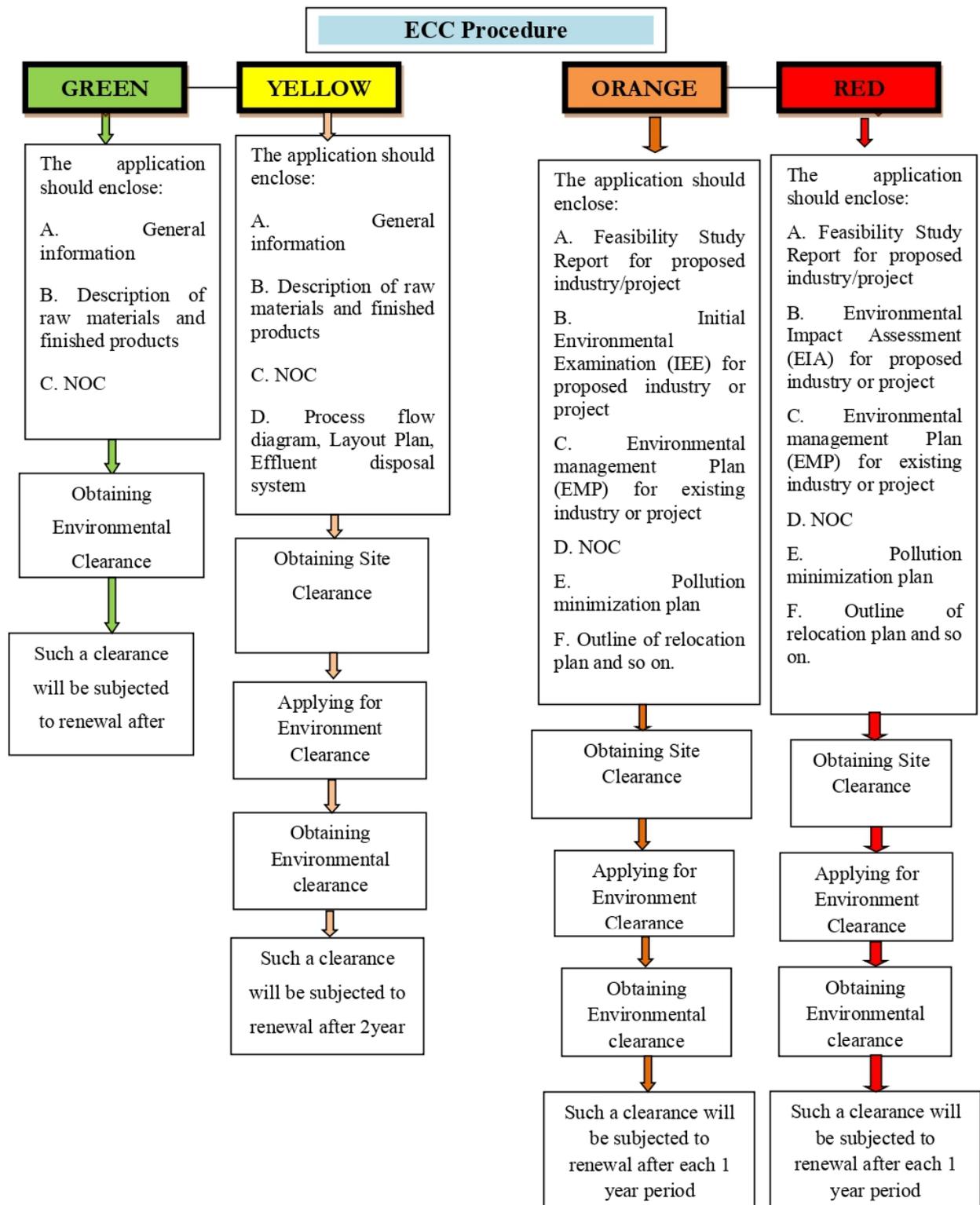


Figure 3:1 Diagram of ECC Procedure

3.7 International and National Environmental Standards/Guidelines

Bangladesh Environmental standards and guidelines relevant to the construction and operation of the project cover the following issues:

- Water Quality
- Atmospheric emissions and ambient air quality;
- Liquid effluent discharges
- Noise emissions and ambient noise levels.

3.7.1 Water Quality

Table 3:1 Standard for Inland Surface Water

Best practice-based classification	Parameter												
	PH	DO mg/1	BOD mg/1	NO ₃ -N mg/1	NH ₄ -N mg/1	PO ₄ -P mg/1	Total Cr mg/1	Pb mg/1	Hg mg/1	Total Coliform Number/100ml	TDS mg/1	COD mg/1	
1. Source of drinking water for supply only after disinfecting	6.5-8.5	≥6	≤2	7	0.1	0.1	0.02	0.03	0.001	≤100	1000	10	
2. Water usable for recreational activity	6.5-8.5	≥5	≤3	7	0.3	0.5	0.2	0.05	0.001	≤50	1000	10	
3. Source of drinking water for supply after conventional treatment	6.5-8.5	≥5	≤3	7	0.3	0.5	0.02	0.03	0.001	≤5000	1000	25	
4. Water usable by fisheries	6.5-8.5	≥5	≤6	7	0.3	0.5	0.05	0.1	0.004	≤5000	1000	50	
5. Water usable by various process and cooling industries	6.5-8.5	≥1	12	-	2.7	-	0.1	0.1	0.05	-	1000	100	
6. Water usable for irrigation	6.5-8.5	-	≤12	5	1.5	2.0	0.1	0.1	0.002	≤50000	1000	100	

Source: Schedule 2, Environmental Conservation Rules-2023, Inland surface water parameter

Notes:

1. Electrical conductivity for irrigation water –2250 $\mu\text{mhoms/cm}$ (at a temperature of 25°C); Sodium less than 26%; boron less than 0.2%.

Table 3:2 Standards for Drinking Water

S.N.	Parameter	Unit	Standards
1.	Fecal Coliform	CFU/100 ml	0
2.	Total Coliform	”	0
3.	Free Residual Chlorine	mg/l	0.20
4.	Nitrate (NO_3)	mg/l	45
5.	Arsenic (As)	mg/l	0.05
6.	Turbidity	NTU	5
7.	Aluminum	mg/l	0.20
8.	Ammonia (NH_3)	”	1.50
9.	Barium (Ba)	”	0.70
10.	Benzene (C_6H_6)	”	0.01
11.	Boron (B)	”	1.0
12.	Cadmium (Cd)	”	0.003
13.	Calcium	”	75
14.	Chloride	”	250*
15.	Carbon Tetra-chloride (CCL_4)	mg/l	0.005
16.	1,1 Dichloro Ethylene (1,1 $\text{C}_2\text{H}_4\text{Cl}_2$)	”	0.03
17.	1,2 Dichloro Ethylene (1,2 $\text{C}_2\text{H}_4\text{Cl}_2$)	”	0.03
18.	Tetrachloro Ethylene ($\text{C}_2\text{H}_4\text{Cl}_2$)	”	0.04
19.	Trichloro Ethylene ($\text{C}_2\text{H}_3\text{Cl}_3$)	”	0.02
20.	Pentachlorophenol	mg/l	0.09

21.	2,4,6 trichlorophenol	”	0.20
22.	Chloroform	”	0.09
23.	Total Chromium (Total Cr)	”	0.05
24.	Color	Hazen Unit	15
25.	Copper	mg/l	1.5
26.	Cyanide (CN)	”	0.05
27.	Fluoride	”	1.0
28.	Hardness (as CaCO ₃)	”	500
29.	Iron (Fe)	”	0.3-1.0
30.	Total Kjeldhl Nitrogen	”	1.0
31.	Lead (Pb)	”	0.01
32.	Magnesium (Mg)	”	30-35
33.	Manganese (Mn)	”	0.4
34.	Mercury (Hg)	”	0.001
35.	Nickel (Ni)	”	0.05
36.	Nitrite (NO ₂)	”	1.0
37.	Odor	-	Odorless
38.	Oil and grease	mg/l	0.01
39.	p ^H	-	6.5-8.5
40.	Phenolic compounds	mg/l	0.002
41.	Potassium (K)	”	12
42.	Radioactive materials (gross alpha activity)	Bq/l	0.1
43.	Radioactive materials (gross beta activity)	”	1.0

44.	Selenium (Se)	mg/l	0.01
45.	Silver	”	0.02
46.	Sodium (Na)	”	200
47.	Suspended Solid (SS)	”	10
48.	Sulfide as H ₂ S	”	0.05
49.	Sulfate (SO ₄ ⁻²)	”	250
50.	Total dissolved solids (TDS)	”	1000
51.	Temperature	°C	20-30
52.	Tin (Sn)	mg/l	2.0
53.	Zinc (Zn)	mg/l	5.0
54.	Aldrin/Dieldrin	µg/l	0.03
55.	Anionic detergent	mg/l	0.2

Source: Environmental Conservation Rule-2023, Schedule-2, Standards for drinking water

Note

*For estuarine area 1000 mg/l

Table 3:3 Standard for Sewage Discharge

Parameter	Unit	Standard Limit
Temperature	Degree Centigrade	30
pH	-	6-9
BOD ₅ at 20°C	mg/l	30
COD	mg/l	125
Suspended Solids (SS)	mg/l	100
Oil & Grease	mg/l	10
Nitrate (NO ₃)	mg/l	50
Phosphate (PO ₄)	mg/l	15
Total Coliform	Number/100 ml	1000

Source: Environmental Conservation Rule-2023, Schedule-6, Standards for sewage discharge

Note: 1. The limit shall be applicable to discharges into surface and inland water bodies.

2. Sewage shall be chlorinated before final discharge.

3.8 Ambient Air Quality

Table 3:4 Standards for Air

S.N.	Categories of Area	Suspended	Sulphur-	Carbon	Oxides of
		Particulate	dioxide	Monoxide	Nitrogen
		Maters (SPM)	(SO ₂)	(CO)	(NO _x)
		$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
a.	Industrial and mixed	500	120	5000	100
b.	Commercial and mixed	400	100	5000	100
c.	Residential and rural	200	80	2000	80
d.	Sensitive	100	30	1000	30

Source: Schedule 2, Environmental Conservation Rules, 1997

Notes:

1. At national level, sensitive area includes monuments, health center, hospital, archeological site, educational institution, and government designated areas (if any).
2. Industrial units located in areas not designated as industrial areas shall not discharge pollutants which may contribute to exceeding the standard for air surrounding the areas specified at Sl. nos. c and d above.

Suspended Particulate Matter means airborne particles of a diameter of 10 micron or less.

Table 3:5 Standard for Odor

Sl. No.	Parameter	Unit	Value
1	Acetaldehyde	Ppm	0.5-5
2	Hydrogen sulfide	Ppm	0.02-0.20
3	Methyl disulfide	Ppm	0.009-0.10
4	Methyl mercapted	Ppm	0.02-0.20
5	Methyl sulfide	Ppm	0.01-0.20
6	Styrene	Ppm	0.4-2
7	Tri-methyl-amine	Ppm	0.005-0.07

8	Ammonia	Ppm	1-5
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Source: Environmental Conservation Rule-1997, Schedule-8, Standards for odor.

Table 3:6 Standard for Emission from motor vehicles

Parameter	Unit	Standard Limit
Black Smoke	Hartridge Smoke Unit (HSU)	65
CO	gm/km	24
	percent area	04
Hydrocarbon	gm/km	02
	ppm	180
NOx	gm/km	02
	ppm	600

Source: Environmental Conservation Rule-1997, Schedule-6, Standards for emission from motor vehicles *As measured at two thirds of maximum rotating speed.

Table 3:7 Approved Air Quality Index (AQI) for Bangladesh

Air Quality index (AQI) Range	Category		Color
	In English	In Bangla	
0-50	Good	Bhalo	Green
51-100	Moderate	-	Yellow Green
101-150	Caution	-	Yellow
151-200	Unhealthy	Ashasthykar	Orange
201-300	Very Unhealthy	Khub Ashasthykar	Red
301-500	Extremely Unhealthy	Ottanta Ashasthykar	Purple

Source: ECR, 1997

3.8.1 Ambient Noise Standards

The MoEF under the provisions of ECR, 1997 is responsible for laying down ambient noise standards. Noise Pollution (Control) Rules, 2006 were laid down by the Ministry through a Gazette notification dated September 7, 2006. Ambient noise standards established as per the provisions Rule 5(2) of the aforementioned Rules have been furnished in the following table.

Table 3:8 Standards for sound

SN	Category for sound	Standards determined (dBA)	
		Day	Night
a.	Silent Zones (Sensitive areas such as parks, school, hospitals and mosques)	45	35
b.	Residential areas	50	40
c.	Mixed areas (mainly residential area, and also simultaneously used for commercial and industrial purposes)	60	50
d.	Commercial areas	70	60
e.	Industrial areas	75	70

Source: Schedule 4, Environmental Conservation Rules, 1997

Notes

1. The time from 6 a.m. to 9 p.m. is counted as daytime.
2. The time from 9 p.m. to 6 a.m. is counted as night time.
3. Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

Chapter 4: Project Description

4.1 General Information

Gelatine has demonstrated its versatility in applications for the **pharmaceutical industry and medicine**. It can be used in the production of capsules or tablets or as a constituent of wound dressings, hemostatic sponges, or blood volume substitutes.

Industrial gelatin cannot be eaten by humans. The raw material is different from the edible or pharmaceutical gelatin. Although it is not edible, it can play an important role in the technical area. Generally speaking, industrial gelatin does not have too many requirements as edible gelatin except photographic film. The main function is the stickiness and filming. The glue and photographed film is the main application.

Bangladesh JW Animal Protein Co. Ltd. is going to be a registered gelatin manufacturer in Bangladesh, specializing in providing capsules for pharmaceutical and health product companies. The company has always attached importance to environmental protection and knows that the development of the enterprise should combine economic, social and environmental benefits to be an environmentally friendly enterprise. The company plans to implement the wastewater treatment project, which is completed and put into operation together with the new plant as a three-time project.

Bangladesh JW Animal Protein Co. Ltd. intends to build a gelatin manufacturing factory at **Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka**. The total land area of the proposed project will be **100 decimals**. The project is determined to provide the people of Bangladesh with best quality halal gelatin for pharmaceutical capsule production. Moreover, it will provide huge job opportunities for a large population from the local community also help to the economic growth of the country.

Bangladesh JW Animal Protein Co. Ltd. initially intends to produce 900 tons of gelatin from cow skins annually. The raw material will be collected from local tannery industries that are used to be disposed into environment as tannery solid waste. All the project activities will be conducted under a single production shade. The project cost will be approximately **6,71,03,610/-** BDT.

4.2 Objectives of The Project

Bangladesh JW Animal Protein Co. Ltd.'s mission is to manufacture high quality halal gelatin from wastage cow skin of tannery factories, to fulfill the demand of gelatin capsule shell in pharmaceutical industries.

The objective of the project are as follows-

- To provide the pharmaceutical industries with best quality gelatin for encapsulation.
- Utilize the massive amount of tannery wastage into valuable gelatin.
- To take part in reduction in import of gelatin from overseas.
- To contribute GDP of the country.
- To create new employment opportunities.
- To earn an optimum benefit through honest investment.

- To contribute to the ultimate development of the country.

4.3 Basic Information

Basic information about the project are as follows-

Basic Information about “Bangladesh JW Animal Protein Co. Ltd.”		
S.N.	Particulars	Information
01	Name of the Project	Bangladesh JW Animal Protein Co. Ltd.
02	Project Type	Edible gelatin manufacturing industry
03	Nature of Investment	Foreign (China)
04	Project Proponent	Mr. Yu Qingyuan
05	Designation	Managing Director
06	Project Address	Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka
07	Project Area	100 decimals
08	Product	Edible gelatin
09	Production Capacity	900 Ton/Year
10	Raw Materials	Salted cow skin, cutting pieces, leather waste without chemicals
11	Raw Material Quantity	5400 Ton/Year
12	Source of Raw Material	Local tannery industries
13	Project Cost	BDT 6,71,03,610/=
14	Power Requirement	600 kVA
15	Connected Load	REB
16	Fuel Type	Natural gas, Diesel
17	Fuel Quantity	20,000 CFT gas, 100-150 liters diesel
18	Source of Fuel	Titash, diesel from local petrol pumps
19	Generator	2 Nos (500kW/ 600kW)
20	Boiler	2 Nos (2ton & 8ton)

21	Sources of Water	Own deep tubewell
22	Total Water Requirement	160 m ³ /day approximately
23	Wastewater Generation	150 m ³ /day
24	ETP Capacity	6.3 m ³ /hr
25	Solid Waste	4-5 kg domestic solid waste e.g., plastic, packaging waste, food waste. The solid by-products from production will be used for animal feed and soap production.
26	Employment	120 persons
27	Factory Running Time	24 hours- 3 Shifts
28	Surroundings of the project	North: Vacant area around 250m, Kaizen Metal Industries Bd. Ltd., Dhaka Aricha Highway South: Khal, Nabinogor Textile Ltd., Aaron Denim Limited, Uzzal Fabrics ltd. East: Berger Becker Bangladesh Limited West: Vacant area, Semi Pacca Road, Local residents

4.4 Location of The Project

Bangladesh JW Animal Protein Co. Ltd. will have a total area of 100 decimal located at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka situated between 23° 54' 52" North latitudes and 90° 14' 34" East longitudes. The project is located in a mixed industrial, residential zone. It is bounded by open spaces, medium to large industrial setups and few local shops and residential houses. The project location is connected to the Dhaka Aricha Highway with a local road of about 20ft. wide.

The access way of the factory is very simple. Facility is located near the main road of Dhaka-Aricha high way with a very short distance (250m) of sub way. It is very convenient to locate the factory. The location of **Bangladesh JW Animal Protein Co. Ltd.** is about 33 km away from Shahjhal International Airport & it will take about 1 hour to reach the site from airport.

The location map, location direction from Google map, and satellite images have been given in the following figures.



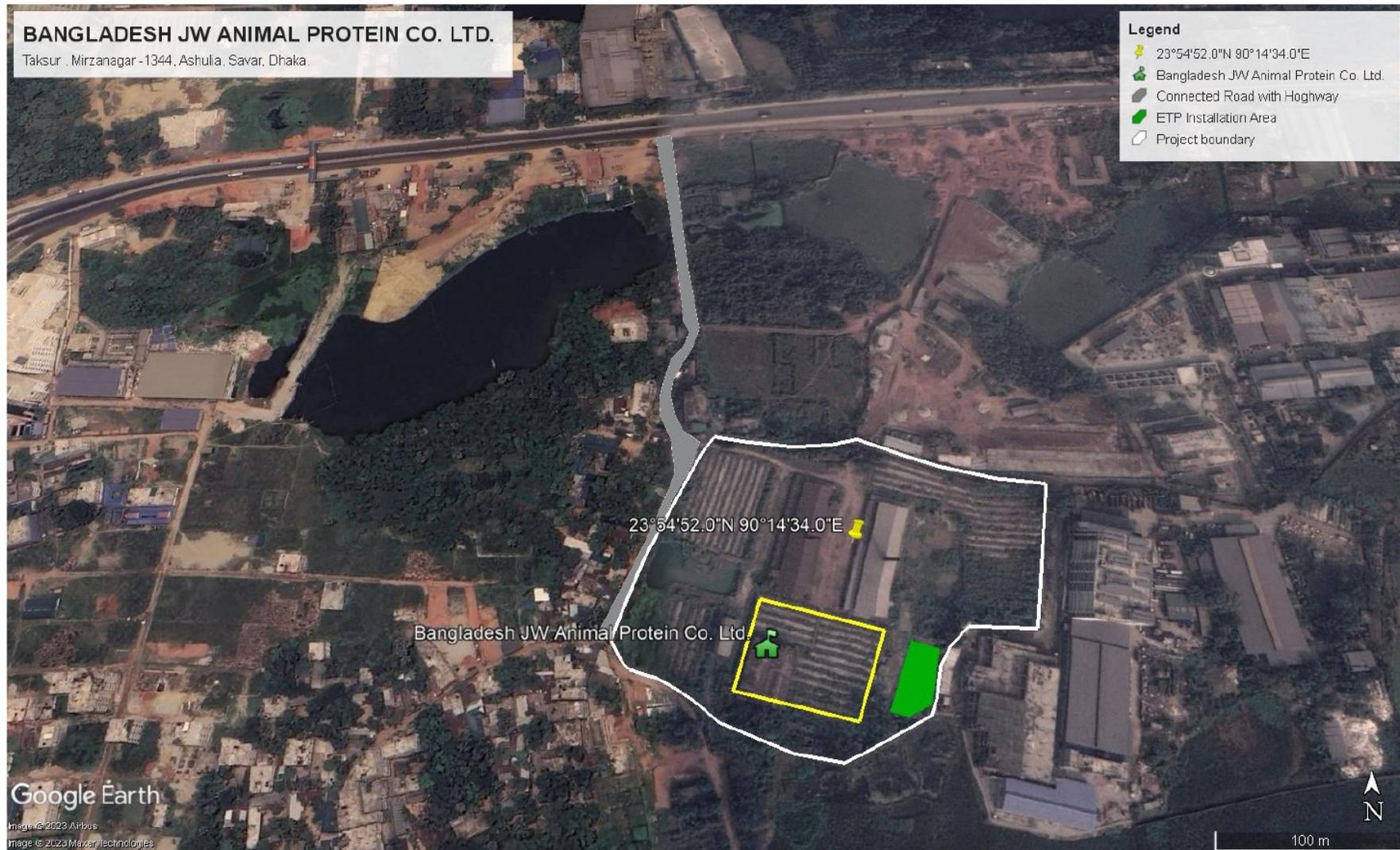


Figure 4:1 The location map of the project (Adopted from Google Earth)

4.5 Surrounding and Accessibility

Bangladesh JW Animal Protein Co. Ltd. will have a total area of 100 decimal located at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka situated between 23° 54' 52" North latitudes and 90° 14' 34" East longitudes. The project is located in a mixed industrial, residential zone. It is bounded by open spaces, medium to large industrial setups and few local shops and residential houses. The project location is connected to the Dhaka-Aricha Highway with a local road of about 20ft. wide. Roads are suitable for all kinds of vehicles.

The surrounding of the project is given below-

North: Vacant area around 250m, Kaizen Metal Industries Bd. Ltd., Dhaka Aricha Highway

South: Khal, Nabinogor Textile Ltd., Aaron Denim Limited, Uzzal Fabrics Ltd.

East: Berger Becker Bangladesh Limited

West: Vacant area, Semi Pacca Road, Local residents



Figure 4:2 North side of the Project



Figure 4:3 South side of the Project



Figure 4:4 East side of the Project



Figure 4:5 East side of the Project



Figure 4:6 Drainage line for ETP



Figure 4:7 Discharge Point

4.6 Building Details

Bangladesh JW Animal Protein Co. Ltd. will carry out their activities on their own shed of 100 decimal land area.

Table 4:1 Shed Details of the Factory

SL	Floor	Shed Detail
1	Sheds	Leather Washing workshop, Warehouse, Utility section, air conditioning Unit, Boiler, etc.

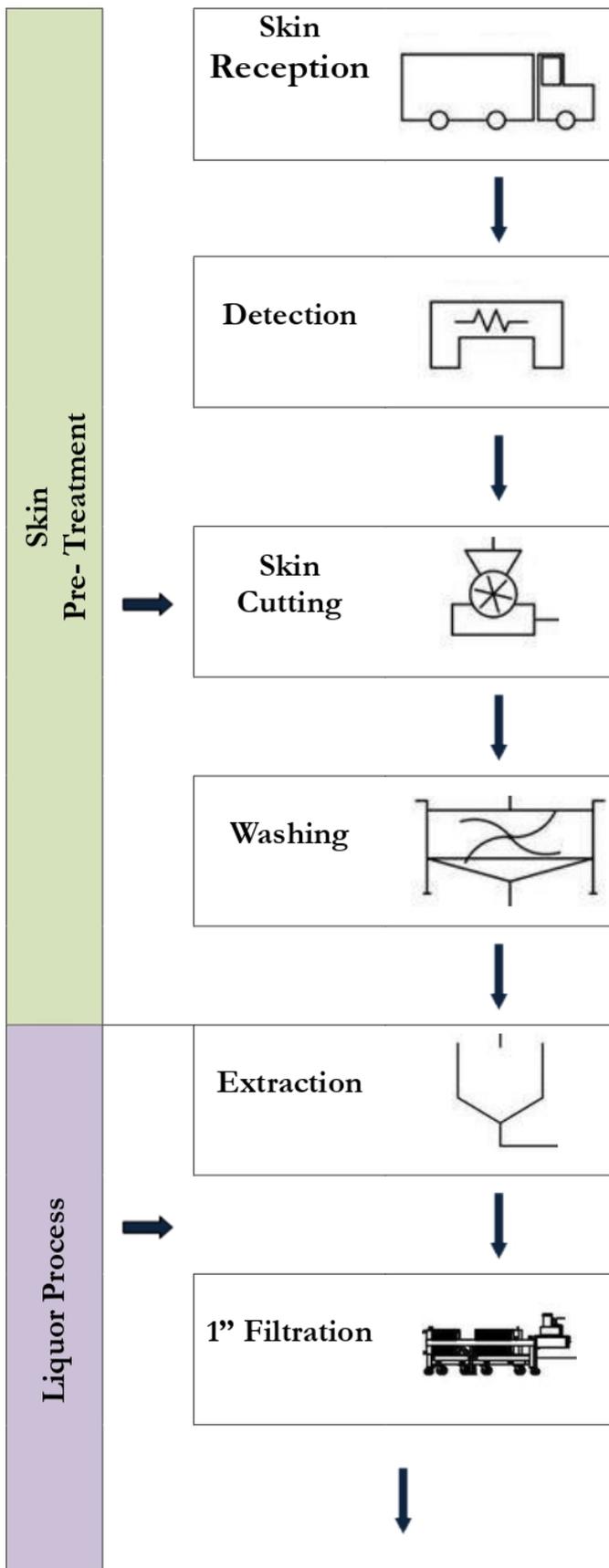
Detailed project layout is attached in the annexure.

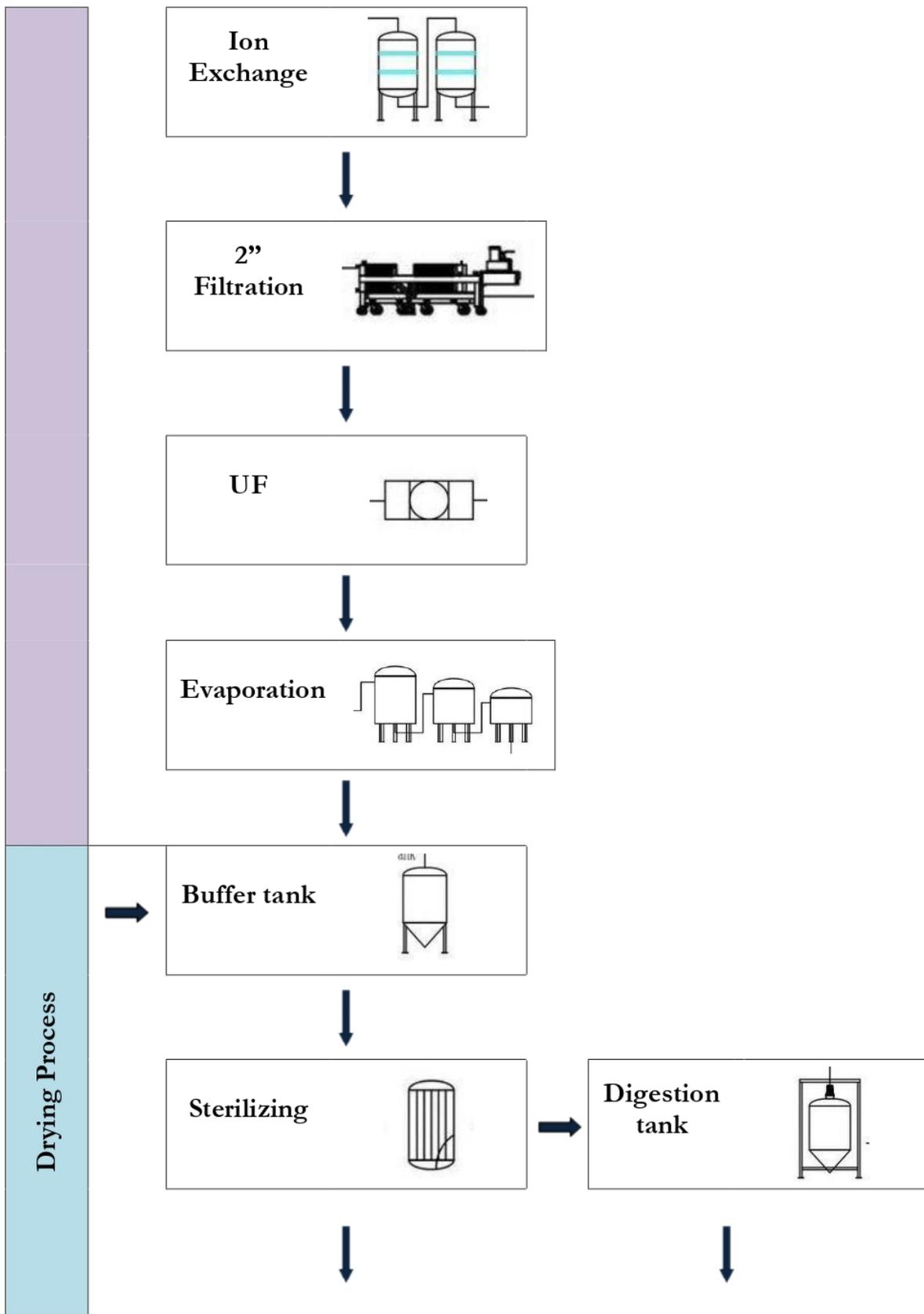
4.7 Product Details

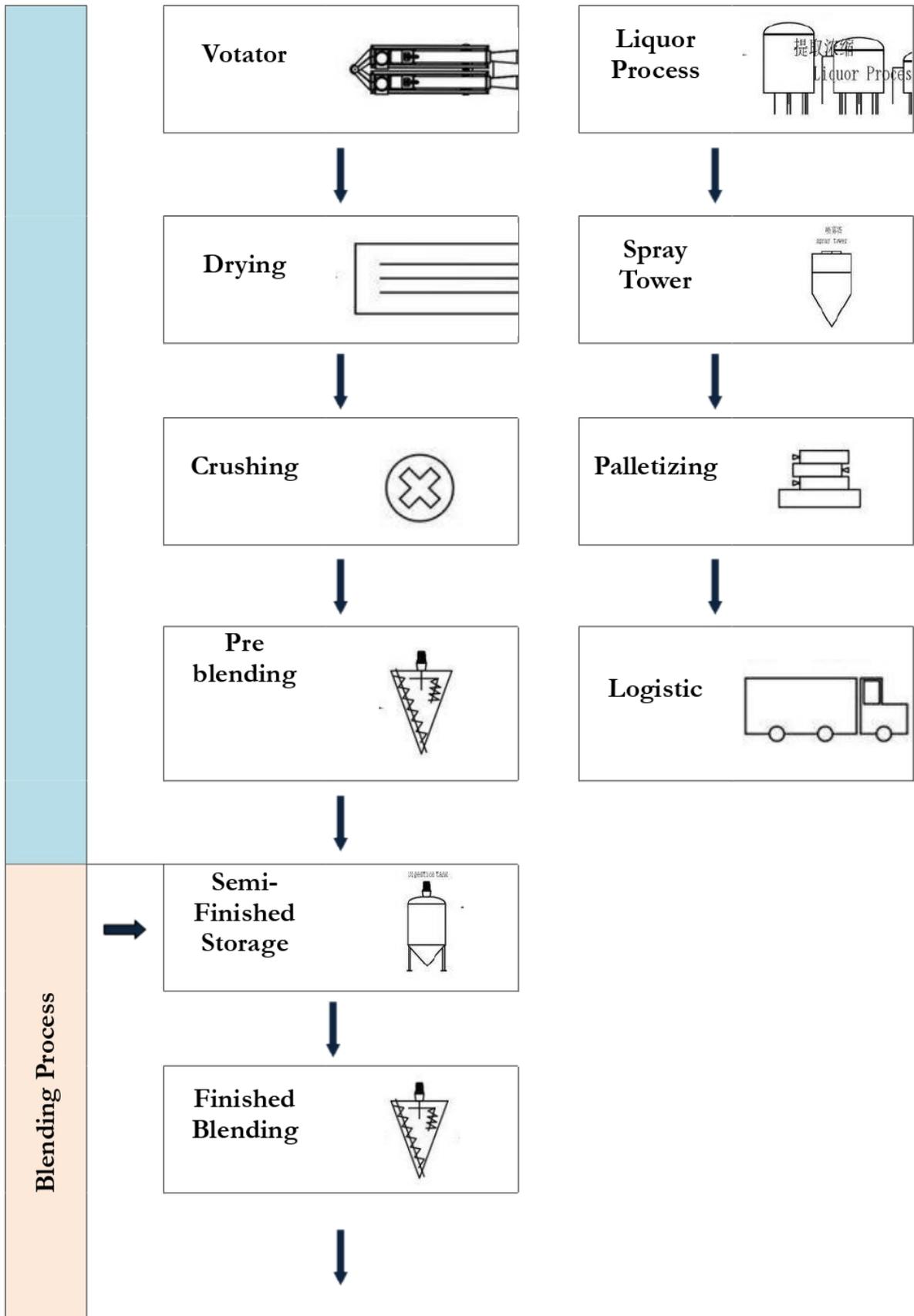
Bangladesh JW Animal Protein Co. Ltd. will manufacture 900tons edible gelatin for industrial use from salted cow skin, cutting pieces, leather waste without chemicals.

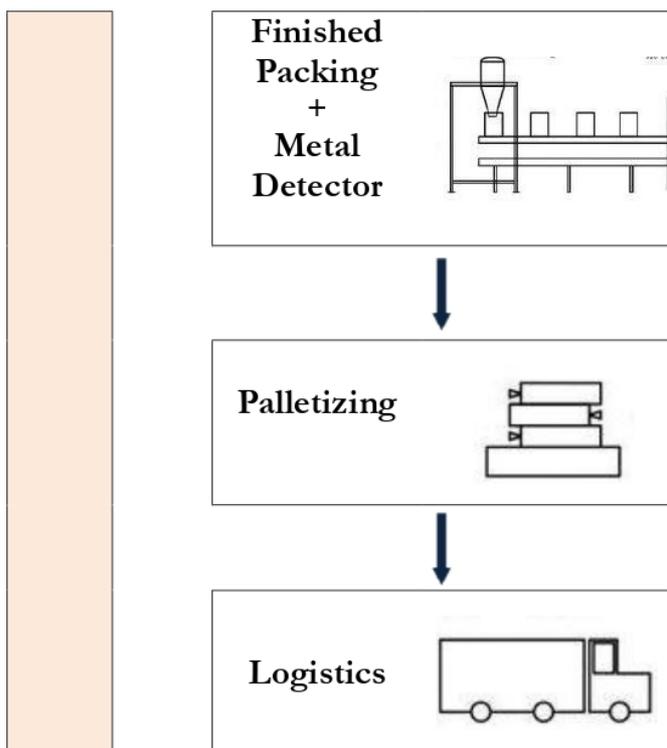
4.8 Production Process

Process flow diagram of the project are as follows-









The production for 1 Ton of gelatin requires 6 tons of raw material Cow Skin. Among the raw material 20% water, 40% skin hair is normally enter into ETP during production, 20% is produced gelatin and the rest 20% by products is used for animal feed, soap etc. production.

It will cut and put into the pool, adding 10 to 15 tons of water for the first-time cleaning and keeping the temperature of the water between 20 to 25 °C. After cleaning, discharge the dirty water into the ETP. And then add another 10 to 15 tons of water for stirring, after that, adding 1% hydrogen peroxide for 10hours soaking. During soaking time, need 10mins stirring in every 3hours. After 10 hours soaking, stir for half hour and then waste water drain into ETP. Add another 10-15 tons of water and clean it again, and then adding 1% proportion of sulfuric acid, soak for 12 hours. During this soaking time, need 15mins stirring every 3 hours. After this soaking, need twice time cleaning with new water. The cleaning water not discharged into the ETP, it will send into the second pool for recycling use.

After washing and cleaning, pH value of the material will be 6.5, and then put into the cooking pot, the gelatin solution will come out after 6 hours cooking, and then stored in the glue tank. It will be filtered by the filtering machine, ion exchange, through the film concentration and stored in the storage tank. Autoclave, and take into the extrusion glue cooling machine, cooling by the long net machine, drying, crushing and finally finished product packaging.

4.9 Machinery & Equipment

The capital machinery list for the gelatin production process are as follows-

Table 4:2 Name of the Machineries

Sl No.	Name of the Machineries	Quantity
1	Gelatin food machine with standard accessories	2
2	Steam boiler machine with standard accessories	1
3	Steam boiler machine with standard accessories	1
4	Fork-lift Truck	2
5	Voltage Stabilizer (800 kW) with standard accessories	2
6	Generator (500 kW/600 kW) with standard accessories	2
7	ETP machine with standard accessories	1

4.10 Raw Material

Bangladesh JW Animal Protein Co. Ltd. will use salted cow skin, cutting pieces, leather waste without chemicals and various chemicals for production. The raw materials will be collected mainly from tannery factories. The product and raw material ration for gelatin manufacturing is 1: 6.

The raw materials of Bangladesh JW Animal Protein Co. Ltd. are given in the following table-

Table 4:3 Raw Material List

Raw Material	Quantity/Year
Salted cow skin, cutting pieces, leather waste without chemicals	5400 tons
Chemicals for processing	As per requirement

4.11 Manpower

The manpower is to ensure the efficient and effective function of the day-to-day activities of the factory. The total manpower of this factory is anticipated to be 150 persons including administrative, workers, staff, security officers, health safety officers, etc.

4.12 Legal Status

Bangladesh JW Animal Protein Co. Ltd. has trade License and initial site approval from local chairman, and have applied for Fire License from the Bangladesh Fire Service & Civil Defense.

The project has also obtained NOC from Pathalia Union Porishod and people around the project. All legal documents are attached in the Annexure.

4.13 Utilities

Different types of utility services such as land, water supply, electricity, generator, transport services, etc.

4.13.1 Land

The project has been proposed to be located at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka. The project land area is 100 decimals.

District	P.S.	Mouza	Dag No.	Khatian No.	Land Type	Total land
Dhaka	Ashulia	Taksur	B.S. 573, 1001	R.S. 47	Chala	100 decimals

The proposed land will be adequate for the project. All the infrastructural facilities like power, gas, water, communication, labor, etc. are available near the proposed site.

4.13.2 Water

Significant amount of liquid waste will be generated from the production process of the proposed factory. Around 150m³/day wastewater will be generated from the raw material washing sections, and will be treated with 6.3 m³/hr ETP. Additionally, 5 m³/day of wastewater will be produced from domestic purposes. The sewerage water will be treated by type Septic Tank & Soak well caused from the sanitation purposes and discharged to the public drainage in compliance with the discharge norms.

ETP details have been attached in annexure.

4.13.3 Power

Bangladesh JW Animal Protein Co. Ltd. will utilize electricity from two sources are:

- (1) The main grid power that will be supplied from the REB with the connected load is 600 KW Per hour
- (2) Two stand-by generators will be used with a capacity of 500 & 600kW.

4.13.4 Fuel

The proposed project will require 20000CFT natural gas from Titash gas and 100-150 liters of diesel for generators from local pumps.

4.14 Possible Date of Implementation

The Following schedule is the possible date of the project.



- Probable date of starting Construction: After obtaining SCC from DoE
- Probable date of Completion: 31 December 2024

4.15 Alternative Analysis

In EIA, it should analyze the alternatives. Alternatives need to mitigate negative impacts. Alternatives need also to reduce the impacts. A discussion of alternatives ensures that the developer has considered other approaches to the project and means of environmental damages. Consideration of alternatives encourages analysts to focus on real choices. Several broad alternatives can consider: the 'no action (Zero/ Do nothing) alternative, alternative locations, scale, process, site layout, equipment, operating conditions, ways of dealing with environmental impacts, etc.

There is little scope for the consideration of alternatives in a project that is linking an existing distribution service to individual household and commercial users. However, during the planning stage and preliminary design, alternatives were considered in the selection of the site in the present location. Skill manpower is available in the area. The site is capable for easy to access. It is away from flood plains, wetlands, and other environmentally sensitive areas. It has been considered for the sake of public safety, places such as schools, hospitals, and places of worship were avoided as where all public utilities wherever possible. Considering all of these factors there is **no plan of the authority of Bangladesh JW Animal Protein Co. Ltd. to look into an alternative site.**

Chapter 5: Site Details

5.1 Location of the Project Site

Bangladesh JW Animal Protein Co. Ltd. will have a total area of 188.93 decimal located at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka situated between 23° 54' 52" North latitudes and 90° 14' 34" East longitudes.

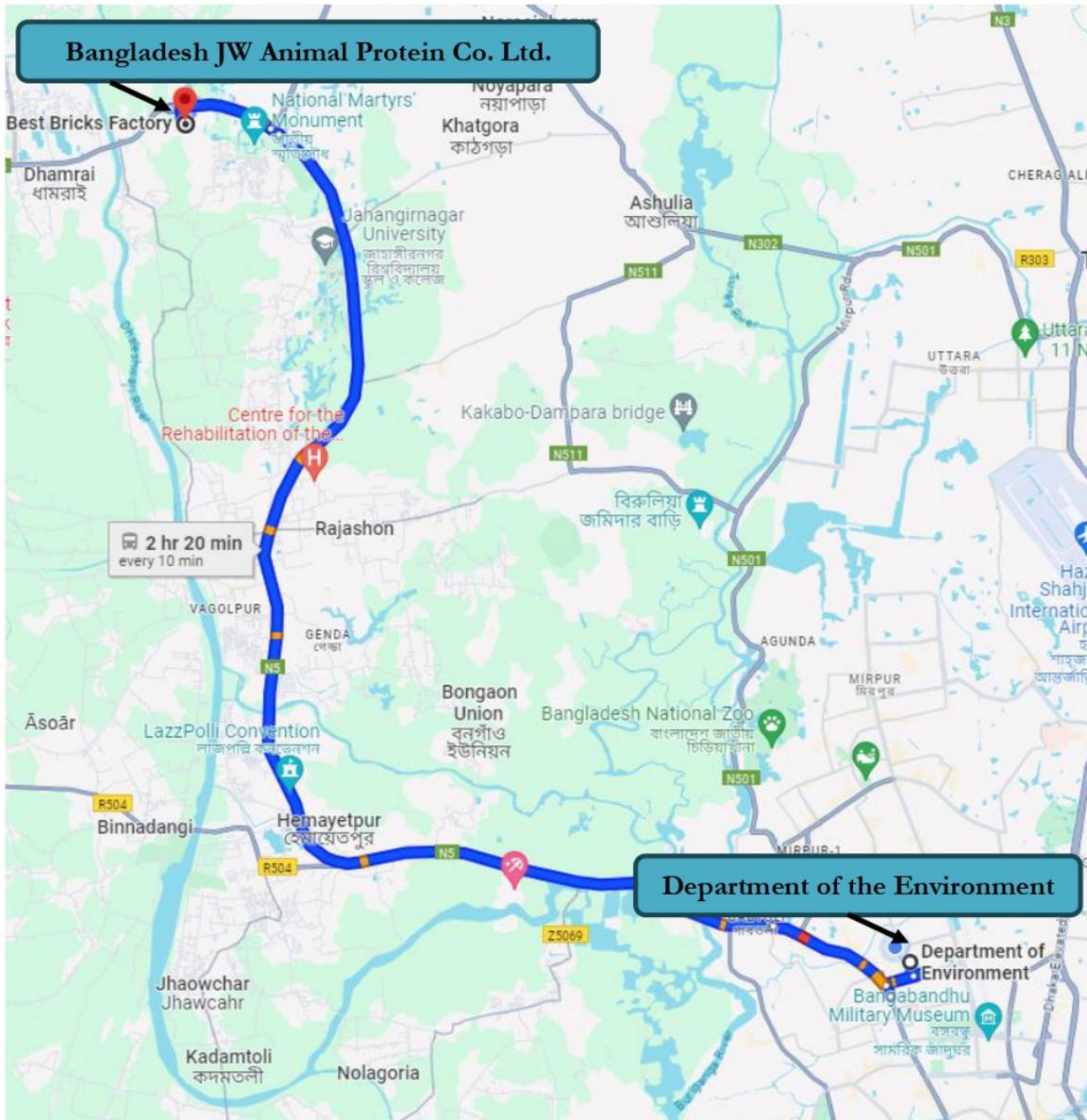


Figure 5:1 Location of the Project from the DoE

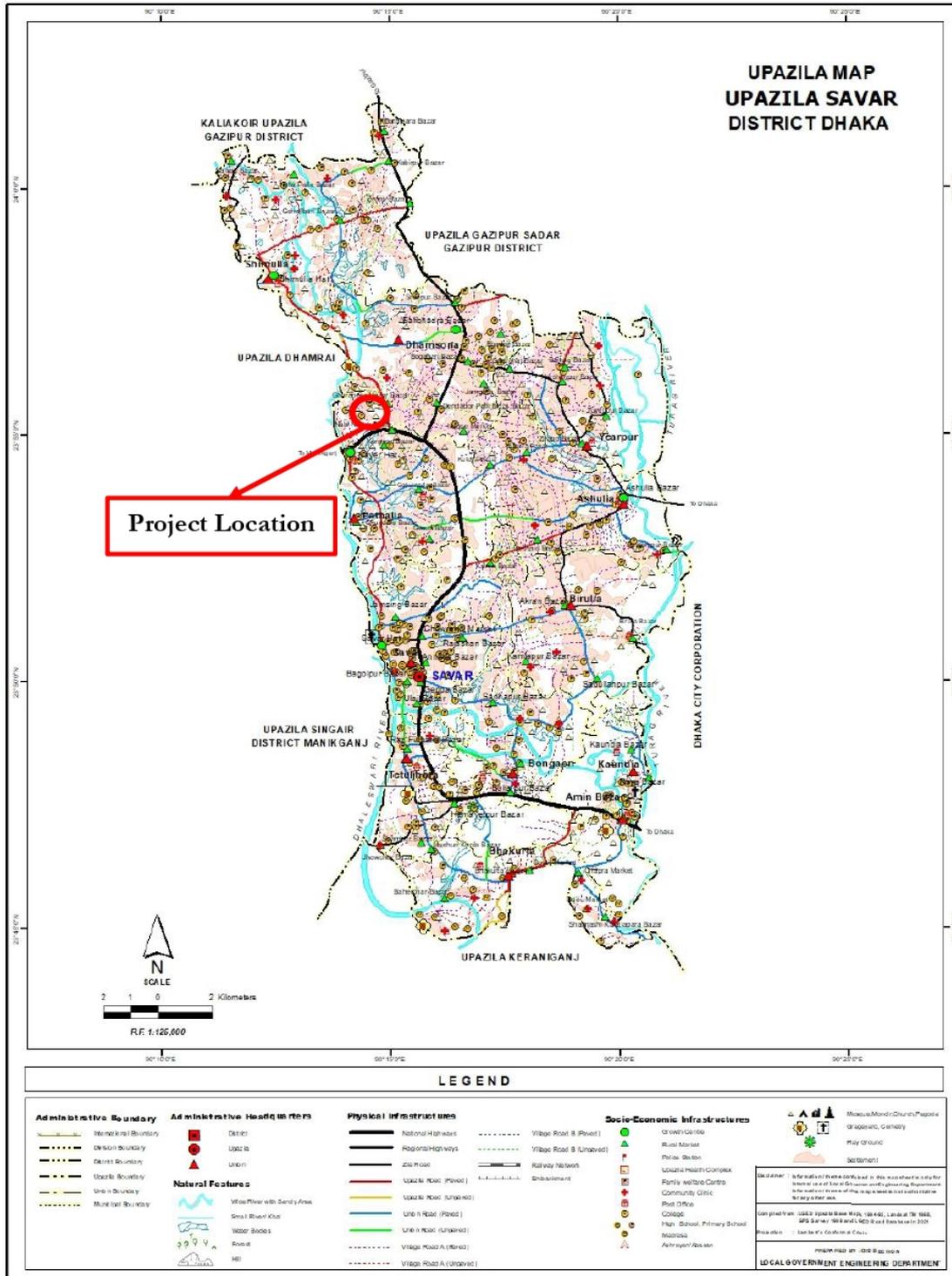


Figure 5:2 Savar Upazilla Map

5.2 Justification for Selecting the Site

The project is located in a mixed industrial, residential zone. It is bounded by open spaces, medium to large industrial setups and few local shops and residential houses. The project location is connected to the Dhaka Aricha Highway with a local road of about 20ft. wide.

The access way of the factory is very simple. Facility is located near the main road of Dhaka-Aricha high way with a very short distance (250m) of sub way. It is very convenient to locate the factory. The location of Bangladesh JW Animal Protein Co. Ltd. is about 33 km away from Shahjalal International Airport & it will take about 1 hour to reach the site from airport.

Justification for selecting the site-

- The project site is located in an industrial area.
- The site has accessible road network for the transportation of raw materials and final products.
- The project site is provided with all amenity facilities such as electricity, fuel, water, etc.
- Labor and workers are available in the area to operate the project.
- The project location complies with the DoE guideline and ECR 2023 site requirement for the Red category.

5.3 List of Industries within the Study Area and Land Use Details

The proposed Bangladesh JW Animal Protein Co. Ltd. is located in an industrial zone. Several industries surrounding the project are as follows-

- Kaizen Metal Industries Bd. Ltd.
- Nabinogor Textile Ltd.
- Aaron Denim Limited
- Uzzal Fabrics Ltd.
- Berger Becker Bangladesh Limited

5.3.1 Land Use

The project is bounded by open spaces, medium to large industrial setups and few local shops and residential houses. The project location is connected to the Dhaka Aricha Highway with a local road of about 20ft. wide.

The surrounding of the project is given below-

North: Vacant area around 250m, Kaizen Metal Industries Bd. Ltd., Dhaka Aricha Highway



South: Khal, Nabinogor Textile Ltd., Aaron Denim Limited, Uzzal Fabrics ltd.

East: Berger Becker Bangladesh Limited

West: Vacant area, Semi Pacca Road, Local residents



Chapter 6: Existing Environmental Conditions

6.1 General Consideration

The baseline condition of the environment states the present status of different components of the environment. The main objective of examining the present environment is to provide an environmental baseline against which potential impacts from the construction and operational phases of any project can be compared. A second important function of establishing a baseline for parameters such as air and water quality is to ensure that any problems arising from existing sources are not erroneously attributed to the project under study. The different environmental parameters that are included in this baseline study are land, water quality, air quality, climate, and noise.

6.2 Study Area

Savar is the second-largest (total area 280 km²) Upazila in the Dhaka district and rapidly growing in the context of urbanization and industrialization. Geographically it is situated at the northern edge of Dhaka, between 23°44' N and 24°12' N latitude and between 90°11' E and 90°22' E longitude. Savar upazila is divided into twelve unions (the lowest administrative division), among which the Shimulia union encompasses the largest area and Savar paurashava (a town) the smallest. Savar is one of the most densely populated upazilas in Bangladesh, with total population 1,387,426. The population density of the region is 4,951 persons per km², whereas the national population density is 1,015 persons per km² (BBS, 2011).

Bangladesh JW Animal Protein Co. Ltd. and surroundings showing the vicinity including major land use, roads, mosque, other big and small-scale infrastructures and features present in the area and are considered to be possibly minor affected by the construction and commissioning of the project. This is considered as the environmental study area for the proposed project.

6.3 Land Use in the Project Area

The project is located in the Savar sub-district of Dhaka. In the study of environmental assessment for the construction and operation of the project, the surrounding environment is required to consider. The brief of the ongoing environmental condition of the district is given in the next sections. Dhaka is a district in central Bangladesh and is the densest district in the nation. It is a part of the Dhaka Division. Dhaka, the capital of Bangladesh, rests on the eastern banks of the Buriganga River which flows from the Turag to the south of the district. Dhaka district consist with Dhaka city, Keraniganj, Nababganj, Dohar, Savar and Dhamrai upazila. The map of Savar Upazila is given in the following Figure.



The description of the existing environment is limited to the study area or the Project Impact Area (PIA) of the Basic Option. However, where necessary the area has been expanded beyond the PIA. The base line study records are required for environmental settings against which potential impacts from construction and operational phase of the project can be compared. In the present study, the different environmental components are examined for setting base line. The selection of the PIA is based on the following factors.

- Project Sites Areas directly affected by the project itself and areas indirectly affected (maintenance area etc.)
- Locations affected by construction activities (quarries, refuse disposal areas, tunnel muck disposal areas, traffic diversions, work camps, temporary access roads etc.)
- Fauna and flora in the inundation area: - Fauna and flora in the area up to the high flood level - Fauna and flora in the 60 meters reservation area from high flood level
- Fauna and flora along the river reservation: Fauna and flora at a distance of 60 meters from the bank along transects at reasonable intervals. Location of line transect were determined according to habitat variation and 100-meter gradient contours.

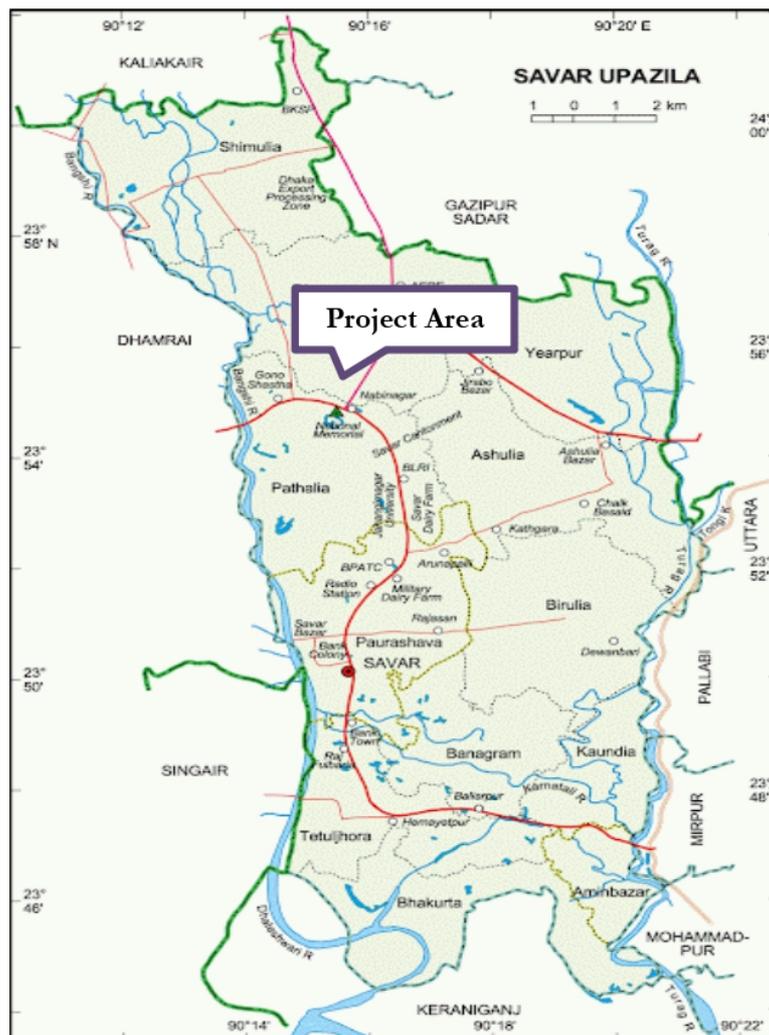


Figure 6:1 Map of Savar Upazila

6.4 Historical Background

The origin of the name Savar is thought to be an evolved version of the ancient 7th-8th century township of সর্বেশ্বর *Shôrbeshshôr* ("Lord of everything") or সম্ভার *Shômbbar* situated on the banks of the river known today as the Bangshi. Shôrbeshshôr, in turn, is said to have been established on the site of the ancient Sambagh Kingdom. Local legends as well as archeological finds indicate a king by the name of Harishchandra, said to be of the Pala dynasty, ruled over *Shôrbeshshôr* - purportedly from the first half of the 7th century having arrived from the Rarh region (Source: Wikipedia).

During the 1971 war, Savar Cantonment (then Ansar Camp) and the then newly founded Jahangirnagar University were some of the first targets of military swoop outside the capital following Operation Searchlight of 25 March. In December of that year, Savar was the last obstacle before the freedom fighters (led by Kader Siddiqui and others) entered the capital and the



Pakistan army conceded defeat. Days before the end of the war, teenager Golam Dastagirr Titu was killed in a direct encounter between the Pakistani army and the freedom fighters. The compatriots buried him near the main gate of the Central Cattle Breeding & Dairy Farm, Savar. The Bangladeshi army constructed a memorial monument in his honor (Source: Wikipedia).

6.5 Geography

Savar is located at 23.8583° N & 90.2667° E. It has 66,956 units of household and a total area of 280.12 square kilometers (108.16 sq mi). Savar upazila was established in 1981. It is bounded by Kaliakair and Gazipur Sadar upazilas on the north, Keraniganj and Nawabganj upazila on the south, Mirpur, Mohammadpur, Pallabi and Uttara thanas of Dhaka City on the east, and Dhamrai and Singair upazilas on the west. The land of the upazila is composed of alluvium soil of the Pleistocene period. The height of the land gradually increases from the east to the west. The southern part of the upazila is composed of the alluvium soil of the Bangshi and Dhalashwari rivers. Main rivers are Bangshi, Turag, Buriganga and Karnatali. The Bangshi River has become polluted due to industrial. The total cultivable land measures 17,820 hectares (44034.18 acres), in addition to net crop land of 17580 hectares (43441.13 acres) and uncultivated land of 240 hectares (593.1 acres) (Source: Banglapedia).

6.6 Demographics

As of the 2011 Bangladesh census, Savar Upazila had a population of 1,442,885 and 4948 people live in per square kilometers. Males constituted 54.20% (769117) of the population, and females 45.80% (673768) and ratio between female and male is 100:118. This Upazila's eighteen-up population was 207,401. The religious breakdown was Muslim 91.38%, Hindu 7.74%, Christian 0.93%, Buddhist 0.03% and ethnic minority group nationals numbered 319 including Buno, Garo, Chakma (Sangma), and Burman. The main occupations are Agriculture 24.34%, agricultural laborer 12.84%, wage laborer 4.44%, cattle breeding, forestry and fishing 1.90%, industry 1.37%, commerce 17.35%, service 20.68%, construction 1.66%, transport 3.96% and others 11.46% (Source: Wikipedia).

6.7 Education

Savar upazila had an average literacy rate of 68.0% (7+ years), and the national average of 59.4% literate. Male literacy was 69% and female was 58%.

Total number of educational institutions in Savar upazila is 365. There are 4 universities, 10 colleges, 8 school and colleges, 46 high schools, 7 higher secondary schools, 6 junior high schools, 16 madrasas (5 Dakhil madrasa, 4 Alim madrasa, 2 fajil madrasa, 12 Ebtedayi madrasa, 2



Government approved Ebtedayi madrasa), 88 government primary schools, 13 non-government or registered primary schools, 14 community schools, 8 satellite schools, and 1 sports institution (Source: Savar upazila website).

Some of the noteworthy institutions of Savar upazila are given in the following:

- Jahangirnagar University, a Public University, along with its School and College
- National Institute of Textile Engineering and Research - NITER, a Public private partnership Institute, Affiliated Institute University of Dhaka.
- Army Institute of Business Administration (AIBA), an Army Run Educational Institute under Bangladesh University of Professionals (BUP)
- Daffodil International University, a Private University (Permanent Campus))
- Gono Biswabidyalay, a Private University
- Asian University of Bangladesh, a Private University
- Abdul Mannan Degree College Affiliated the National University of Bangladesh (NU)
- Savar University College Affiliated the National University of Bangladesh (NU)
- Zirabo Cantonment Public School & College
- Savar Cantonment Public School and College
- Savar Adhar Chandra High School, A secondary Higher School.
- B.P.A.T.C School and College (Bangladesh Public Administration Training Centre)
- Enam Medical College and Hospital (founded by MP Enam).
- Radio Colony Model School, Bangladesh Betar
- Shimulia S.P High School, Savar, Dhaka
- Siraz memorial school & college.
- Alhaz Tayab Ali Model School
- Zirabo Dewan Idris College.
- Ashulia College.
- City University.
- Chakulia High School Chakulia, Savar, Dhaka



- Konda High School and College, Nagar Konda, Savar, Dhaka
- Happy Isle International School, Savar, Dhaka
- Savar Darul Ulum Madrasa, Savar, Dhaka
- Jabal- E-Noor Dakhil Madrasah, Savar, Dhaka
- Bhakurta Union High School and College, Bhakurta, Savar, Dhaka

6.8 Economy

Agriculture and manufacturing are the two major economic sectors in Savar. Main source of income: Agriculture 20.46%, non-agricultural laborer 3.09%, industry 2.82%, commerce 20.55%, transport and communication 5.75%, service 28.74%, construction 2.84%, religious service 0.18%, rent and remittance 2.67% and others 12.90%. The main crops grown here are Paddy, Jute, peanut, onion, garlic, chili and other vegetables. The extinct or nearly extinct crops in the region are Aus paddy, Asha Kumari paddy, sesame, linseed, kali mator, randhuni saj, mitha saj, kaun and mas kalai. The main fruits cultivated here are Jackfruit, mango, olive, papaya, guava, kamranga, berry and banana. There are 181 combined fisheries, dairies and poultries Dairy, 5 hatcheries, 209 poultries, and 1319 fisheries (Source: Wikipedia).

Manufacturing facilities include Ceramic industry, beverage industry, press and publication, garments industry, foot ware, jute mills, textile mills, printing and dyeing factory, transformer industry, automobile industry, biscuit and bread factory, pharmaceutical industry, soap factory, brick field, cold storage, welding, plant nursery, etc. The Cottage industry includes 8 Weaving, 100 goldsmith and 29 others workshops. The main exports are Jackfruit, papaya, flower, sapling, dairy products, meat, transformer, fabrics, dye, medicine, readymade garments, electronics and electric goods, shoe, brick, sweetmeat etc. (Source: Wikipedia).

There are 62 km of pucca (first-class), 52 km of semi pucca, 668 km of mud road; and 50 km of highway, 44 waterway and 92 culverts. Transports used here include the traditional (and extinct or nearly extinct) Palanquin, bullock cart and horse carriage as well as modern day vehicles. The minimum wage is approximately \$9.50 per week, or \$38 per month (Hossain et al., 2013)

Besides, Savar has DEPZ, the 2nd largest industrial area in Dhaka. Dhaka Export Processing Zone is a special economic zone of Bangladesh. It is also known as Dhaka EPZ, DEPZ or Savar EPZ for short. It is located in Ashulia Police Station, Savar. This Export Processing Zone was established in 1993 and in 1997 another expanded zone was added to it. Established on an area of 356.22 acres, this EPZ is the second largest export processing area in Bangladesh. The estimated



total number of industrial factories in DEPZ is 451. The products produced here include readymade garments, toys, sweaters, blanket head caps, jerseys etc. Exports from Dhaka EPZ amounted to US \$ 1,780.72 million. In the last 8 years, BEPZA has achieved 129.55% growth in investment, 155.95% in exports and 112.30% in employment (Source: Savar upazila website).

6.9 Hydrology

6.9.1 Surface Water Quality

As the factory is situated in the Dhaka City, therefore the water quality of the baseline environment is considered for the city water quality. The water quality of the Dhaka city is discussed in this section as surface water quality and ground water quality. The quality of water, from both surface and groundwater sources, has recently being endangered by many factors, natural and man-made, which have caused a deterioration. The quality of the water sources used in Bangladesh is at high risk, especially in the capital city of Dhaka, due to increased pollution resulting from unlimited migration of rural people. Consequently, the existing groundwater-based water supply system is not adequate to fulfill the water demand of the mega-city Dhaka. To alleviate the city's present severe water crisis, the question has been asked as to why the Dhaka Water Supply and Sewerage Authority (DWASA) is not using the rivers around Dhaka as a source of water. In this context, DWASA is seriously considering two options: (i) introduction of a separate water supply system for domestic purposes other than drinking water by pumping available river water around the city; and (ii) installation of a small-scale treatment plant for water supply using river water around the city as a source of raw water. Implementation of either of these options will require a study on the quality of the water sources, and development of appropriate cost-effective treatment methods. A study has been conducted at the Bangladesh University of Engineering and Technology (BUET) to evaluate the important physical, chemical, and biological water quality parameters of the five rivers around Dhaka City. Test results indicate that the water of all rivers around Dhaka City is highly polluted during the dry season, except for water of the River Sitalakhya. The important water quality parameters in the dry and wet seasons, when compared with earlier values, indicate that the degree of pollution of these rivers is gradually increasing with time. This paper focuses on the study and analysis of important water quality parameters of river waters around Dhaka City (Sohel et al., 2003).

Five rivers, namely: Buriganga, Sitalakhya, Balu, Turag and Tongi are located inside and around Dhaka city. Turag is the nearest river to the project area. Department of Environment (DoE), Bangladesh has published a report on water quality of Bangladesh in 2016. According to the report a graphical presentation of the water quality of Turag River is given in the following figure.

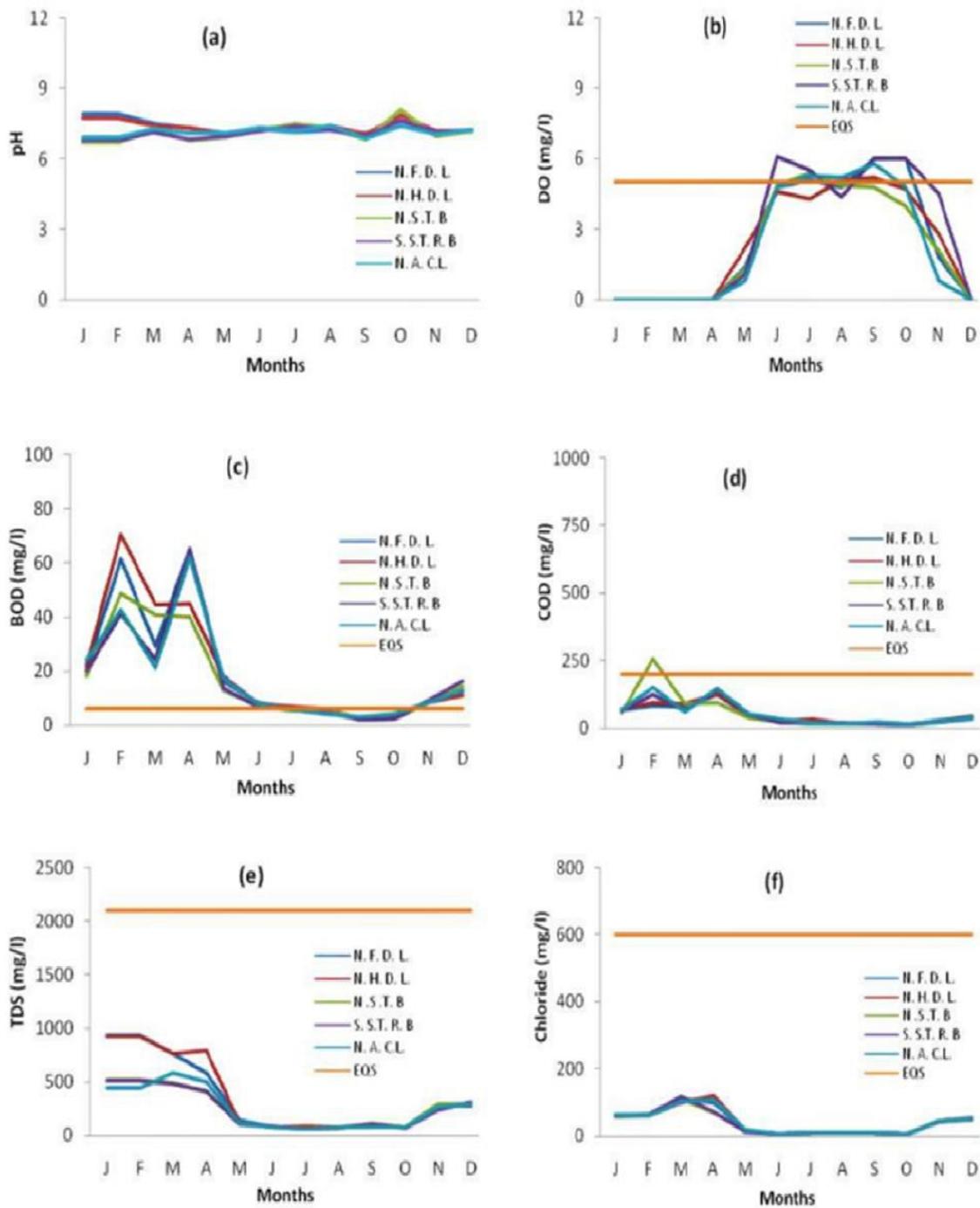


Figure 6:2 Graphical presentation of pH, DO, BOD, COD, TDS, Chloride, and Turbidity of Turag River

Water quality of Dhaka city is regularly monitored by DoE as a routine monitoring program. Water quality of the project area of 2021 is given in the following table.

Table 6:1 Water parameters of Turag River in 2021 (Source: DoE)

Location	Temp (°C)	pH	EC	Alkalinity (mg/L CaCO ₃)	TSS (mg/L)	TDS (mg/L)	DO (mg/L)	BOD (mg/L)	COD (mg/L)
Ashulia	22.6	7.58	189	96	138	96	3.1	21	44
Turag	22.1	7.58	196	101	123	100	3.4	10	40

There is main four rivers across the Savar. The Bangshi, the Turag, the Buriganga and the Karnatali are these four main rivers. The surface water quality is very poor due to the industrial development nearby these rivers. The river water quality according to the DoE research and other source is given in the following Table.

Table 6:2 The River Water Quality of Savar

Parameters	Buriganga	Bangshi	Turag	EQS for wastewater after treatment from industrial units	Unit	Remarks
pH	6.58 - 7.98	7.32	6.14-8.79	6.5 - 8.5	-	Some data have been taken from the table of the report. Some has been derived by an average calculation from the table of the report.
DO	0.0 - 5.48	4.2	0.0 - 5.9	> 5	mg/l	
BOD	0.6 - 35	5.25	2.0 - 154	< 6 (for Fisheries)	mg/l	
COD	4.83 - 124.3		17-233	200	mg/l	
TDS	60.9 - 639		52.4 - 806	2100	mg/l	
Total Alkalinity	127.27		42 - 280	150	mg/l	
EC	504.19		100 -1682	1200	µmhos /cm	
SS	40.27			150	mg/l	
Chloride		20	786 -129.7	600		

Source: River Water Quality 2015, Mukti, UITS



On the other hand, pond, lake, and/or khal are the other sources of surface water. The road side surface water quality of Savar has been found good. One study on the road side water quality has been analyzed by Ahmed (2017).

According to this study TSS 25.154 ± 8.674 mg/l, TDS 840.400 ± 311.081 mg/l, pH 7.574 ± 0.256 pH unit, DO 4.544 ± 0.933 mg/l, BOD 0.758 ± 0.179 mg/l, Cl^- 51.494 ± 28.095 mg/l, F^- 0.771 ± 0.153 mg/l, NO_3^{2-} 2.211 ± 0.878 mg/l, NO_2^- 4.692 ± 5.971 mg/l, SO_4^{2-} 69.545 ± 53.873 mg/l, Ca 48.458 ± 22.690 mg/l, Mg 19.676 ± 7.361 mg/l, K 12.874 ± 11.382 mg/l, Zn 0.027 ± 0.029 mg/l, Pb 0.096 ± 0.154 mg/l.

6.9.2 Surface Water Quality of Nearby Waterbody

6.9.2.1 Sample Collection:

The water samples were collected from 8 different points along the nearest khal of the project at a regular interval of 100 m between each sampling point. The GPS positions were taken from each point and it was shown in the GIS map in Figure 6.3. The samples were taken in plastic containers of 1000 ml capacity and prior sampling the bottles were washed with 20% (V/V) HNO_3 solution and then rinsed thoroughly with de-ionized water. The containers were completely filled with sample water to the brim. Later the containers were labeled and sealed carefully. The sampling points and coding numbers were marked on the containers by a permanent marker pen. The sampling was started from the upstream of the river near the Dhalai beel down to the downstream upto the Karapara canal.



Figure 6:3 GIS Map of sampling points.

6.9.2.2 Methods of the Study

Before attempting detail field survey a reconnaissance survey over the study area has been conducted. It revealed that the general status of the physical environment. Sampling location has been selected from this initial survey with the help of GPS (Table 2). The depth of the sampling was fixed at 2.5 ft for avoiding the surface interference. Detailed field study includes samples collection from appropriate locations, field measurements (pH, DO, Temperature, etc.). Photographs were taken to document the status of the study area and sampling locations. In this study there were a number of physical and chemical parameters studied through different standard methods. The EC, TDS, Salinity, DO, BOD, COD were studied by EC meter of model Hanna, EC 241 conductivity; Hanna HI 8734 TDS meter, C-114; Hanna instrument for Salinity meter; HI 9141, microprocessor auto cal DO meter; 5-day BOD by Winkler method and Closed refluxed titrimetric method for COD, respectively. Heavy metals were studied by Atomic Absorption Spectrometry (AAS)- Model: AA-7000 instrument of SHIMADZU corporation.

Table 6:3 GPS location of the sampling points

Sampling points	Latitude	Longitude
1	219016.23 m E	2647200.58 m N
2	219099.21 m E	2647275.86 m N
3	219164.04 m E	2647217.94 m N
4	219206.66 m E	2647296.06 m N
5	219295.30 m E	2647341.96 m N
6	219339.39 m E	2647385.63 m N
7	219344.58 m E	2647280.04 m N
8	219570.27 m E	2647349.51 m N

Table 6:4 Physico-chemical parameter of the project surrounding

Location	Depth (ft)	Tept. °C	pH	DO (ppm)	TDS g/l	Salinity g/L	EC dS/m	Turbidity FTU	BOD ₅ (ppm)	COD (ppm)
L-1	2.5	28	9.90	1.00	1.09	1.30	2.58	22.11	190	182
L-2	2.5	31	9.97	1.40	1.16	1.25	2.71	10.43	148	172
L-3	2.5	27	10.25	3.14	0.85	1.06	2.86	7.66	83	148
L-4	2.5	26	10.31	2.04	1.07	1.25	2.49	26.19	78	122
L-5	2.5	26	10.05	2.36	0.92	1.02	2.08	7.98	79	122
L-6	2.5	27	9.74	2.32	0.79	0.82	1.64	5.74	76	122

L-7	2.5	27	9.55	2.32	0.71	0.76	1.52	16.45	78	122
L-8	2.5	28	9.67	2.35	0.66	0.85	1.70	8.25	79	122

6.9.3 Ground Water Quality

Groundwater is another important source of water use in vast for drinking and industrial purpose. Groundwater is one of the most valuable natural resources of livelihood and food security for millions of rural people across Bangladesh. Groundwater availability in Bangladesh is governed by its subtropical monsoon climate, aquifer storage capacity, consumption rate along with changes in volume and distribution of groundwater recharge conditions. Groundwater withdrawal from the shallow alluvial aquifer (depth <150 m) is the country's source of arsenic-enriched waters (Haque, 2018).

The Savar is in this common scenario. The groundwater aquifer is rich in Savar. Though industrial activity has been polluting its shallow water table. The water level of the area has been lowered 4 to 5m since the last 5 years in the vicinity of Savar about 1.0m due to increasing industrialization and urbanization (Zahid, 2020).

Previous studies and analysis of available lithologs suggests that the study area has one major aquifer system, a thick sequence Plio-Pleistocene Dupi Tila Sand, which are mostly overlain by thin to occasionally thick Pleistocene Madhupur Clay and in few places by recent floodplain sediments viz. silty clay, silt and fine sand (Khan et al., 2011; UNDP, 1982). The geological cross-section of the study area shows that the thickness of the aquitard is greater in the central portion, and smaller towards the east and west of the study area. The lack of a significant aquitard is observed in the southern and north-eastern parts. Hydrogeologically the aquifer system of the study area is semi-confined to confined in nature and transmissibility of the main aquifer varies from 855 m² /day to 1259 m²/day with a storage coefficient ranging from 0.002505 to 0.013395 (IWM and DWASA, 2006; Zahid, 2003). It is quite alarming that there has been a constant decline in the groundwater level since 2005, with the average rate of decline about 0.6 m/year. The groundwater level is relatively higher in the northern and western parts and lower in the southeastern part of the study area due to huge water extraction in Dhaka city (Ahmed et al., 2010).

Aquifer Depth: For the present study, Depth to aquifer varies from about 1 m to 30 m. The lower values Depth to aquifer (15 m) were found in the southern part of the Savar paurashava, and in the east of the Amin bazar and Birulia unions. In the other areas, small-to-moderate values of Depth to aquifer (3 m to 15 m) were reported. In terms of area, the five depth to aquifer categories:

(1) 15 m were found to cover 1.8%, 6.2%, 54%, 33% and 5%, 332 respectively, of the total study area (Figure 4:3).

Net Recharge: Net recharge is the annual volume of water that penetrates the ground surface and reaches the aquifer (Edet, 2014). Most of the central part of the study area (northern part of the Savar paurashava, northwestern parts of the Shimulia and Birulia unions) had the highest Net recharge (>400 mm/year). In contrast, the areas in the west of Pathalia, the north of Ashulia, the south of Yearpur and the southeast of the Amin bazar unions had relatively lower Net recharge (400 mm/year covers 7.4% of the total study area (Figure 4:3).

Aquifer Media: Aquifer media determines the pore spaces and controls the flow of water within the aquifer (Aller et al., 1987). In the study area, three distinct aquifer materials that characterize the aquifer system are: (1) fine sand; (2) medium sand; and (3) coarse sand. Aquifers composed of medium sand cover the greatest area, 86% of the total study area; aquifers composed of fine sand cover 9.1% (a few patches in the Shimulia, Bhakurta, Dhamsona and Ashulia unions); and aquifers composed of coarse sand cover 4.9% (in the south of the Amin bazar union) of the total study area (Figure 4:3).

Soil Media: The soil constituents control the recharge potential and hence the ability of contaminants to move vertically through the vadose zone (Lee, 2003). From the soil map, it can be inferred that clay and sandy loam are the two dominant soil types in the study area, covering 37% and 36% of the total study area, respectively. The other soil types are clay loam, sandy clay loam and loamy sand, representing 16%, 7.8% and 3.2% of the total study area, respectively (Figure 4:3).

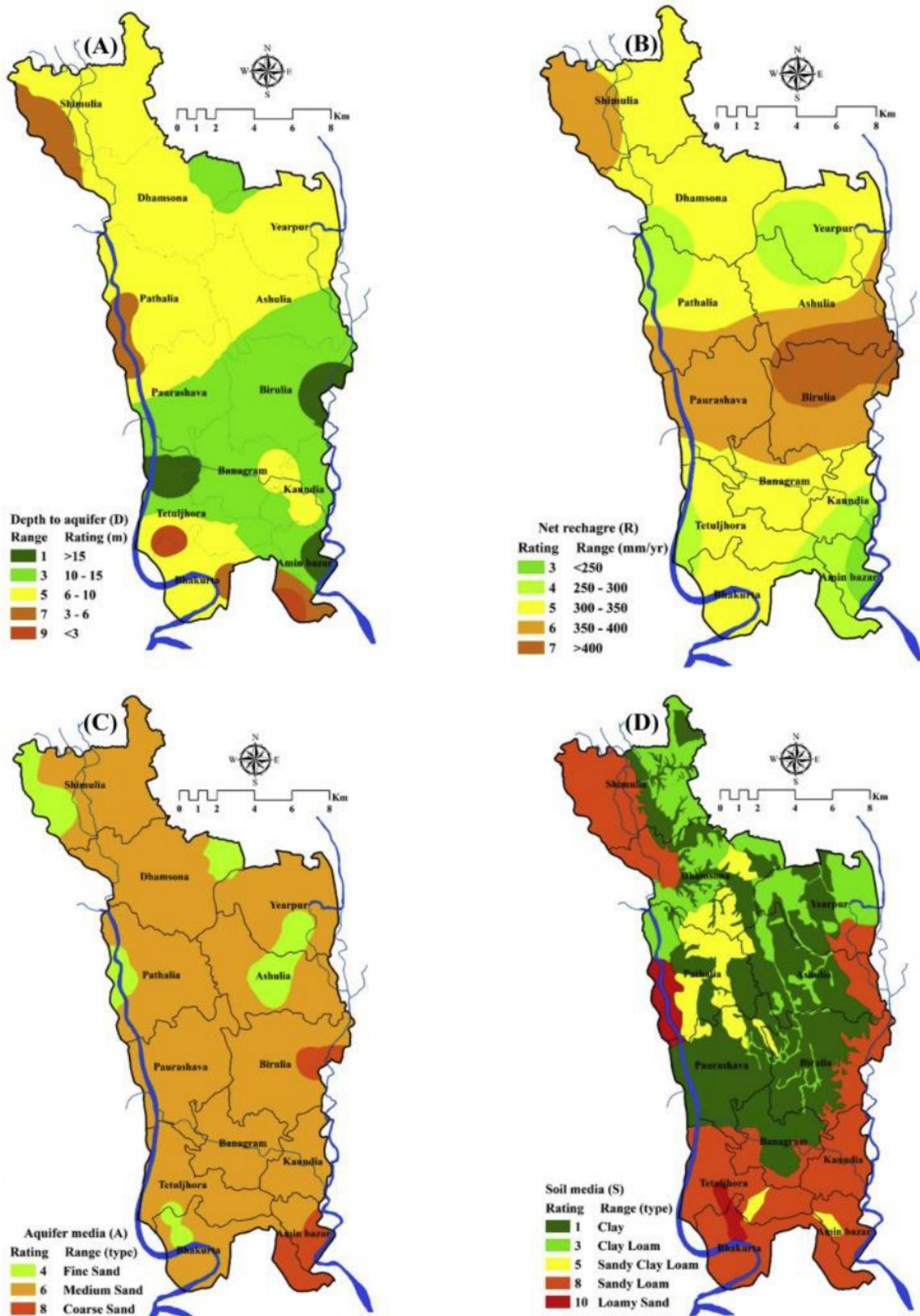


Figure 6:4 Spatial distribution map of (A) Depth of Aquifer (B) Net Recharge (C) Aquifer Media (D) Soil Media

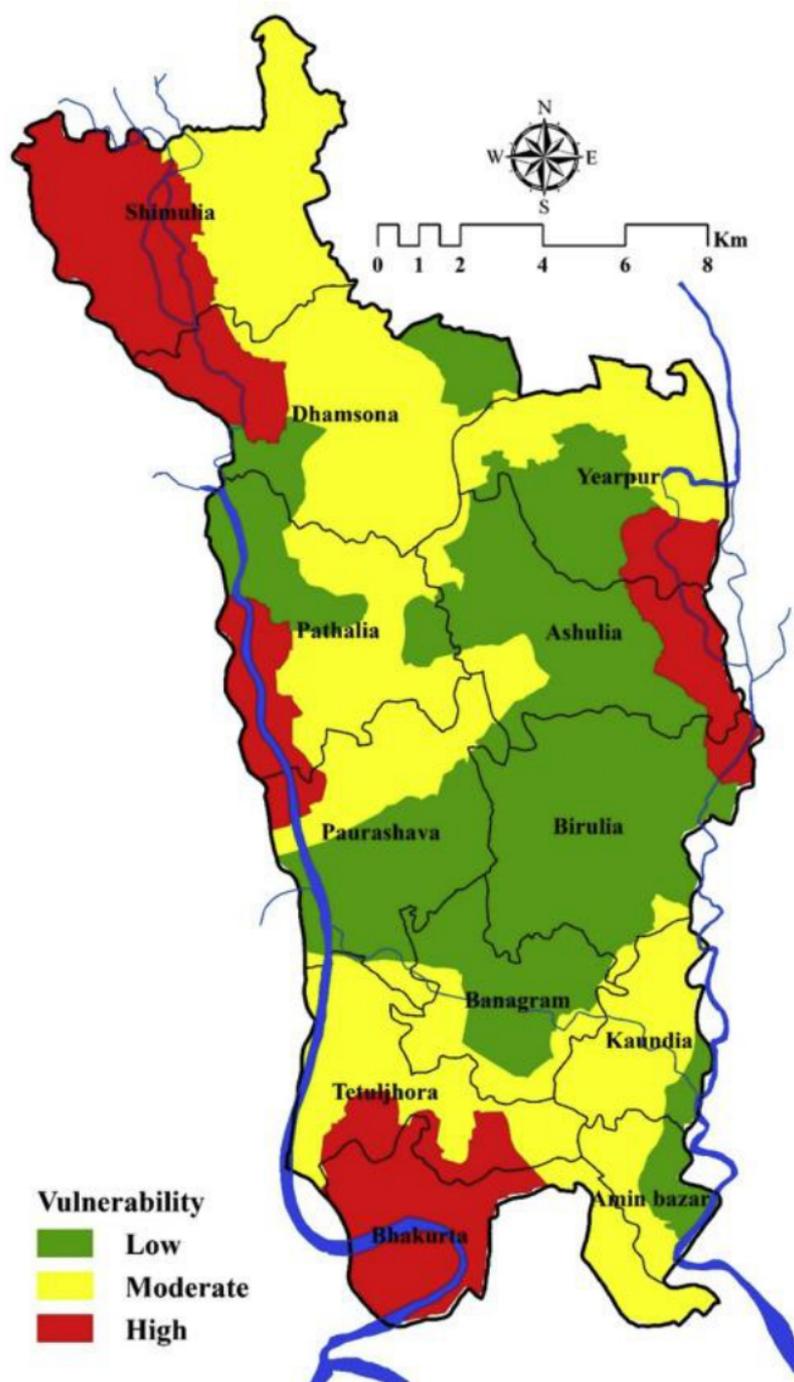


Figure 6:5 Groundwater Vulnerability Map

6.10 Air Quality

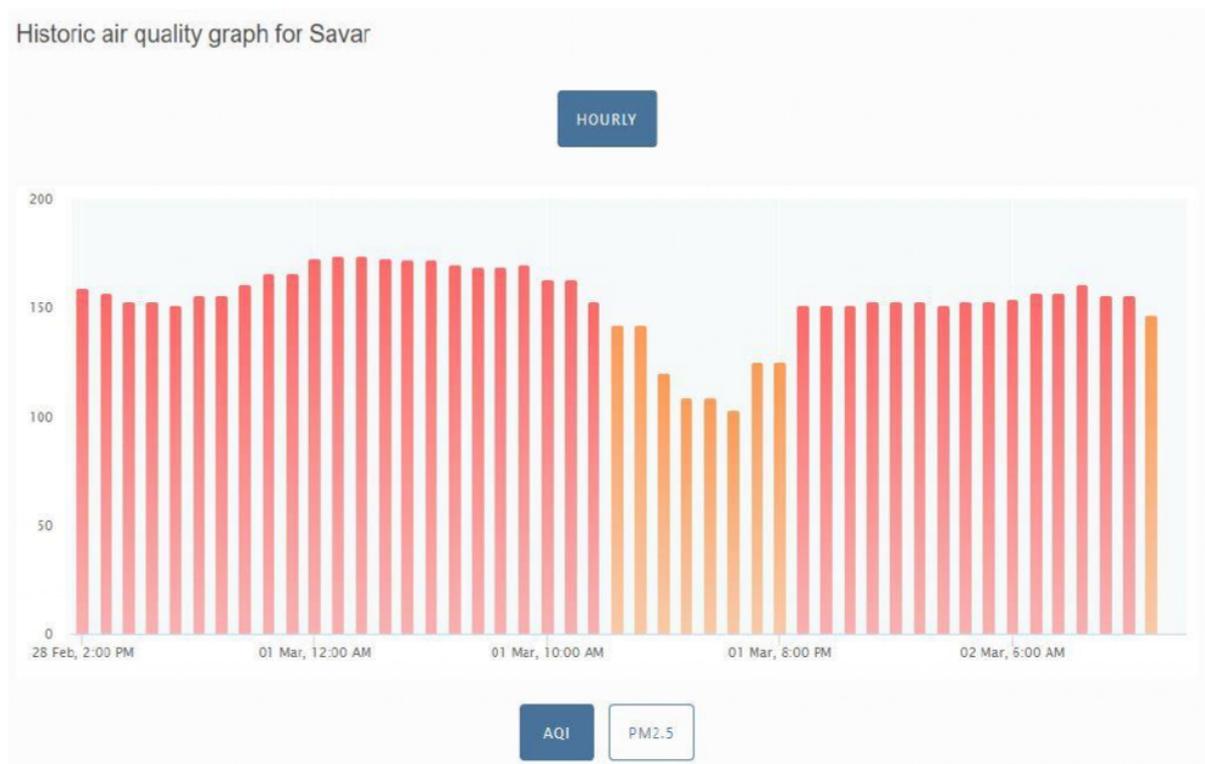
Air quality depends on the substances, which are present in the atmosphere in such concentrations that they produce undesirable effects on human beings, animal and plant life as well as the properties. These substances include various gases like SO_x, NO_x, CO, CO₂ etc. As well as

Suspended Particulate Matter (SPM) likes Smoke, Dust, Fumes etc. and many more. Concentration of different pollutants above permissible standards can have adverse impacts on plant, animal and human life. The main contributor to this high level of air pollution is the increase in vehicular population. Fortunately, recently the Bangladesh Government has taken some strict measures through the DoE and the situation is now improving.

Besides garments and other industries, Savar accommodates the highest number of conventional brick fields emitting black smoke into the air. Therefore, the area is polluted with its surroundings in terms of air quality. Polluted air contains excessive Carbon monoxide (CO), Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), Ozone(O₃) and Particulate matter (PM 2.5) and leave short- and long-term impact on people's health, as well as the environment. People, mainly infants and pregnant women among the poor, are the most exposed to such pollutants.

The front road of the factory is a little polluted for the vehicle movement. This road is jammed at certain times of the day. Emission from the vehicles a little amount of various gases like SO_x, NO_x, CO, CO₂, Smoke, Dust may be contaminated in the air.

A typical air quality of the Savar upazilla and Dhaka district is given in the following figure.



Historic air quality graph for Savar



Figure 6:7: Air quality of Savar Upazilla (PM 2.5)

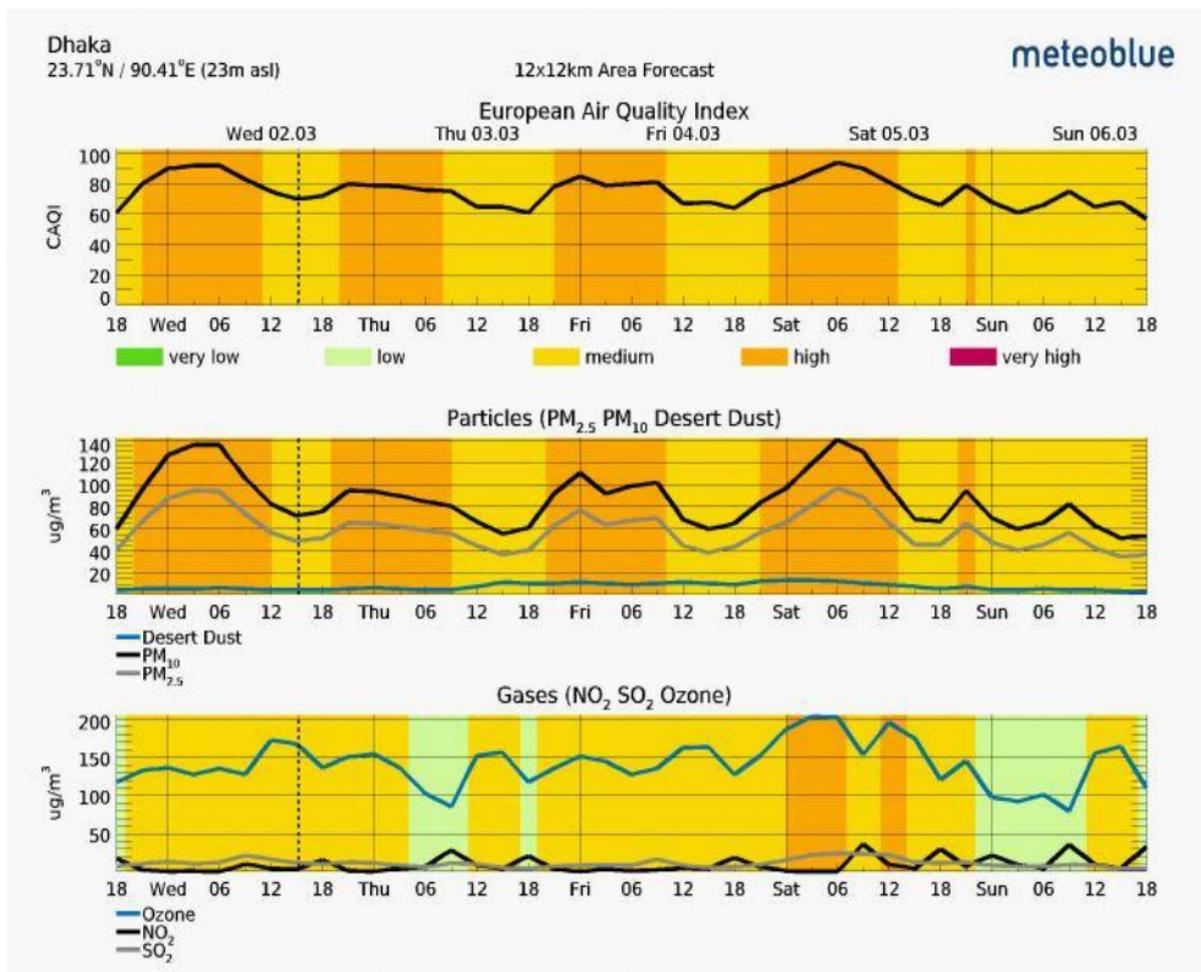


Figure 6:8: Air quality of Dhaka

6.11 Meteorology

The Savar lies on 13m above sea level. Savar upazila climate is classified as tropical. In winter, there is much less rainfall than in summer. The climate here is classified as Aw by the Köppen-Geiger system. April is the warmest month of the year. In April 2021, the average temperature in Savar was 35°C | 95 °F, pressure (mb) was 1006.3, wind speed was 16.9 kmph, and average humidity was 46%. Precipitation here is about 1990 mm | 78.3 inch per year. In January 2021, the average temperature was 25 °C | 77 °F, pressure (mb) was 1012, wind speed was 7.7 kmph, and average humidity was 40%. It is the lowest average temperature and January is considered as coldest month of the whole year (source: world weather online.com). The monthly average wind speed is 2.4 Km/day in the summer, 3.5 Km/hr. in the Monsoon and 2.9 Km/hr. in winter. The maximum wind speed occurs in July to September.

During winter season (December, January and February) the northeasterly winds prevail over the country blowing from land to sea except northern hilly areas where mainly easterly wind prevails.

Clear sky, low temperatures, low humidity and light winds are the common weather phenomenon of winter season. But during the passage of upper air cyclonic circulation over northwestern part of the country (called western disturbances) light rain occurs over the country (Khatun, 2016). The average wind speed becomes high in the monsoon season and low in the dry season. This is the scenario of last ten years (Source: BMD).

6.11.1 Climate condition of the project area

The **Bangladesh JW Animal Protein Co. Ltd.** is located between 23° 54' 52" North latitudes and 90° 14' 34" East longitudes in Dhaka district. Dhaka has a tropical wet and dry/ savanna climate with a pronounced dry season in the low-sun months, no cold season, the wet season is in the high-sun months. According to the Holdridge life zones system of bioclimatic classification, Dhaka is situated in or near the **subtropical moist forest biome**. The annual average temperature is 26.1°C (79°F). Average monthly temperatures vary by 9 °C (16.2°F). This indicates that the continental type is hyper oceanic, subtype barely hyper oceanic. Total annual Precipitation averages 1875 mm (73.8 inches) which is equivalent to 1875 Liters/m² (45.99 Gallons/ft²).

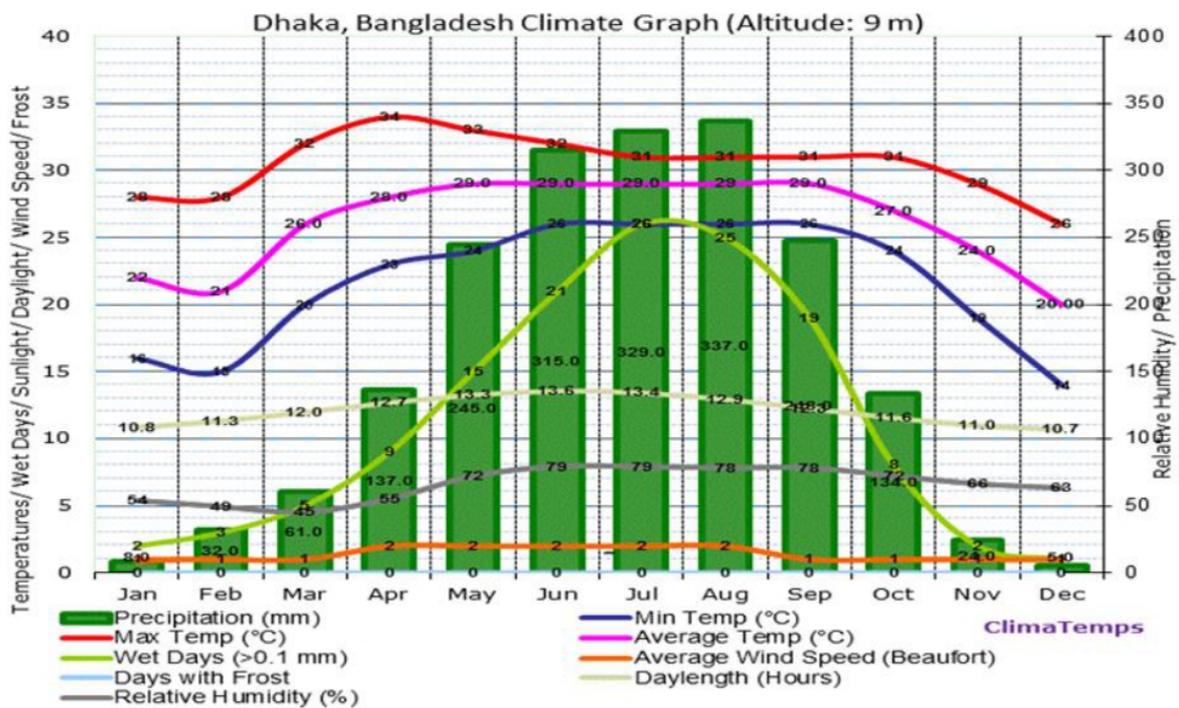


Figure 6:9 Climate graphs of Dhaka collected from <http://www.climateps.com/>

In recent years heat wave has been found due to indiscriminate cutting of trees and geographical locations. Now the highest temperature recorded in this metropolitan area is 38 degrees Celsius



and lowest 12 degree Celsius. During raining monsoon, the average temperature remains 25.0 degree Celsius. In most cases, the temperature remains normal but it is known from local people that the temperature is gradually rising day by day. Especially the temperature has risen during last 5 years that normal life of people has been turning harder. The main reason of heat wave is rise of humidity in atmosphere. This will be a great barrier for future development.

Table 6:5 Climate data for Dhaka

Climate data for Dhaka (1981–2010)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	31.1 (88.0)	34.4 (93.9)	40.6 (105.1)	42.2 (108.0)	41.1 (106.0)	36.7 (98.1)	35.0 (95.0)	36.1 (97.0)	36.7 (98.1)	37.2 (99.0)	34.4 (93.9)	30.6 (87.1)	42.2 (108.0)
Average high °C (°F)	25.1 (77.2)	28.3 (82.9)	32.5 (90.5)	33.8 (92.8)	33.4 (92.1)	32.5 (90.5)	31.8 (89.2)	32.1 (89.8)	32.0 (89.6)	31.8 (89.2)	29.7 (85.5)	26.5 (79.7)	30.8 (87.4)
Daily mean °C (°F)	18.6 (65.5)	22.0 (71.6)	26.3 (79.3)	28.4 (83.1)	28.8 (83.8)	29.0 (84.2)	28.7 (83.7)	28.9 (84.0)	28.5 (83.3)	27.4 (81.3)	24.0 (75.2)	20.0 (68.0)	25.9 (78.6)
Average low °C (°F)	13.1 (55.6)	16.2 (61.2)	20.8 (69.4)	23.8 (74.8)	24.8 (76.6)	26.2 (79.2)	26.3 (79.3)	26.4 (79.5)	25.9 (78.6)	23.9 (75.0)	19.4 (66.9)	14.8 (58.6)	21.8 (71.2)
Record low °C (°F)	6.1 (43.0)	6.7 (44.1)	10.6 (51.1)	16.7 (62.1)	14.4 (57.9)	19.4 (66.9)	21.1 (70.0)	21.7 (71.1)	21.1 (70.0)	17.2 (63.0)	11.1 (52.0)	7.2 (45.0)	6.1 (43.0)
Average precipitation m m (inches)	7.5 (0.30)	23.7 (0.93)	61.7 (2.43)	140.6 (5.54)	278.4 (10.96)	346.5 (13.64)	375.5 (14.78)	292.9 (11.53)	340.0 (13.39)	174.5 (6.87)	31.1 (1.22)	12.1 (0.48)	2,084.5 (82.07)
Average precipitation days	2	3	5	10	15	14	17	16	13	7	2	1	105
Average relative humidity (%)	71	64	62	71	76	82	83	82	83	78	73	73	75
Mean monthly sunshine hours	220.3	225.3	256.3	237.8	220.9	142.2	131.5	140.6	152.7	228.6	236.3	242.6	2,435.1
Source #1: Bangladesh Meteorological Department													
Source #2: Sistema de Clasificación Bioclimática Mundial (extremes 1934–1994), Deutscher Wetterdienst (sun, 1961–1990)													

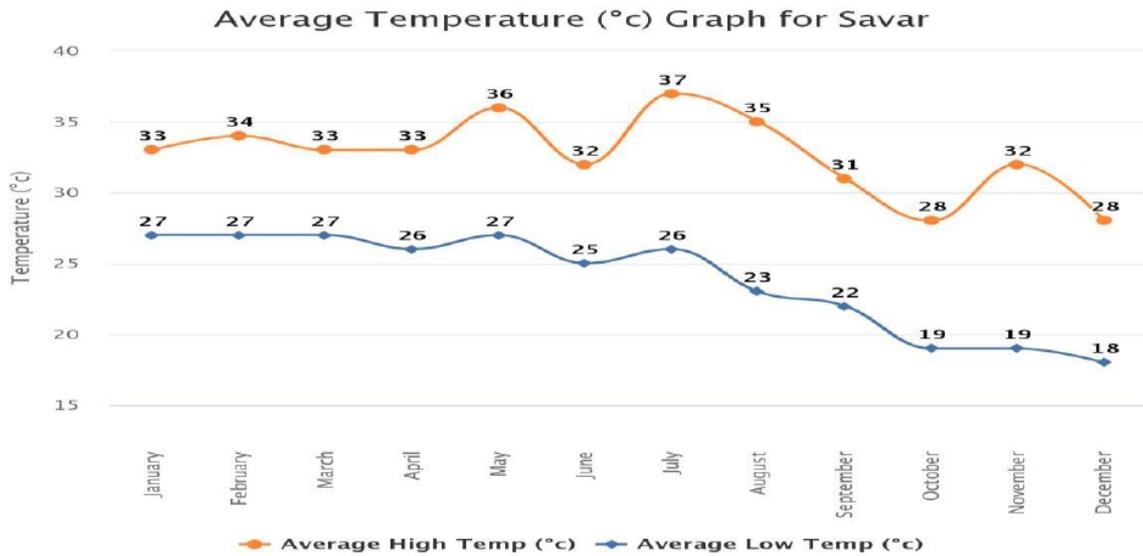


Figure 6:10 Average annual Temperature pattern of Savar Upazila

Analyzing the trend of rain it is found that average rainfall in Savar upazilla and Dhaka district area are almost same. But more research is needed to ascertain whether this trend indicates Climatic Change. The usual rainy moon son time is getting delayed due to abrupt change of rainfall pattern. The average rain fall over the year is given below:

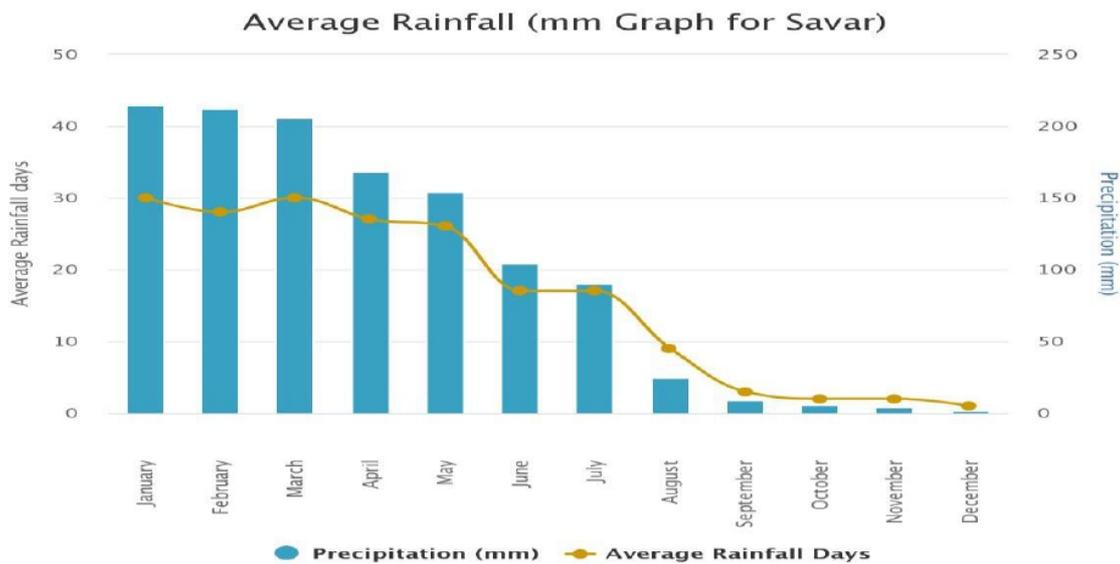


Figure 6:11 Average annual Temperature Pattern of Savar Upazila

Wind blows from southwest and southeast during pre-monsoon and monsoon season, from Northwest and Northeast during the post-monsoon and dry season. Between mid-April and early

June, and between mid-September and mid December high wind velocity are experienced. The average wind speed over the year in the project is given below:

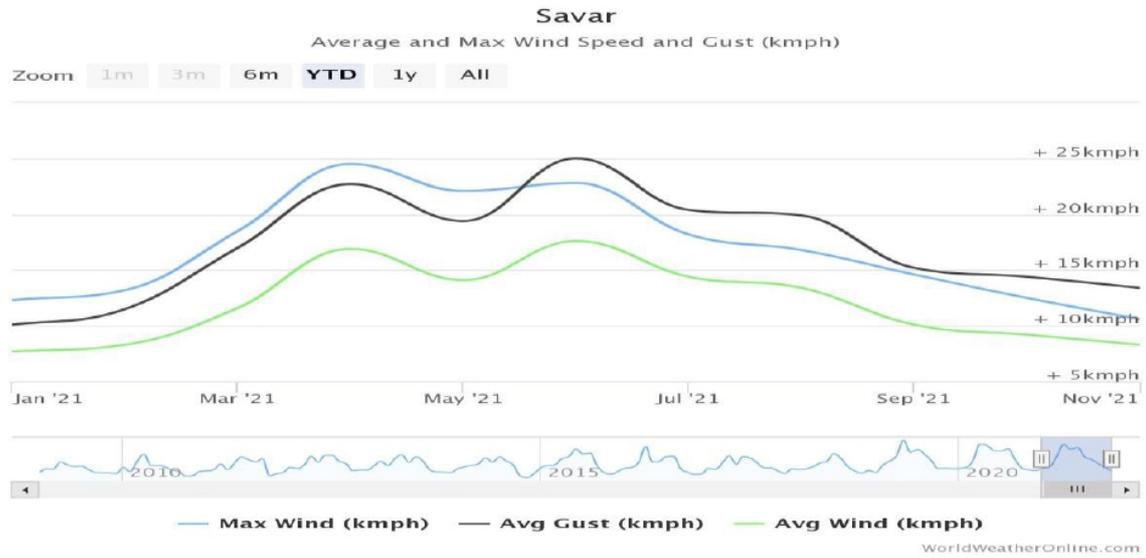


Figure 6:12 Average annual wind speed of Savar Upazila

According to the statistics shows that average humidity goes up between June and October close to 80% other side it goes down rest of the months. The average humidity over the year is given below:

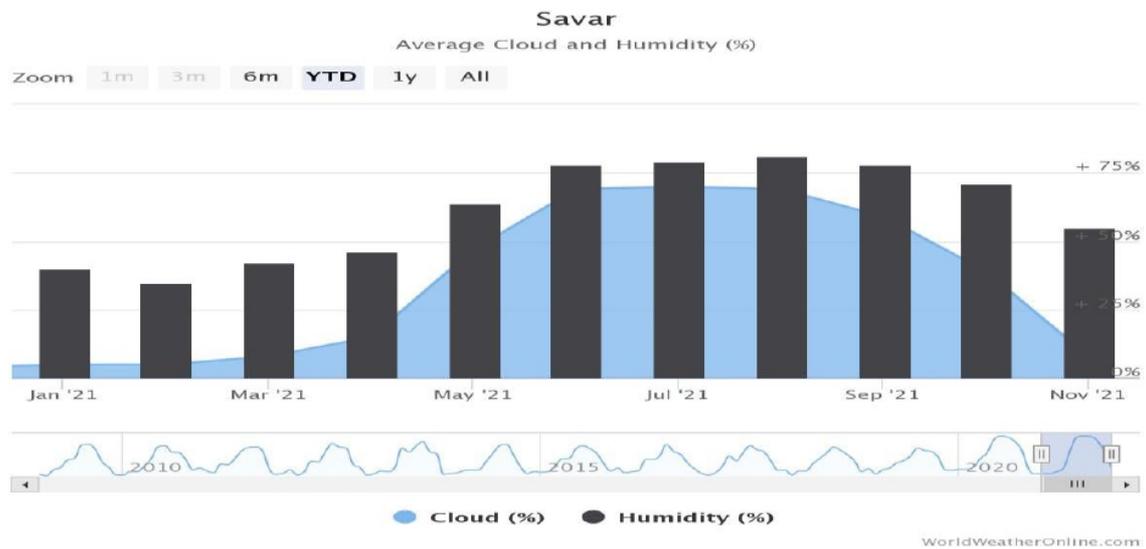


Figure 6:13 Average annual Humidity and Cloud pattern of Savar Upazila

The graphical data indicates increase in the atmospheric pressure from January to December.

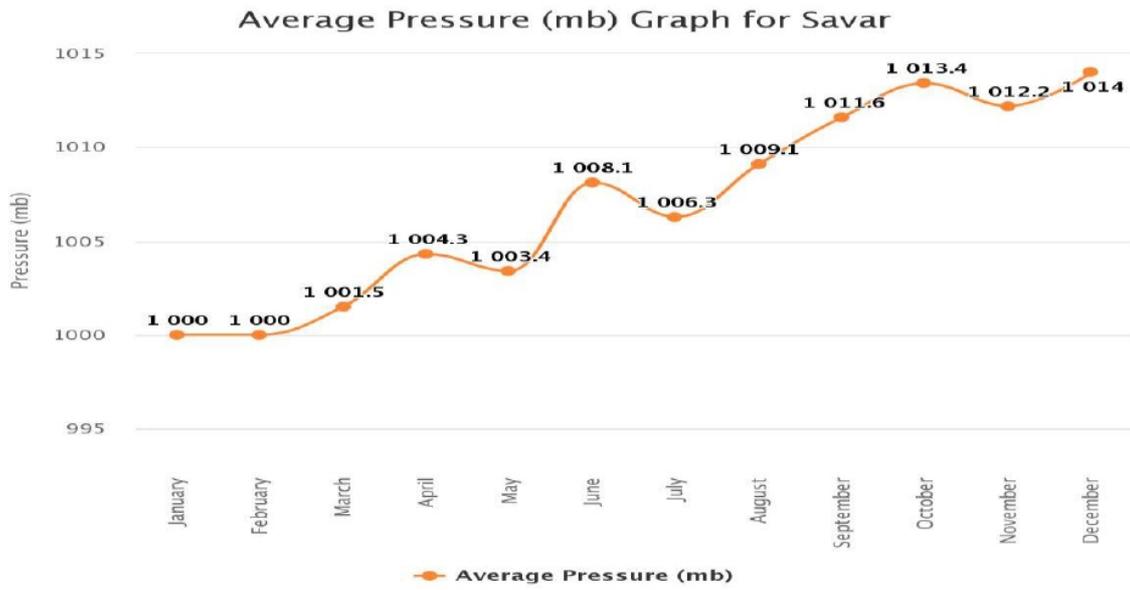


Figure 6:14 Average annual Pressure of Savar Upazila

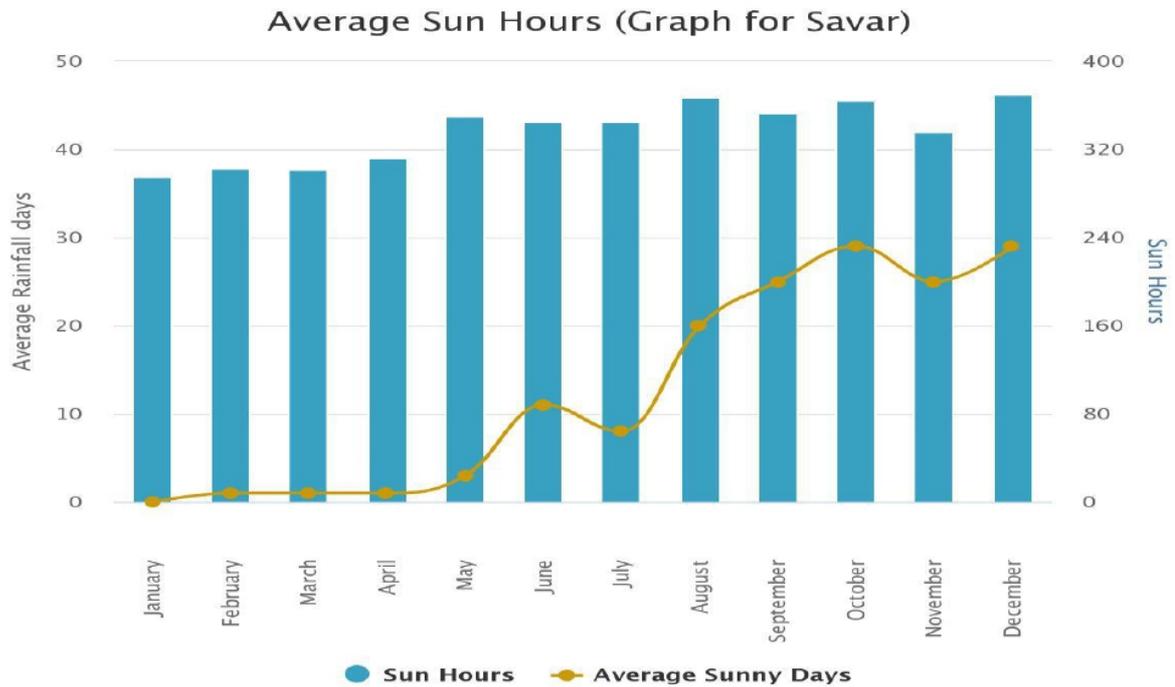


Figure 6:15 Average annual Sun hours of Savar Upazila

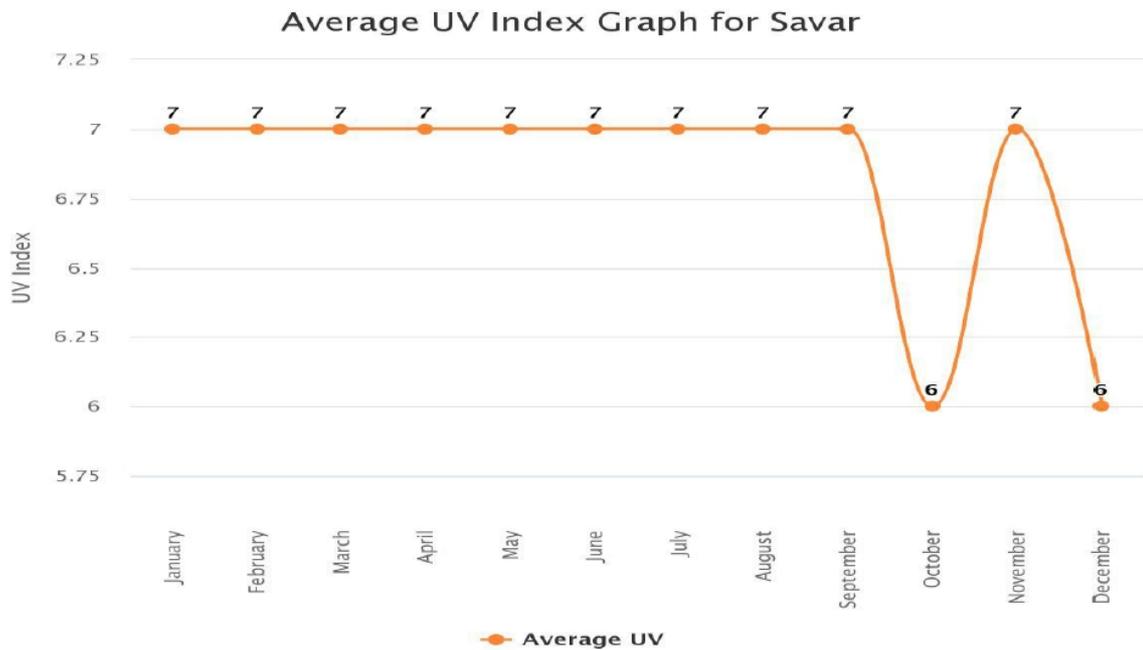


Figure 6:16 Average annual UV Index of Savar Upazila

Air pollution, smog, fog affects the visibility range. The following graph shows average visibility of Savar upazila.

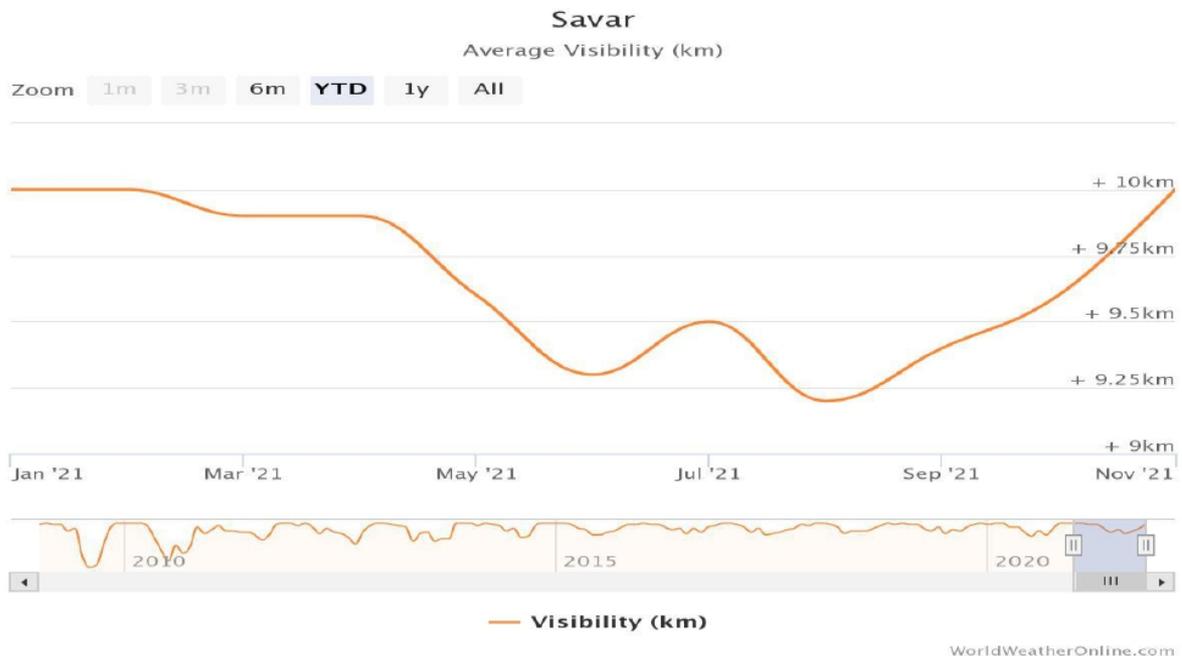


Figure 6:17 Average annual Visibility of Savar Upazila

6.12 Noise

Noise is an important part of the environment. The World Bank and Bangladesh have different recommended values for noise standards. The level of noise at the project is not detected and too much noise level data near the project is not found. Now, the project area is quite silent. After the construction, sophisticated machineries will be installed in the project area when the industries will be set up after allocation, which will produce little significant noise.

Noise is an 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. The generators are encompassed by a soundproof shed. So, no noise pollution occurs from generators in the project area.

Table 6:6 Noise Level around the project site

Sampling Point	Latitude	Longitude	Sound Level (Day Time)	Sound Level (At Night)
1	2647406.87 m N	219176.44 m E	56.6 dBa	20.0 dBa
2	2647450.94 m N	219158.64 m E	55.6 dBa	22.0 dBa
3	2647519.17 m N	219188.15 m E	60.6 dBa	19.7 dBa
4	2647568.84 m N	219240.27 m E	58.6 dBa	21.5 dBa
5	2647360.42 m N	219257.43 m E	57.6 dBa	20.0 dBa
6	2647534.75 m N	219419.77 m E	60.6 dBa	18.0 dBa
7	2647450.44 m N	219410.80 m E	62.5 dBa	15.5 dBa
8	2647401.37 m N	219351.34 m E	59.0 dBa	20.0 dBa
Standard Limit			Below 75 dBa	Below 70 dBa

6.13 Seismicity

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 north-eastern Indian plate near the edge of the Indian carton and at the junction of three tectonic plates—

the Indian plate, the Eurasian plate, and the Burmese micro plate. These form two boundaries where plates converge– the India-Eurasia plate boundary to the north forming the Himalaya Arc and the India-Burma plate boundary to the east forming the Burma Arc.

Active faults of regional-scale capable of generating moderate to great earthquakes are present in and around Bangladesh. These include the Dauki fault, about 300km long trending east-west and located along the southern edge of Shillong Plateau (Meghalaya- Bangladesh border), the 150 km long Madhupur fault trending north-south situated between Madhupur Tract and Jamuna flood plain, Assam-Sylhet fault, about 300km long trending north east southwest located in the southern Surma basin and the Chittagong-Myanmar plate boundary fault, about 800km long runs parallel to Chittagong-Myanmar coast.

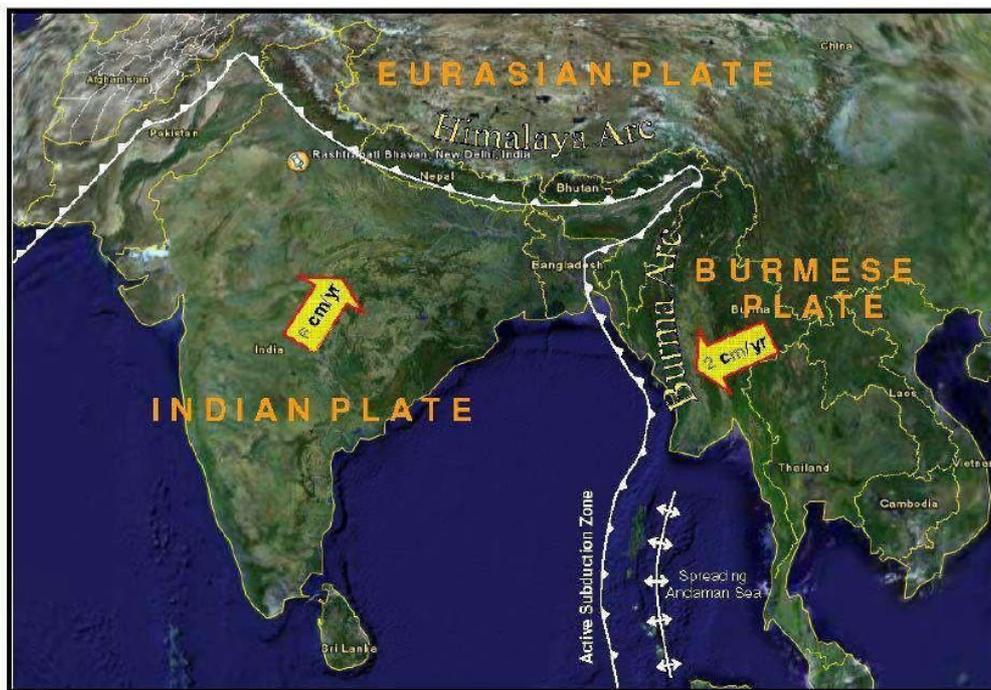


Figure 6:18 Regional tectonic setup of Bangladesh with respect to plate configuration

Dhaka is situated in the central part of the country on the bank of the Buriganga River and at the southern tip of the Madhupur Tract dating back to the Pleistocene age. The Madhupur Tract is an area of recent uplift within the delta and the surface of the tract is in general higher on the west, sloping very gently eastward to disappear beneath younger sediments (Fergusson, 1863; Morgan and McIntire, 1956). Dhaka is surrounded by the old Brahmaputra floodplain in the north and east, by the Ganges-Meghna flood plain in the south, and by the Jamuna flood plain in the west.

Dhaka is slightly elevated above the surrounding floodplains and represents mostly flat land with minor undulations. Topographically Dhaka is of low relief with many low depressions. According to (Alam, 1988), the Madhupur Tract is structurally controlled. The Pleistocene sediments of Madhupur Tract have been affected by numerous episodes of faulting. These faults are probably the branch-out surface faults from the low dipping western extension of the Burma Arc detachment fault. Dhaka lies within 50 to 500km distances from the seismogenic faults and sits on the Burma Arc detachment fault.

Based on earthquake epicenters and morpho-tectonic characteristics, Bangladesh is divided into three seismic zones, namely zone-I, zone-2, and zone-3 (Table 6.7). The northeastern folded regions of Bangladesh are the most active zone and it belongs to zone-I. Zone-II consists of recent uplifted Pleistocene blocks of the Barind and Madhupur Tract and the western extension of the folded belt. Southwest Bangladesh is referred to as zone-III and it is a seismically quiet zone. The Bask coefficients of these three zones are 0.08, 0.05, and 0.04, respectively.

Table 6:7 Seismic zones of Bangladesh

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

The factory will be located in Zone-II of earthquake zones (Figure 6.19) which is a 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.

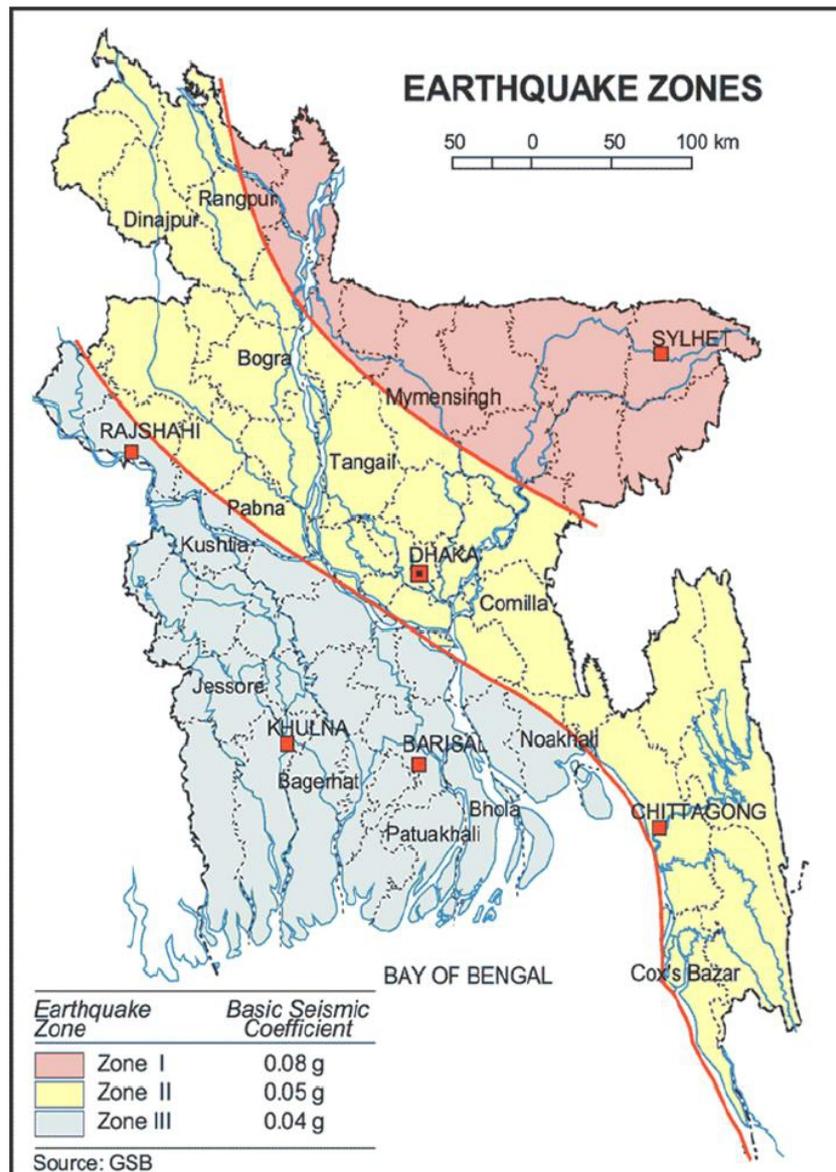


Figure 6:19 Earthquake zones of Bangladesh

6.14 Ecological Baseline

6.14.1 Introduction

The ecological baseline is the ecological value of a site before construction works are undertaken. It can be compared to the ecological value of the site after construction works are complete to determine where there have been changes. The survey of the ecological status is the first step of the implementation. This study has two main outputs: In one hand it is a baseline for the monitoring of the ecological result of the project. In the other hand it provides data for the Environmental Impact Assessment (EIA).

The survey cover the whole target area from the terrestrial habitats to the water body, including either the Hungarian or the Croatian side regarding to the fact that the habitats are divided only by the state border.

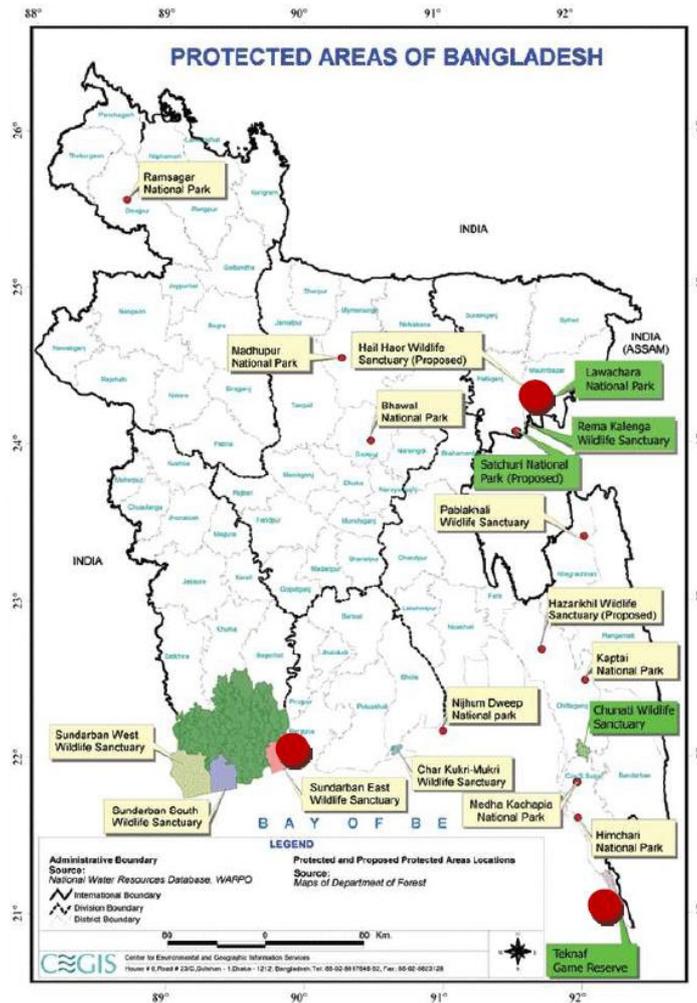


Figure 6:20 Protected Areas of Bangladesh

6.14.2 Ecological and Conservation Designations

6.14.2.1 Overview

There are 19 protected areas in Bangladesh, covering 2,458 sq. km and representing 1.68% of the land area (FD record as on July 2007). The Forest Department has the mandate for the management of these protected areas. The protected areas are declared in the country under the “Bangladesh Wildlife (Preservation) (Amendment) Act, 1974”. The protected areas are divided into following categories-

6.14.2.2 National Parks

National Park is a relatively large area of scenic and natural beauty created for the preservation of scenery, flora, and fauna in a natural state to which access of the public for recreation and educational and research purposes is allowed. There are 10 national parks available in our country.

No National Parks are located near the project site.

6.14.2.3 Wildlife Sanctuary

Wildlife Sanctuary is an area closed to hunting, shooting or trapping of wild animals and maintained undisturbed for breeding of wildlife and vegetation, soil and water is protected from public interference. There are 8 wildlife sanctuaries present.

No Wildlife Sanctuary is located near the project site.

6.14.2.4 Game Reserves

Game Reserves are created for protection of wildlife and increasing their number where capturing of wild animals is unlawful. There is only one game reserve present in our country named Teknaf Game Reserve, Cox's Bazar which area is 11,615 ha. and notified on 1983.

No Game Reserve is located near the project site.

6.14.2.5 Ecologically Critical Area

An Ecologically Critical Area (ECA) is an environmental protection zone in Bangladesh. In 1995, specific areas in Bangladesh could be deemed Ecologically Critical Areas as a result of the Environmental Conservation Act.

Bangladesh has a wide variety of ecosystems that include over 300 rivers that creates marine and fresh water environments. There are a multitude of areas that have been considered ECAs. Cox's Bazar is on the border of Bangladesh and Myanmar in the southeast corner of Bangladesh. The Teknaf Peninsula is 80 km of sandy beach and holds a variety of species as one of the longest beaches in the world. The Sonadia Islands are home to some of the last mangrove forests that house distinct species that can tolerate the high salinity of the mangrove forests in this area. The Sundarbans also contain mangrove forests and was named an ECA because it continues to suffer from over-exploitation and illegal urban development. St. Martin's Island is known for its coral-algal that overwhelms its rocky reefs. The island is a refuge for globally threatened marine species. Finally, the Hakaluki Haor found in greater Sylhet is an ECA because it has an extensive amount of wetland habitats that support a wide variety of life.

Gulshan-Baridhara Lake was declared an ECA in 2001. In September 2009, the four rivers around the capital city Dhaka—Buriganga River, Shitalakshya River, Turag River and Balu River—have been declared by the Department of Environment as ECAs.

The project site does not locate in any Ecologically Critical Area.

6.14.2.6 Eco Park

Eco Park a short form of Ecological Park. It is exploited as an amusement park without hampering its natural environment so that the bio-diversity remains unaffected there. Generally, a particular area of a forest is demarcated and brought under intensive management for this purpose. Sometimes forest areas having special natural features are selected as eco parks. Flora of the concerned area gets preference for such consideration. However, protection and preservation of both flora and fauna get top priority. Beauty offered by the nature is opened to the visitors. Moreover, efforts to attract and entertain the visitors are also visible in the Eco parks.

Eco Park is not only a mere component of forest management. It facilitates to enjoy the beauty of the jungles as well as to acquire firsthand knowledge on its ecology, particularly the growth and development of flora and fauna. Eco Park also helps to increase public awareness about the necessity of maintaining bio-diversity. The Department of forest has set up nine eco parks throughout Bangladesh considering their natural beauty and specific features like geographical location. These are: Sitakunda Botanical Garden and Eco Park, Bashkhali Eco park, Madhavkundo Eco park, Madhutila Ecopark, Bangabandhu Jamuna Eco Park, Kuakata Eco park, Tilagarh Eco park, Jafflong Garden Park and Barshijora Eco park.

The project site does not locate in any Eco Park Area.

6.15 Terrestrial Ecology

6.15.1 Flora

The flora of the Dhaka district is largely similar to that of other adjoining districts. This district was thickly populated by many indigenous plants now that unique vegetation has been greatly reduced due to random and ruthless destruction of vegetation for increasing human habitation.

The main agricultural crops are rice, jute, wheat, sugar cane, vegetables, oil seeds, tobacco, spices etc. Rice is the dominant agricultural crop. Among the rice crops, boro covers the largest area followed by amon and aus (Census of Agriculture 2008). Jackfruit is extensively grown and is an important cash crop.

The common varieties of trees that are found in the district are khejur (*Phoenix sylvastris*), plam (*Borassus flabellifer*), black berry (*Syzygium cumini*), baroi (*Zizyphus mauritiana*), starapple District (*Syzygium malaccaensis*), pitraj (*Aphanamixls polystachia*), mango (*Mangifera indica*), guava (*Psidium guava*), sajna (*Moringa oleifera*), bahera (*Terminalia bellirica*), neem (*Azadirachta indica*), kadam (*Anthocephalum cadamba*), palash (*Butea monosperma*), hijal (*Barringtonia acutangula*), mariad (*Tamarindus indica*), bel (*Aegle marmelos*), jackfruits (*Artocarpus heterophyllus*), mandar (*Erythrina variegata*) coconut (*Cocos nucifer*), kamranga (*Averrho karambola*), bat (*Ficus indica*) etc. Various kinds of herbs, shrubs and orchids also grow here abundantly.

Besides, there are several gardens in the Dhaka city in which many interesting and rare plants local or foreign have been planted and maintained. Of these gardens, balda garden at batkhola road is very interesting. The collections of the orchids, ferns, cactus and nymphaea are particularly rich in this garden. The rare plants are agor plant, australian acacia, michaelia champaka, magnolia grandoflora, century plant, cammelia japonica and the like.

The Botanical garden of Dhaka University, though small, is quite rich in plant collections.

A few plant species occurring in the Ramna Park are akashmoni, kanchan, mahua, keya, basanti, ceylon oak, sutana champa, australian acacia etc. moreover, mirpur botanical garden has some rare plants, such as rose of venezuela, bread fruit, karpur, african tulip, devil's tree, kurchi, nagalingam, tree of heaven, cashew nut etc.

6.15.2 Fauna

Mammals: Of primates, the rhesus monkey (*Macaca mullata*) is fairly common in the district, Until recently, a large number of monkeys were seen frequently jumping around in the Dhaka city. They have now retreated to the city and far beyond. Other mammals that are commonly found in this district are: Bengal Fox (*Vulpes bengalensis*), Jackal (*Canis aureus*), grey mongoose (*Herpestes edwardsi*) etc.

Bats are represented by a few species' including India fruit bats. At times, porpoises are seen in the rivers of the district. Rodents are represented by different species of squirrels, rats and mice.

Birds: The common birds of the district include bhat shalik (*Acridotheres tristis*), house sparrow (*Passer domesticus*), magpie robin (*Copsychus saularis*), black drongo (*Dicurus macrocercus*), spotted dove (*Streptopelia chinensis*), lesser golden backed woodpecker (*Picus myrmeco phoneus*), white breasted kingfisher (*Alcedo atthis*), pond heron (*Ardeola grayii*), little cormorant (*Phalacrocorax niger*), white breasted water hen (*Amaurornis phoenicurus*), rose ringed parakeet (*Psittacula cupatria*), common hawk cuckoo (*Cuculus micropterus*), tailor bird (*Orthotomus sutorius*), koel (*Eudynamis scolopacea*), barn owl (*Tyto alba*), house crow (*Corvus splendens*), brahmyn kite (*Haliastur Indus*). The smaller and song birds include the bush lark, halde pakhi, (*Oriolus xanthornus*) weaver bird, shrike, warblers, purple sun bird etc.

In addition, a large number of migratory birds are found here during winter specially in Jahangirnagar University. They include most of the waders including the sheld duck (*Tadorna tadorna*), greyleg goose (*Anser anser*), little ringed plover (*Charadrius dubius*), pintail (*Anas acuta*), fantail sinpe (*Gallinago stenura*), brahmyn duck (*Tadorna ferruginea*), common teal (*Anas crecca*), common pochard (*Aythya ferina*), grey wagtail (*Motacilla cinerea*), brown shrike (*Lanius cristatus*), pied harrier (*Circus melanoleucos*), common turn (*Sterna birusdo*), herring gull (*Larus argentatus*), marsh harrier etc.

Reptiles and Amphibians: Different species of fresh water tortoises and turtles such as pond tortoise (*Melanochelys trijuga*), reacock soft shell turtle (*Trionyx burum*), common roof turtle species of lizard like house lizard (*Hemidictylus brooki*), wall lizard (*Hemidictylus frenatus*), yellow water monitor (*Varanus flaviscens*), striped skink, grey land monitor etc. are also found. The poisonous snakes include common cobra (*Naja naja*), rat snake (*Ptyas mucosus*), common krait (*Bungarus caeruleus*), banded krait (*Bungarus fasciatus*) and common blind snake.

Amphibians like skipper frog (*Rana cynophytis*), bull frog (*Rana tigerina*), cricket frog (*Rana limnobaris*) and toad (*Bufo melanostictus*) are also found in this area.

Fishes: Fishes are caught in the ponds, rivers, creeks and beels of the district. The popular edible fishes are hilsa (*Hilsa ilisha*), ruhi (*Labeo rohita*), catla (*Catla catla*), mrigel (*Cirrhinus mrigala*), kalbaush (*Labeo calbasu*), sarpunti (*Puntius sarana*), chital (*Notopterus chitala*), airh (*Mystus aor*), pabda (Ompok pabda), bacha (*Eutropichthys vacha*), pangas (*Pangasius pangasia*), koi (*Anabas testudineus*), shing (*Heteropneustes fossilis*), magur (*Clarius batrachus*) etc. Beside fish, invertebrates like prawn (*Palaemon carcinus*), shrimp (*Palaemon malcolmsoni*) and crabs are also available here.



Moreover, some exotic fishes like telapia (*Oreochromis mossambicus*), nilotica (*Oreochromis niloticus*), silver carp (*Hypophthalmichthys molitrix*), and grass carp (*Cteopharyngodon idella*) etc. have also been introduced in the district.

No trace of aquatic flora and fauna is found around the project location because this area mainly commercial, residential and industrial area.

6.16 Socio-Economic Condition

Main Crops: Paddy, jute, wheat, potato, peanut, onion, garlic, chilly, ginger, betel nut, pulse, corn, sugarcane, vegetables etc. are main crops of this district.

Main Fruits: Mango, jackfruit, papaya, guava, olive, coconut, kul and banana etc. are main fruits of this district.

Manufacturing Industries: Ceramic industry, beverage industry, press and publication, garments industry, foot ware, jute mills, textile mills, printing and dyeing factory, transformer industry, automobile industry, biscuit and bread factory, pharmaceutical industry, cosmetic industry, soap factory, rice mill, flour mill, ice factory, ball pen industry, polythene industry, saw mill, brick field, cold storage, welling, plant nursery, etc. are main sectors of manufacturing industries of this district.

Economic Situation: Main sources of income Agriculture 23.94%, non-agricultural laborers 2.66%, industry 0.89%, commerce 14.81%, transport and communication 4.16%, service 14.01%, construction 2.06%, religious service 0.18%, rent & remittance 19.96% and others 17.33%. The economy of Dhaka rural area is agro-based and Dhaka urban area is industry based. Out of total 2,266,479 holdings of the district 10.65% holdings are farms, which produce varieties of crops, namely, local and HYV rice, wheat, jute, tobacco, potato vegetables, spices, pulses etc. Various fruits like mango, jackfruit, lichee, black berry, palm betel-nut, banana etc. are the main fruits of the district. Varieties of fish are caught from rivers, beels and paddy fields during rainy season. The most common fishes are ruhi, katla, mrigel, magur, singi, koi, puti, shoil, gazar, boal, etc. All these fishes are economically valuable. Besides these common varieties, some other well-known varieties of fish are pangash, airh, bacha, rita batasi, khalisha and chingri are found. Besides crops, livestock and poultry are the subsidiary source of household income of the district.

Enormous amount of socio-economic activities is present near the industrial site. People are engaged in wide variety of occupation in industrial, commercial, transportation and various other sectors. In this industrial area people from different cultural and religious background live, work and worship peacefully. Due to the establishment of the resort people were not removed from the site or people were not affected. Multi-disciplinary activities/business has been generated aiming

to the establishment of this resort and as such a number of people have engaged in the activity of the resort to run their livelihood. The resort itself employed a large number of people, skilled and unskilled, during operational phase. Many local people have been benefited directly or indirectly for the establishment of the resort through employment and other activities.

6.17 Historical Monuments and Archeological heritage

A total of 13 ancient archaeological sites have been discovered at Savar. These are as follows

1. Raja Harish Chandrer Badi
2. Sulia
3. Rajasan,
4. Kotbadi,
5. Gandaria,
6. Karnapada,
7. Kalma
8. Madanpur
9. Dagar Mura
10. Mathbadi
11. Fulbadi
12. Konda
13. Palthalia (Jahangirnagar University Campus).

These fall into three categories i.e., administrative, religious and pottery or residential sites. All the sites are found in and around Savar and on the eastern side of the Bangshi (Source: Banglapedia).

Besides these a number of ancient ponds can also be found in this area. Local legends suggest that King Harish Chandra excavated a total of 50 ponds in a single night. Of these the names of 30 ponds are known from different literatures. These are Sagar Dighi (near Raja Harish Chandrer Badi), Raj Guru's pond, Chhota Khuda, Bara Khuda, Kumaria pond, Dakaitmara pond, Jor pukur, Niramis pukur, Kodaldhoya pukur, Giyas pukur, Satini pukur, Amis pukur, Doyatdhoya pukur, Raj Dighi, Sukh Sagar, Khataishya pukur (near Kalma), Jalori pukur, Ban pukur, Chhobangara pukur, Lal pukur, Satpukuri pukur, Chhaiyal pukur, Jaleshvari pukur, Pitkila pukur, Choti Mara pukur, Andar pukur, a second Kodaldhoya pukur, Budir Bagh pukur, Yogir pukur (at Jahangirnagar University Campus) and Moor pukur. Most of these ponds have now been silted up by natural processes or have been brought under human habitation (Source: Banglapedia).

There are not any historical sites or structures of archeological paleontological or architectural significance within the factory areas.

6.18 Tribal communities

According to the BBS census 2011, ethnic minority group nationals numbered 319 including Buno, Garo, Chakma (Sangma), and Burman live in Savar Upazilla.

6.19 Life Style

Life style of people near about the factory area is progressing because this area is gradually developing and expanding of job opportunity for local people.

6.20 Settlement and Housing

As the project area is a combined community of residential, commercial and industrial zone, people of various economic status lives in this area. All sorts of settlements and housing have already been established in the resort surroundings. Working people of different sectors live in this area. At the same time socio- economic activities will also be increased with money flow and activities of the newly settled working people of this project. The services include infrastructure such as water, garbage collection, sanitation, electricity, roads and drainage etc. will need to be improved. The concerned authority of the Local Body and the proponent will assist to improve service facilities of the area. So, there is no question of evacuation of settlement and housing in the project area.

6.21 Traffic and Transport

The factory is connected to Dhaka-Ashulia Highway. Traffic and transport facilities are good on the project site.

6.22 Socio-economic and cultural environments

Enormous amount of socio-economic activities is present near the project site. People are engaged in wide variety of occupation in health services, commercial, transportation and various other sectors. In this area people from different cultural and religious background live, work and worship peacefully.



Chapter 7: Potential Environmental Impacts and Mitigation Measures

7.1 General

Anticipated environmental impacts associated with the proposed project activity of the unit have been identified in this study. Various activities during the construction and operation phase of the project, which are likely to cause an impact on various environmental components, have been listed.

For evaluation of impacts due to proposed activities of the unit, the baseline data generated for environmental parameters presented in chapter-6 of this report has been utilized. Changes in the environmental parameters and their impact whether short term or long term, positive or negative are identified & predicted as well as reversible nature of impacts are described in this chapter.

For identification, prediction, and quantification of the impacts due to the proposed project, an assessment task is performed for both Construction as well as Operation stages. All possible care to maximum extent is taken for assessment of temporary, short term, long term, direct, indirect as well as reversible and irreversible in nature of impacts. It is also borne in mind that the impact caused by activities of the construction phase will be temporary and restricted to a period of construction of the project. In this chapter, the effect due to construction & Operational activity of the proposed project is explained. Finally, the description in tabular form which is commonly known as the “Impact matrix” is illustrated.

During this assessment, it is revealed that implementing proper Management measures for all major predicted impacts, can be eliminated or can be minimized to a negligible extent of damage /hazard to the environment.

7.2 Environmental Sensitivity Investigation

The proposed project area is environmentally sensitive due to its geographical location. All the environmentally sensitive issues were investigated by a selected consultant’s group through carrying out primary and secondary data analysis. The main hindrances of the proposed project sustainability are natural calamities like cyclones, earthquakes, etc. Design consultants should consider this sensitive issue in the design structure to make the project environmentally sound and sustainable. The structure should be maintained at an adequate height to protect from cyclones, earthquakes, landslides, etc. A disaster management plan has to be developed by the project proponent to protect from natural calamities.

7.2.1 Natural Hazard

A vulnerability map gives the precise location of sites where people, the natural environment, or property are at risk due to a potentially catastrophic event, often induced by climate change, which could result in death, injury, pollution, or other destruction. Such maps are made in conjunction with information about different types of risks. It could delineate the commercial, tourist, and residential zones that would be damaged in case of natural disaster.

Vulnerability mapping can allow for improved communication about risks and what is threatened. It allows for better visual presentations and an understanding of the risks and vulnerabilities so that decision-makers can see where resources are needed for the protection of these areas. The

vulnerability maps will allow them to decide on mitigating measures to prevent or reduce loss of life, injury, and environmental consequences before a disaster occur. Those preparing the maps can overlap flood inundation and slope stability zones with property maps to determine which properties and buildings are at risk. They can then notify the landowners and inform them of government subsidies or other support available for undertaking a measure that would protect their homes from potential damage by, for example, water inundation or slope failure.

The following figure shows the vulnerability map of different hazards of Bangladesh. From the figure, it is understood that the study area is fall in storm surge affected area. Storm surges are generally caused due to cyclones. So, any infrastructure development in this area should be followed precaution to resist this event. It would help the decision-maker to take decisions during the design period.

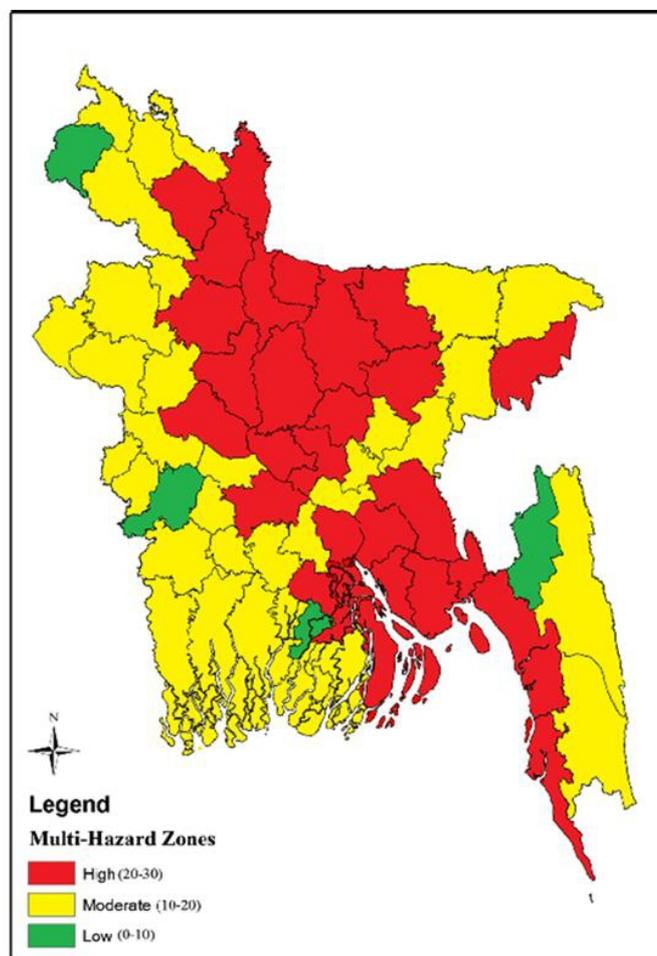


Figure 7:1 Hazard Map of Bangladesh

7.2.2 Seismicity

Seismic structural strength assessment of existing buildings, strengthening of existing proposed foundation system and superstructures of critical structures, incorporation of liquefaction potential criteria in the structural design process for structures are a few of the considerations to be in mind. A preventive measure can be coordinated by ensuring anti-seismic design (end-bearing pile

foundation including bored or driven piles and use reinforced concrete raft for shallow foundation), and quality control (selection of adequate material and appropriate workmanship) under expert supervision. The project site lies in seismic zone II which is also called moderate intensity seismic zone with a basic seismic coefficient of 0.15g. Having a location in Zone-II the land buildings and land-based structures for this project should be designed to withstand the maximum lateral load of 50% of gravity load.

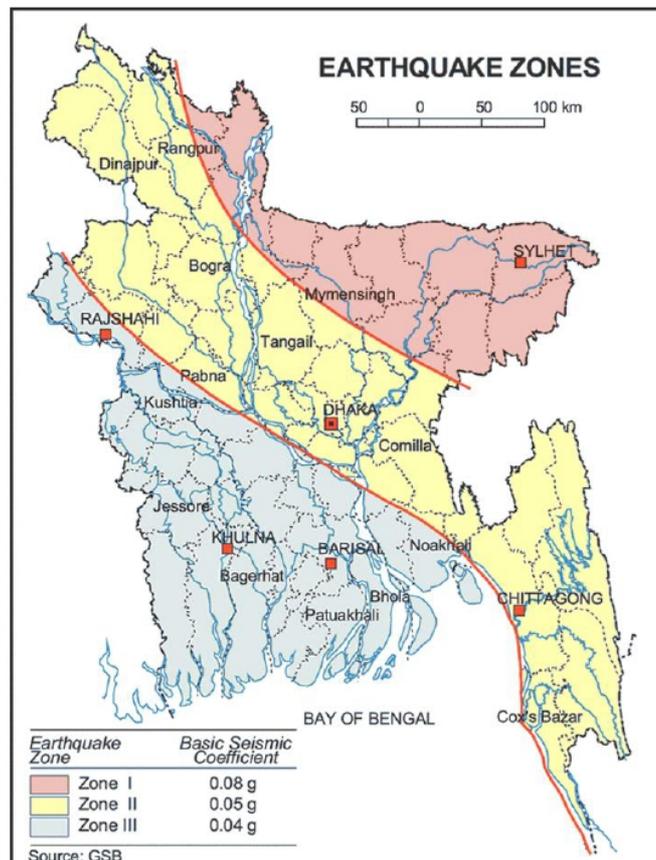


Figure 7:2 Earthquake Zoning Map

7.3 Identification of Potential Impacts

One of the important elements of Environmental Impact Assessment (EIA) is the identification of impacts, as it helps in quantification and evaluation of impacts. Although, in general, a number of impacts have been identified while describing the baseline environmental status, it is necessary at this stage to identify the critical impacts positive/negative on various components of the environment that are likely due to installation of **Bangladesh JW Animal Protein Co. Ltd.** Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are attributed directly to project activities whereas secondary impacts are indirectly induced and typically include the associated investment and changed patterns of social and economic activities due to the proposed project activities. The construction and operational phase of the proposed **Bangladesh JW Animal Protein Co. Ltd.** comprises various activities, each of which may have either positive or negative impact on some or other environmental attributes. The proposed project activities would impart impact on the environment in two distinct phases:

- During construction phase which may be regarded as temporary or short term and reversible effect; and
- During operational phase which may have long term effects.

The evaluation of environmental impacts due to installation of **Bangladesh JW Animal Protein Co. Ltd.** considering the baseline status within a radius of 3 km around the proposed plant and the mitigation measures are as under:

7.4 Identification of Impacting Activities

I. Various activities involved in the proposed project are:

- A. Construction phase activities
- B. Operation phase activities

II. The activities identified for the proposed project under each phase are:

A. Construction phase:

1. Excavation
2. Foundation & Civil work
3. Transportation of construction materials, equipments & machineries
4. Construction of project.

B. Operation phase:

1. Handling and Transfer of Solid waste
2. Movement of the Vehicle
3. Operation of Project
4. Sewage water Management

7.5 Likely Beneficial Impacts

The project will bring in much direct and indirect positive impact on the social wellbeing of the locality. The likely benefits from the construction and operation of the proposed development project are listed as below:

7.5.1 Construction Phase

7.5.1.1 Employment opportunities in construction and supervision work

Skilled and semi-skilled human resources will be used in the construction activities of the factory which will generate the employment. The direct employment during the construction phase has been estimated to 20-30 (daily average basis) which will increase in income level.



The impact will be direct, high magnitude, site specific and short term; therefore, it will be significant in nature.

7.5.1.2 Skill and knowledge development through training and orientation

The human resource involved in the project construction will gain experience and skills that enhances their capability in their respective field which will increase in income generating activities and employment opportunities.

The impact will be direct, medium magnitude, local and long term; therefore, it will be significant in nature.

7.5.1.3 Increase in economic activities due to supply of goods and services

Different commercial activities will be increased in project area due to the construction works. Local suppliers will get an opportunity to supply construction materials like cement, steel, bar, gravel, sand etc. which definitely benefits the local market and help to boost the economic activities.

The envisaged direct impact is medium in magnitude, site specific in extent, and long term in duration and hence significant in nature.

7.5.2 Operation Phase

7.5.2.1 Employment generation and promotion

A number of professionals will be involved in the project for the production process. Around 150 peoples will get direct/indirect employment opportunity during the operation of the industry. Besides this, adjacent area of the project and many people will be engaged to provide other necessary facilities to the project visitors through opening of groceries or commodity stores and restaurants. This employment generation will increase the income of locals.

The envisaged direct impact is high in magnitude, local in extent, long term in duration and hence very significant in nature.

7.5.2.2 Increase in revenue generation

With operation of the project, revenue generation will be increased at district and upazilla level.

The envisaged direct impact is medium in magnitude, local in extent, long term in duration and therefore very significant in nature.

7.5.2.3 Promotion of local business

The project operation will increase the daily activities like, animal husbandry through food waste supply, vegetable and fruit supply to project, electronics supply, human resource enrollment, vehicle hire services provider and so on within the premises of project. The demand of local goods, markets, food and other basic requirement certainly increases at the project site. The large number of visitors especially tourist from different countries and other staff will significantly increases the economic transaction in and around the vicinity, which will attract people to migrate around the area. This will lead to urbanization of the area and will improve the socio – economic status of the local people.



The envisaged direct impact is medium in magnitude, local in extent, long term in duration and hence significant in nature.

7.5.2.4 Corporate Social Responsibility (CSR) Activities

During the operation phase of the project, beside commercial activities, project will support various community programs on the basis of public interest. Project will organize different welfare programs for the wellbeing of the society to minimize the effect of the complex to the possible extent. Furthermore, the proponent will also take full responsibility for the any kind of adverse impact of its activities on the environment, communities, stakeholders and all other members of the society. In gist, it will help in enhancement in the skill of local and promotion in the small-scale business.

The envisaged direct impact is medium in magnitude, site specific in extent, long term in duration and therefore will be significant in nature.



7.5.3 Beneficial Impact Identification and Evaluation Matrix

The beneficial impacts during construction and operation phase are presented in following table as;

Table 7:1 Beneficial Impact Identification and Evaluation Matrix

S.N.	Issues	Impacts	Impact Rating				
			Nature	Magnitude	Extent	Duration	Rating
Beneficial Impacts							
Construction Phase							
1	Employment Opportunity	Employment generation and local employment	D	H	SS	ST	Significant
2	Skill Enhancement	Skill and knowledge development through training and orientation	D	M	Lo	LT	Significant
3	Increase in Economic Activities	Increase in economic activities due to supply of goods and services	D	M	SS	LT	Significant
Operation Phase							
1	Employment Generation and Promotion	Increases in economic status of employer Growth of local economy	D	H	Lo	LT	Significant
2	Income and revenue generation	Income and revenue generation for the both proponent and Ashulia, Savar	D	M	Lo	LT	Significant



3	Promotion of local business	Establishment of small-scale business leading to growth of economic condition of local	D/ID	M	Lo	LT	Significant
4	Corporate Social Responsibility activities	Enhancement in the skill of local and promotion in the small-scale business	D	M	SS	LT	Significant

Notes: D= Direct; ID= Indirect; H= High; M=Medium; SS= Small scale; Lo= Local; R= Regional; ST= Short Term; LT= Long Term



7.6 Community Recommendations

The following recommendations were made during public consultation -

- As positive externalities, the proposed project should improve and create a livelihood for the local people;
- Local people should be employed by the contractor during construction work;
- Adequate safety measures should be taken during construction work;
- Concerns were also raised on possible traffic and population pressure caused by external employed personnel;
- A water treatment system should be installed to prevent water pollution.
- Finally, local people have appreciated the Project and employment generation; and have promised that they will cooperate with the executing agency during project implementation.

7.7 Identification of Environmental Attributes

Before environment impact assessment it is necessary to focus on environmental parameters, the major concern of selecting the environmental parameters is for Impact identification, prediction, and quantification. These parameters may be independent or inter-related with each other as well as related to the proposed project. The selected parameters for the Environmental Impact Assessment are illustrated below.

7.7.1 Ecological Parameters

Floral Communities, Faunal Communities, Aquatic Ecosystem, and Marine ecosystem.

7.7.2 Physico-Chemical Parameters

Water quality, Air quality, Soil quality, and Land use.

7.7.3 Socio-Economic Environment

Aesthetic Conditions, Local Housing Structures, Public Services, Health & Safety, Socio-economic activities, Employment.

7.8 Identification of Potential Physical Environmental Impact

7.8.1 Construction Phase

7.8.1.1 Impact on Land Use

The construction of the project will bring change in the existing land use of the area are permanent as well as temporary. The permanent land use conversion will be due to the construction of main block, pool facilities and utilities and generator house. No soil cutting activities will be occurred during the construction of the project. The storage of construction materials may change the land temporarily but will be reversed to the previous state.

The envisaged direct impact is low in magnitude, site specific in extent and long term in duration and hence insignificant in nature.

7.8.1.2 Impact due to Spoil Disposal

Construction works require huge quantity of materials from excavation work. The spoil generated during the construction period will temporarily burden the project environment. Stockpiling of those construction materials will create aesthetic pollution and can cause health hazards when mixed with water sources. The spoil and muck disposed during these activities will be managed within the project premises.

The envisaged direct impact is low in magnitude, site specific in extent, short term in duration and hence insignificant in nature.

7.8.1.3 Impact on Air

During the construction phase mixing of cement, sand, and aggregate, transport of materials etc. which may make the environment dusty and pollute the air in and around the construction site.

The envisaged direct impact is medium in magnitude, local in extent, short term in duration and hence significant in nature.

7.8.1.4 Impact due to Noise Generation and Vibration

The major impact on the noise level of the proposed project, during the construction phase, is envisaged due to the noise generated by the operation of the machineries, equipments, and some mechanical works. There are many equipments and machineries likely to be used during the construction. These are mainly recognized to be Dozers, Cranes, Trailers, Generators, etc. It is envisaged that the noise level due to this equipments will be 70-85 dB (A) at the receptor point at the associated work/construction area. The impacts due to noise of these equipments will be local and temporary

7.8.1.5 Issues Concerned with Construction Waste

The mostly generated solid wastes during the construction phase includes debris, broken brick pieces, left out/non-usable reinforcement bars, sand, stone, waste cement and sand mix and packing materials which will adversely affect the area at and around if not handled and managed properly cause health hazards.

The envisaged direct impact is minimum in magnitude, local in extent, short term in duration and hence significant in nature.

7.8.1.6 Impact on Ground Water

During the construction phase the water requirement will be fulfilled from ground water. The water requirement during the construction phase will be supplied by groundwater extraction.

The envisaged direct impact is low in magnitude, site specific in extent and short term in duration and hence insignificant in nature.

7.8.1.7 Impact due to Waste Generation

A number of people required for the construction will approach to the project site. Waste generated during construction phase when not treated carefully, it will degrade the environment from foul smell and rodents. This will have adverse impact to the surrounding.



The envisaged indirect impact is low in magnitude, local in extent, short term in duration and hence insignificant in nature.

7.8.1.8 Impact due to Water Pollution

The wastewater, lubricating oils used in the machineries, construction equipment and vehicles, liquid waste coming out from cleaning, paint, solvent and other chemicals which may pollute the land, contaminate the soil and in the long run may pollute and contaminate the surface water and ground water, if not handled properly. If proper care is not taken, oil may be spilled from the construction equipment or chemicals used may come in contact with water during the construction activities. This can contaminate surface and ground water.

The envisaged direct impact is high in magnitude, site specific in extent, and short term in duration and hence significant in nature.

7.8.1.9 Issues Concerned with Fire Hazard

During use of electrical machines, electrical equipment's handling may cause the fire hazards.

The envisaged indirect impact is Medium in magnitude, site specific in extent and long term in duration and hence significant in nature.

7.8.1.10 Energy Alternatives

The energy required during the construction phase of proposed project will be supplied from national electricity grid. During the power cutoff energy will be supplied through generators.

The envisaged direct impact is characterized as direct, low, site specific and short term and hence significant in nature.

7.8.1.11 Soil Stability and Safety of Neighboring Properties

There will be no excavation work for the construction of basement piling during the construction time of the project which envisaged possible sliding or failure of ground attached to the neighboring houses and roads.

The envisaged direct impact is low in magnitude, local in extent, short term in duration, and hence significant in nature.

7.8.1.12 Effect of Heavy Equipment on Road Surface

There will be significant increment in the movements of heavy vehicles like excavator, tipper, tractor, concrete mixture for the transportation of raw materials to project area. This activity may increase pressure on road surface.

The envisaged direct impact is low in magnitude, site specific in extent, short term in duration and hence significant in nature.

7.8.1.13 Road Congestion, Traffic and Parking Issues

There will be significant increment in the movements of vehicles for the transportation of construction materials to project area. This activity may increase the traffic congestion in Gacha road.

The envisaged direct impact is medium in magnitude, local in extent, short term in duration and hence significant in nature.

7.8.2 Operation Phase

7.8.2.1 Solid Waste Generation and its Management Issues

The operation of the project will produce domestic solid waste and production by product. The waste will include food packages, empty water bottles, used tissues, paper waste, food remains, etc. This solid waste will be collected in waste bins and will be transferred to Savar municipality.

The solid by products from the project will be sold to other industrial components for reusing that is 20% of the raw material and will be used in animal feed production, fatty acids from the skin will be used for soap manufacturing.

When wastes are not treated separately and carefully, it will have significant impact. For the case of project, the estimated domestic waste generation of solid waste will be minimal and as low as 1 kg (full occupancy) in final stage after reuse and composting. Based on this scenario, the issues related with management is concerned with waste collection system.

The envisaged direct impact is low in magnitude, local in extent, long term in duration and hence very significant in nature.

7.8.2.2 Waste Water Management Issues

The wastewater generated from the project is only from toilet and will not create additional pressure on the existing waste water management infrastructure network. The project will set up septic tank and soak well for treatment of sewage water.

The envisaged direct impact is low in magnitude, local in extent, long term in duration and hence very significant in nature.

7.8.2.3 Ground Water Availability and Recharge Issues

The project will require not much water during operation phase only around 2 m³/day of water per day for drinking and sanitation purposes. The project will use groundwater for its drinking & sanitation purpose. From this, if the withdrawal rate exceeds the recharge rate, there will be a chance of ground water depletion in the surrounding area.

Hence, increment in use of water will not create significant pressure on water sources and its availability.

The envisaged direct impact is low in magnitude, local in extent, long term in duration and hence significant in nature.

7.8.2.4 Offensive Odor

Some unavoidable odor will be generated during the production of gelatin from cow skins. But it is anticipated that the offensive odor won spread to the locality and only could be smelled in the production section.



The proponent will provide proper PPE e.g., mask, gas masks to the workers to prevent themselves from odor during work.

The envisaged direct impact is low in magnitude, local in extent, long term in duration and hence significant in nature.

7.8.2.5 Fire, Accidental Hazard and Emergency Preparedness

The project might get fire at any time by any cause like electric sorts, lightening, carelessness of project staffs, smoking cigarettes. If proper extinguisher systems are not installed in project, project will be in great risk.

The envisaged indirect impact is low in magnitude, site specific in extent and long term in duration and hence insignificant in nature.

7.8.2.6 Noise pollution

Different noise sources will be present due to various operational activities and operation of generators. The noise generated from mobility of worker may be insignificant in comparison to vehicular movement and operation of generators.

The envisaged direct impact is low in magnitude, site specific in extent, medium in duration and hence insignificant in nature.

7.8.2.7 Traffic congestion and obstruction

The traffic density will be insignificantly high during the operation phase of the project due to increase in flow of materials. Since the entrance of the proposed project leads to the Dhaka-Aricha Highway, the inflow of vehicles is likely creating traffic obstruction and congestion which will affect the locality.

The envisaged direct impact is low in magnitude, site specific in extent, medium in duration and hence insignificant in nature.

7.8.2.8 Drainage Management

The project site is located in Gazipur. The drainage system is well developed in the area.

The envisaged direct impact is low in magnitude, site specific in extent, and long term in duration and hence significant in nature.

7.8.2.9 Higher Energy Requirements

The energy required during the operation phase of proposed project will be supplied from national electricity grid. During the load shedding energy will be supplied through generator. At that time operation of generator may create air and noise pollution at the project site.

The envisaged direct impact is medium in magnitude, site specific in extent, short term in duration and hence significant in nature.



7.9 Identification of Potential Biological Environmental Impact

7.9.1 Construction Phase

7.9.1.1 Impact on Flora and Fauna

There is not any significant amount of endangered flora and fauna determined on the project site; therefore, construction would have no adverse effects on endangered flora and fauna. There would have been some impacts on fauna due to the construction of the project.

7.9.1.2 Impact on Ecosystem

Impacts of construction on the ecosystem are negligible since there are;

- No removal or interference with the prey of predatory animals.
- No significant siltation from run-off, altering aquatic and marine flora and fauna populations and hence population dynamics of dependent organisms;
- No noises disrupting breeding behavior or use of breeding grounds, resulting in shifts in population dynamics; and
- No removal of predatory animals resulting in increased prey populations that exceed the carrying capacity of the local environment.

7.9.2 Operation Phase

7.9.2.1 Impact on Flora and Fauna

It is assumed that the air emissions majority may affect the land biota, whereas the fauna species can be moved away from the discomforting sources, and plants will have to respond physiologically. Operation of the project will supply reliable electrical energy to the users in the region which will limit the use of any systems that could have adverse impact on the environment.

7.9.2.2 Impact on Ecosystem

There will be no significant impact on operation of the project on the ecosystem as no hazardous effluent will be discharged to receiving bodies without proper treatment. The noise generated from the project may cause disturbance to several animals which is insignificant.

7.10 Impact on Socio-Economic and Cultural Environment

7.10.1 Construction Phase

7.10.1.1 Demographic

The construction of the project will have limited effects on the demographic conditions. There are no permanent living quarters associated with the proposed project. The project wouldn't cause any displacement of individuals whose livelihood depends on the land that will be occupied by the project.

7.10.1.2 Conflict in or with nearby host communities

Influx of the construction workers from other parts of the area may increase conflict. In general, conflict among the workers due to the difference in opinions and interests may arise during the construction phase in the project area.



The envisaged indirect impact is low in magnitude, site specific in extent, short term in duration and hence insignificant in nature.

7.10.1.3 Gender Related Issues

During the construction work of project, use of female labor might be lower as beliefs of that male can do more work in same time interval in construction activities of project. For this case, there can be chance of wage discrimination and opportunity.

The envisaged indirect impact is low in magnitude, site specific in extent, short term in duration and hence insignificant in nature.

7.10.1.4 Health and Sanitation in and around project site

The biodegradable and non- degradable wastes generated from the labor camps will pollute the surrounding environment, if not managed properly. The haphazard disposal or storage of biodegradable wastes will increase foul odor, can provide favorable habitat for disease vectors like rodents, mosquitoes, flies and can impact community health.

The envisaged direct impact is moderate, site specific and short term and hence insignificant in nature.

7.10.1.5 Pressure on Utilities and Infrastructures

During the construction phase, the project area will have around above 20-30 workers (direct or indirect) at least on daily basis. Improper management of drinking water facilities and sanitation of the workers may create disputes among the locals and the project workers.

The envisaged direct impact is moderate, site specific and short term and hence insignificant in nature.

7.10.1.6 Occupational Health and Safety

Working without use of safety measures during excavation work, spoil management work, electrical equipment handling activities, constructional activities may call the risk of accidents. From many accidents, primary victims may be the workers involved in the construction.

The envisaged direct impact is medium in magnitude, local in extent, short term in duration and hence significant in nature.

7.10.1.7 Grievances Management

Influx of the construction workers from other parts of the project area may increase conflict. In general, conflict among the workers due to the difference in opinions and interests may arise during the construction phase in the project area. If the construction phase grievances are not recorded properly then it may arise conflict with hereby local residents.

The envisaged indirect impact is low in magnitude, site specific in extent, short term in duration and hence insignificant in nature.



7.10.2 Operation Phase

7.10.2.1 Demographic

The operation of the project will have limited effects on the demographic conditions since there is no permanent living quarters associated with this proposed project. Hence there will be no increased demand on local infrastructures, such as utilities, housing medical facilities, schools, water, and food. The project will not cause any displacement of individuals whose livelihood depends on the land that will be occupied by the proposed project. The labor force for the operation of the plant will be supplied also from local area, which will result in increased disposable income for project employees. The proposed project will contribute in the GDP of the country which is a positive impact of the project.

7.10.2.2 Occupational health and Safety

Working without use of safety measures may call the risk of accidents. The potential occupational hazards amongst the employees are further divided into 4 categories namely (i) physical hazards that include heat, and radiation exposures, (ii) chemical hazards that include fumes dust and gasses, (iii) mechanical hazards that include back problem, muscular pain and varicose vein, and (iv) psychosocial hazards that include fatigue headache, stress and depression.

The envisaged impact is direct in nature, site specific in extent, moderate in magnitude and long term and hence significant in nature.

7.10.2.3 Grievances management

The mis-management of during operation phase like increased noise level in surrounding from production, unmanaged waste generated from the project, disturbance to nearby roads due to haphazard parking practice will raise grievances in nearby community.

The envisaged impact is characterized as direct in nature, site specific in extent, moderate in magnitude and long term in duration.

7.10.3 Adverse Impact Identification and Evaluation Matrix

Table 7:2 Adverse Impact Identification and Evaluation Matrix

S.N.	Issues	Impacts	Impact Rating				
			Nature	Magnitude	Extent	Duration	Rating
A	Adverse Impacts						
Physical Environment							
A6.8.1	Construction Phase						
A6.8.1.1	Change in land use	Change in land use due to construction of project	D	L	SS	LT	Insignificant
A6.8.1.2	Impact due to spoil disposal	Water, soil and air pollution	D	L	SS	ST	Insignificant
A6.8.1.3	Impact due to air	Air pollution	D	M	Lo	ST	Significant
A6.8.1.4	Impact due to noise and vibration	Noise pollution	D	M	Lo	ST	Significant
A6.8.1.5	Issues concerned with Construction waste	Water, soil and air pollution	D	M	Lo	ST	Significant
A6.8.1.6	Impact on ground water	Reduce the water table	D	L	SS	ST	Insignificant
A6.8.1.7	Impact due to waste generation	Reduction on drainage and waste disposal quality	ID	L	Lo	ST	Insignificant
A6.8.1.8	Impact due to water pollution	Water Pollution	D	L	Lo	ST	Insignificant
A6.8.1.9	Issues concerned with fire hazard	Accident, loss of lives and property	ID	M	SS	LT	Significant
A6.8.1.10	Energy alternatives	Sound pollution	D	L	SS	ST	Insignificant

A6.8.1.11	Soil stability and safety of neighboring properties	Sliding or failure of ground	D	M	Lo	ST	Insignificant
A6.8.1.12	Effect of heavy equipment on road surface	Damage on road surface	D	L	SS	ST	Insignificant
A6.8.1.13	Road congestion, traffic and parking issues	Congestion around the road, traffic and parking area	D	M	Lo	ST	Significant
A6.8.2	Operation Phase						
A6.8.2.1	Solid Waste management issues	Soil, water and air pollution	D	L	Lo	LT	Significant
A6.8.2.2	Waste water management issues	Water quality and pollution	D	H (60)	Lo (20)	MT	Significant
A6.8.2.3	Ground water availability and recharge issues	Reduction in ground water table	D	M	SS	LT	Significant
A6.8.2.4	Fire, accidental hazard and emergency preparedness	Accident and loss of life and properties	ID	L	SS	LT	Insignificant
A6.8.2.5	Noise pollution	Noise pollution	D	L	SS	MT	Insignificant
A6.8.2.6	Traffic congestion and obstruction	Congestion around the road side traffic jam, parking area	D	L	SS	MT	Insignificant



A6.8.2.7	Drainage Management	Inundation of water from urban storm water	D	L	SS	LT	Inignificant
A6.8.2.1	Higher energy requirements	High energy demand due to operation of many electronic appliances	D	H	SS	LT	Significant
Biological Environment							
A6.9.1	Construction Phase						
A6.9.1.1	Impact on flora and fauna	Loss of biodiversity	D	M	SS	MT	Significant
A6.9.1.2	Impact on ecosystem	Ecosystem disruption	D	M	SS	MT	Significant
A6.9.2	Operation Phase						
A6.9.2.1	Impact on flora and fauna	No impact is identified	-	-	-	-	-
A6.9.2.2	Impact on ecosystem	Ecosystem disruption	ID	L	SS	LT	Significant
Socio-economic and Cultural Environment							
A6.10.1	Construction Phase						
A6.10.1.1	Demographic	No impact is identified	-	-	-	-	-
A6.10.1.2	Project associated conflict	Conflict in or with nearby host communities (between local and outsiders)	ID	L	SS	ST	Insignificant
A6.10.1.3	Gender related issues	Discrimination in opportunity and wage	ID	L	SS	ST	Insignificant



A6.10.1.4	Health and sanitation around project sites	Incident of diseases	D	M	SS	ST	Insignificant
A6.10.1.5	Pressure on utilities and infrastructures	Pressure on public infrastructures and facilities	D	M	SS	ST	Insignificant
A6.10.1.6	Occupational health and Safety	Accident to the labors and loss of life	D	M	Lo	ST	Significant
A6.10.1.7	Grievances management	Conflict and dispute among the workers	ID	L	SS	ST	Insignificant
A6.10.2	Operation Phase						
A6.10.2.1	Demographic	No impact is identified	-	-	-	-	-
A6.10.2.2	Occupational health and Safety	Probability of accident and loss of life	D	M	Lo	ST	Significant
A6.10.2.3	Grievances management	Dispute and conflict among the staff and nearby society	ID	L	SS	ST	Insignificant

Notes: D= Direct; ID= Indirect; H= High; M=Medium; SS= Small scale; Lo= Local; R= Regional; ST= Short Term; LT= Long Term



7.11 Impact Analysis by Leopold Matrix Method

The impacts of the man-made, unlike its type, can be assessed by matrix analysis, which is very well known as the Leopold Matrix System among the environmentalists of the world.

The impacts of the plant construction, it was assessed by a method adapted from the Leopold method, and the outcomes of the analysis are tabulated on subsequent pages.

The criteria for evaluation of the qualitative matrix are presented here:

1) No Impact (0)

This indicates that the project activity is unlikely to have any impact on an environmental attribute.

2) Negligible Adverse Impact (-1) / Negligible Beneficial Impact (+1)

It signifies that the actions have a minor effect, adverse or beneficial, on the environmental parameters concerned.

3) Significant Adverse Impact (-2) / Significant Beneficial Impact (+2)

The activities and their environmental Impacts are judged to be significant if they create, or have the potential to create concern in the public or professional community.

4) High Adverse Impact (-3) / High Beneficial Impact (+3)

The action can create, or have the potential to create controversy in the public or professional community, due to its long-term effect. They may be at times irreversible.

The matrices for both the construction and operation phases are presented below considering the environmental attributes discussed in the previous section.



Table 7:3 Impact Matrix for Construction Phase

Sl. No.	Project Activities	Water Requirements	Civil Works	Mechanical Works	Operation of Machineries and Equipments	Transportation activities	Total
PARAMETERS							
Physical Parameters							
1	Water Quality	0	-1	0	0	0	-1
2	Air Quality	0	-1	0	0	-1	-2
3	Soil Quality	0	-2	0	0	0	-2
4	Noise	0	-1	0	0	0	-1
Social Parameters							
5	Aesthetic	0	0	0	0	0	0
6	Local Housing Structure	0	0	0	0	0	0
7	Activities of Local People	0	0	0	0	0	0
8	Health and Safety	0	-1	0	0	0	-1
Ecological Parameters							
9	Flora and Fauna	0	-1	0	0	0	-1
10	Agriculture	0	2	0	0	0	2
11	Ecosystem	0	-1	0	0	0	-1
Economic Parameters							
12	Employment	0	3	3	3	3	12
Total		0	-3	3	3	2	5



Table 7:4 Impact Matrix for Operation Phase

Sl. No.	Project Activities	Operational activities	Water Requirement	Domestic activities and waste disposal	Electricity Consumption	Transportation activities	Total
PARAMETERS							
Physical Parameters							
1	Water Quality	-1	-1	-1	0	0	-3
2	Air Quality	0	0	0	0	0	0
3	Soil Quality	0	0	0	0	0	0
4	Noise	0	0	0	-1	0	-1
Social Parameters							
5	Aesthetic	3	0	0	0	0	3
6	Activities of the local people	1	0	0	0	0	1
7	Health and Safety	0	1	0	0	0	1
Ecological Parameters							
8	Flora and Fauna	0	0	0	0	0	0
9	Marine Ecology	0	0	0	0	0	0
	Agriculture	3	0	0	0	0	3
10	Environmental Sustainability	3	0	0	0	0	3
Economic Parameters							
11	Employment	3	0	2	0	3	8
12	GDP Growth	2	0	0	0	0	2
	Total	14	0	1	-1	3	17

Table 7:5 Potential impacts due to project construction and operation

No	Impacts	Negative		Positive		No Impact	Magnitude Low – L Medium - M High - H	Mitigation Measures
		Short Term	Long Term	Short Term	Long Term			
A	General							
	Displacement of People					√	-	-
	Change of Land use			√			L	N/A
	Loss of trees/vegetation	√					L	Plantation Around the land
	Shifting of utilities					√	-	-
	Impact on archeological property					√	-	-
B	Construction Phase							
	Pressure on local infrastructure	√					L	N/A
	Impact on water quality	√					L	Proper drainage, Use substances that protect leaching of oil
	Impact on air quality (including dust generation)	√					M	Tarpaulin or jute sheet use during construction
	Noise pollution	√					M	Use Earplug for personnel, Use modern machinery, Cover the area

	Traffic congestion	√					L	Traffic management and permit heavy vehicle in the early morning or night
	Disposal of construction debris/material	√					L	Do not dispose anywhere, sell or store
	Public health and safety	√					M	Strictly follow to use PPE
	Social Impact			√			L	-
C	Operational Phase							
	Change in ambient air quality	√					H	Water spray around the project site, Install ATP
	Impact on water quality		√				L	Proper drainage
	Increase in noise level					√	L	Cover the area and machinery
	Water harvesting and recharge				√		L	-
	Disposal of solid waste		√				L	Proper waste management as per BD guidelines and pathogenic waste will be burned by incubator
	Quality of life				√		M	-

	Contribution to National GDP				√		H	-
	Increment in green cover	√					L	-

7.12 Conclusion

It has been noticed from both matrix that the proposed project is basically construction of project namely **Bangladesh JW Animal Protein Co. Ltd.** Hence there is no activity found accountable to create any major adverse impact on environmental quality. The impact matrix revealed that, noise will be the major environmental issue regarding the construction of the factory. Adverse impacts on air environment and workers health & safety due to Factory construction and operation were found among all the adverse impacts. However, those impacts can be reduced to a negligible amount by proper Management measures. Civil works during construction phase may alter the soil structure of the surrounding area. In furtherance to these, the study and evaluation of impacts, has shown that the proposed project would have major encouraging impacts due to social economic and environmental developments in terms of getting sustainable alternative to natural gas, growth in GDP and creating employment opportunity.

It can be concluded that the overall negative impact from various activities on different environmental parameters is negligible with proper Environmental Management Plan (EMP) in place. Even the negative impacts can be converted into positive beneficial impact with proper and timely implementation of EMP. **Hence, the project can be considered environmentally safe & fit.**

Chapter 8: Environmental Management Plan

8.1 Environmental Management Systems (EMS)

An environmental management system is the process used by an organization to manage, review, correct, and improve the organization's approach to business. An Environment Management System (EMS) is a tool for managing the impacts of project activities on the environment. An EMS offers a structured way to incorporate environmental considerations into day-to-day operations; it promotes continual improvement of the environment. The concept of EMS is very much similar to financial management system. As management system monitors, regulate and audit the income and expenditure thus ensuring a regular check on the project performance and take positive steps if any diversion from the objective and criteria is found with an aim of ensuring better management of financial resources to provide aid in the growth and development of the company, similarly an EMS monitors and check the environmental performance, integrate and implement the environmental management and its performance with and along the routine operations of a company, long and short term planning, quality management system and take positive steps in case of any diversion with a view to ensure better and enhanced performance.

8.2 Components of an Environmental Management System

In order to develop an EMS an organization has to identify the impacts, set targets to reduce the negative impacts, plan and decide the targets and set proper and appropriate steps to achieve the targets effectively and efficiently.

The most important component of an EMS is commitment towards an organization which is a two-fold process and has in a symbiotic manner by both the staffs and the organization. Apart from the other vital component which form part of EMS considered are:

8.2.1 Environmental Impact Identification:

Any economic development project, whether it is a simple and small or a large and complex it has some environmental implications. The environmental implications may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. It refers to identification and documentation of the actual and potential environmental impacts of an organization's operations need to be undertaken. This can be achieved through undertaking an environmental audit. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. As the IEE study progresses, more data become available on the environment and socioeconomic conditions. The preliminary identification of impacts from scoping may be confirmed or new impacts may be identified as requiring investigation.

8.2.2 Objectives and Targets

Decision of objectives and targets are of prime consideration which is possible only after environment audit. A sound and marked environmental audit can only enable in the determination of positive and feasible objectives and targets. While fixing objectives and targets it should be kept in mind that they should be feasible, specific and effective. It is always advisable for an organization



to formulate stringent long-term objectives so as to encourage and enhance stable and continuous growth and performance.

However, it is also advised that the targets and objectives should be continuously and timely revised so as to ensure better results. Such objectives and targets are dependent on the impacts identified and observed at the time of procession of the activity of the proposed project and are set as per the impacts observed and recorded.

8.2.3 Consultations

This component mainly aims at ensuring committed staffs to the organization. A proper and sound consultation with community and staffs should be done before implementation of EMP. This is very essential in order to assure that the staffs are completely devoted, committed and focused to EMP. In order to develop the commitment of staffs an organization can also take steps like providing a copy of the environmental policy as part of orientation to the employees, conducting of awareness training, each employee is expected to identify to their supervisors training that they feel would help to improve their performance, etc. which shall not only encourage commitment of staffs but also increase their competence level. It can also help to improve public perception of the company, one of the benefits of implementing an EMS.

Consultation with staff, local communities, associated experts/contractors, relevant organization and managerial bodies should be conducted at regular intervals or as and when required with a view of reviewing EMS work, discuss the problems concerned, share opinions and provide suggestive measures for the possibility of further improvement of EMS and EMP.

8.2.4 Operational and Emergency Procedures

Operational and emergency procedures mainly aim at ensuring that they are congruent with organization's environment objectives and targets and suggest required steps in case of any diversion. However, any changes if any should be included in the document and clearly specified.

8.2.5 Environmental Management Plan

An Environmental Management Plan (EMP) describes the processes that an organization shall follow to maximize its compliance and minimize harm to the environment.

8.2.6 Documentation

This is one of the most crucial and important components which focuses on having a documented proof for all objectives, targets, policies, responsibilities and procedures along with information on environmental performance and its impacts. This is mostly useful in verifying environmental performance to staffs, regulatory and community and can also be used at a later stage if or any further study as and when required.

8.2.7 Training

This component mainly focuses on developing trained and competent staffs. This mainly deals with familiarizing the staffs with all their responsibilities, duties and tasks associated with them for implementation of EMS. For this purpose, different organizations follow various measures in



order to infuse them with necessary skill and motivation required for effective and efficient implementation of EMP.

8.2.8 Review Audits and Monitoring Compliance

This component mainly targets towards smooth and subtle functioning of an activity. Prior and essential reviewing of audit and monitoring compliance should be done so as to achieve the stated objectives and to modify and steer the policies laid down with time in order to meet its goals. Monitoring is also one of the vital components which ensures whether all the requirements are met or not and everything is carried on in a systematic and planned way.

8.2.9 Continual Improvement

This is the most important component as everything is based on the concept of continuous development. An EMS as said to be most efficient only when it is responsible for providing continual growth and improvement to the organization by reviewing and monitoring the targets and objectives set by the company. The policy and procedures laid down in this direction should be constantly monitored and checked and any changes if required should be ensured if the objectives are to be met in the most efficient way.

8.2.10 Environment Management Plan

An Environmental Management Plan (EMP) can be defined as “*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced*”. EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle. This plan also helps an organization map its progress toward achieving continual improvements.

Each organization is unique and, as a result, so is Environmental Management Plans. The level of detail and length of an EMP shall vary depending on the type of organization, the complexity of its processes and the maturity of the organization in understanding its environmental responsibilities. Some plans may end up being only a few pages long, while others could become extensive documents. An EMP consists of:

- Environment Protection Plan to reduce impacts and risks. Issues related to existing legislation, codes of good engineering practice, proponent commitment
- Summary of Impacts and Risks. These are the actual expected impacts and risks of the projects, which shall need to be managed, monitored, and reported.
- Impact Management and Environmental Enhancement to balance adverse impacts by providing alternate benefits to adversely impacted persons or biophysical systems.
- Environmental monitoring plans.
- Impact Reporting.

The emphasis is on identifying issues and options, to guide the detailed design of specific EMP measures as part of program and project feasibility studies. Environmental Management Planning

gives the tools to assess and manage environmental issues during every phase of your project or operations. The outcome shall minimize the risk of costly, time-consuming environmental issues, while maximizing productivity and performance. It provides a framework through which environmental priorities, responsibilities and risks are systematically managed. EMPs, which are often a key component of a project's regulatory filings, provide the basis for assurance that environmental factors shall be carefully managed throughout the project lifecycle.

An EMP also includes the Management measures and other environmental management activities for any project. This is an important aspect to preserve & improve the environmental quality of project area.

8.3 Management of different Environmental Aspects based on Identified Impacts

8.3.1 Management measures for Air Environment during

Construction phase

- Diesel driven construction machinery and equipments shall be fitted with appropriate silencers, will not be left idle for prolonged periods of time, and be subjected to regular scheduled maintenance to minimize the exhaust emission.
- Vehicle engines shall not be left running when not in use.
- Improperly functioning equipment and vehicles shall be removed from the project site or shall be repaired before returning to service.
- The contractor working for the project shall ensure that waste arising from the construction activity on site, shall not be burnt in the premises.
- Water sprinklers will be used to control the fugitive dust.

Operation phase

- Burning of solid wastes or waste oils shall be strictly prohibited. The entire solid waste generated shall be disposed of.
- All the roads should be paved to reduce the pollution level.
- Water should be sprinkled regularly to reduce dust pollution.
- Emission from the equipment's/machineries & vehicles shall be monitored regularly.
- All necessary equipment's/machineries shall be in good condition for proper operation.
- Employees shall be provided with sound environmental management & safety materials. They shall be given proper training, and display of the summarized Environmental management & Safety Procedures shall be made available at different sites through signboards.
- Regular Air monitoring and inspection of the environmental management practices shall be carried out, and the necessary documents & records shall be maintained.



- The sources of air pollutants are burning fuel. During operation, these sources emit exhaust gases containing CO₂, O, NO_x, SO₂, and negligible particulate matter (PM10). Control of air pollutants from these sources would be achieved by safe dispersal, providing adequate heights to the respective exhaust ducts, and improving the combustion process.

8.3.2 Management Measures for Water Environment

Construction phase

- During concrete work, care should be taken that no mortar or cementing material should fall in the water as this will not only pose impacts but also would lead to loss of material.
- As a precautionary measure this circumstance led to providing of plastics sheet or tarpaulin in order to avoid any chance of dumping of construction materials into the water.
- Storage area of the construction material shall be at adequate distance from the coastal area to prevent any chances of contamination of coastal/marine environment as well as to facilitate efficient construction work.
- Runoff (Wastewater) from the construction work shall be carefully managed to ensure the prevention of entry of contaminants arising from construction work/site.
- Spillage or leakage of construction material in the nearby aquatic habitat is envisaged. Care shall be taken to minimize the chances of the Spillage or leakage of construction materials.

Operation Phase

Waste Water Generation

Significant amount of liquid waste will be generated from the production process of the proposed factory. Around 150m³/day wastewater will be generated from the raw material washing sections, and will be treated with 6.3 m³/hr ETP. Additionally, 5 m³/day of wastewater will be produced from domestic purposes. The sewerage water will be treated by type Septic Tank & Soak well caused from the sanitation purposes and discharged to the public drainage in compliance with the discharge norms.

8.3.3 Management Measures for Land Environment

Construction phase

- The small amount of construction debris and excavated material shall be disposed of in suitable pre-identified areas.
- Storage & handling of construction materials shall be done properly to avoid spillage or leakage which may cause release of the material in environment causing adverse impacts.
- Major contamination shall never occur beyond the periphery of construction site to prevent any effects on the marine & coastal ecology, human, terrestrial biota and avian community.

Operation phase

- Operational area of concern for soil contamination by spillage/leakage of materials or fuel shall be lined to prevent entering of contaminating materials in the soil under the area.

- Dumping of solid wastes or waste oils on land shall be strictly prohibited. The entire solid waste generated shall be disposed of.
- A designated solid waste storage area shall be provided.

8.3.4 Management Measures for Noise

A significant amount of noise is predicted to be generated in the factory. In this project, the noise will be created from a stand-by generator and from the production.

Noise level must have to be less than 85 dBA because working under a condition more than 85 dBA is harmful for health in short and long term. Mainly personnel working at the project is at high risk because the noise level found higher than the acceptable limit of both Department of Environment Bangladesh (DoE) and World Health Organization.

Construction phase

- All vehicles shall be equipped with the horn of low noise level which is recommended by authority to avoid impacts on noise level. Further, adequate silencers must be attached with all vehicles to reduce the noise.
- Machineries/equipment causing high noise level shall not be operated during the night time.
- It would be ensured that the equipment used during construction is properly maintained to keep noise emissions within the permissible limits.
- Construction machinery should be in good working condition and engines turned off when not in use.

Operation Phase

- The generator will be with canopy and silencer to reduce noise.
- The generator room will be covered by sound proof wall to reduce sound level in surrounding.
- Periodic monitoring of sound level at suggested places will be carried out.

8.3.5 Odor Management

Some unavoidable odor will be generated during the production of gelatin from cow skins. But it is anticipated that the offensive odor will not spread to the locality and only could be smelled in the production section.

The proponent will provide proper PPE e.g., mask, gas masks to the workers to prevent themselves from odor during work. The production shade should be enclosed properly to prevent the odor from spreading in the locality.

8.3.6 Management Measures for Terrestrial biodiversity

Construction phase



On regular basis monitoring shall be done to avoid contamination of natural habitats. The major impacts would be on terrestrial ecology. Care should be taken during the construction activity so that it will not affect the terrestrial habitants.

Operation phase

- Disposal of effluent & sewage shall not be made into the nearby/adjacent waterbody as well as other ecological habitats to prevent impacts on the ecological structure & habitat of the area.
- Any kind of solid waste shall not be dumped into the marine environment as well as on the land of premises /surrounding area.
- Contamination of marine water caused by any means of project operation shall be avoided to prevent adverse impacts on ecology.
- Regular monitoring of the local area shall be done to inspect any residual impacts on ecology caused by the project operation. Necessary technologies/facilities for prevention of such impacts shall be provided immediately by the project proponent.

8.3.7 Management Measures for Socio-economic Environment

Construction Phase

Significant opportunity of direct & indirect employment and uplifting of the economic status of the people living in nearby area will be the major affirmative impact of the proposed project. Local population would also get opportunities in related services activities like small contractors, sub-contractors, supply of construction materials, supply of basic facilities like eatables to the site etc. The construction activities will generate lot of employment in the ancillary activities.

Operation Phase

The proposed project shall result in significant employment during the operation. The proponent shall give priority to the appointment of local people to the maximum extent during the employment process for the proposed project. Safety training shall be provided to all the workers. The workers shall pass through the medical examination prior to recruitment and periodic medical checkup shall also be carried out. An emergency response plan and disaster management plan shall also be placed to take care of adverse impact in case of any incident of accident. Such plans shall also be helpful to the local area during the incidence of Natural Disaster.

8.3.8 Occupational Health and Safety

8.3.8.1 General

Occupational health is an activity which deals with the protection and promotion of the health of the employees by preventing and controlling occupational diseases and by eliminating occupational factors and conditions hazardous to the health of the employees at work. It deals with the development and promotion of healthy and safe work, work environments and work organizations. The objectives of occupational health are to enhance the physical, mental and social well-being of the employees and support for the development and maintenance of their working capacities. Management of occupational health aims at the following.



- To prevent, eliminate, control and treat the diseases/ disorders arising out of occupation
- To participate in the prevention of the physical, chemical, biological, mechanical, and psychological hazards at workplaces, closely working with the shop floor team
- To plan with evidence-based data to place the employees on safe jobs, so as to achieve the benefits which are mutually beneficial both to the employees and the plant
- To promote positive health among employees through continuing health education.

It is essential in plant that an occupational health center is established in or near a place of employment for (i) protecting the employees against any health hazard arising from work or conditions in which work is carried on, (ii) contributing towards the employees' physical and mental adjustment, and (iii) contributing to establishment and maintenance of the highest possible degree of physical and mental well-being of the employees.

8.3.8.2 Occupational health hazards

The potential occupational hazards amongst the employees are further divided into 4 categories namely (i) physical hazards that include heat, and radiation exposures, (ii) chemical hazards that include fumes dust and gasses, (iii) mechanical hazards that include back problem, muscular pain and varicose vein, and (iv) psychosocial hazards that include fatigue headache, stress and depression.

- **Air contaminants**

Many people are exposed to common air pollutants in their occupations e.g., smoke, dust, SPM, carbon mono-oxide, sulfur dioxide, oxides of nitrogen (NO_x), hydrocarbons, and heavy metals like Pb, Cd, Cr, As, Ni etc. Their prolonged exposure causes various health hazards. Heavy metals cause acute and chronic poisoning. Some disastrous episodes have focused attention upon air pollution as a health hazard. Some fugitive gaseous and dust emissions may cause primary occupational health problems to the employees engaged in the steel plant, gaseous and dust emissions from the steel plant pose potential health risk to the populations residing in the surrounding areas. Black lung, metal fume fever, silicosis, pneumoconiosis etc. are all occupational maladies which are attributed to inhalation of one or other type of fine dust particles.

Air contaminants are commonly classified as either particulate or gas and vapor contaminants. The most common particulate contaminants include dusts, fumes, mists, aerosols, and fibers.

Dusts are solid particles generated by handling, crushing, grinding, screening, and heating materials such as iron ore, coal and coke, and fluxes etc.

Fumes are formed when material from a volatilized solid condenses in cool air. In most cases, the solid particles resulting from the condensation react with air to form an oxide.

The term mist is applied to liquid suspended in the atmosphere. Mists are generated by liquids condensing from a vapor back to a liquid or by a liquid being dispersed by splashing or atomizing. Aerosols are also a form of a mist characterized by highly respirable, minute liquid particles.

Fibers are solid particles whose length is several times greater than their diameter, such as asbestos.



Gases are formless fluids that expand to occupy the space or enclosure in which they are confined. They are atomic, diatomic, or molecular in nature as opposed to droplets or particles which are made up of millions of atoms or molecules. Through evaporation, liquids change into vapors and mix with the surrounding atmosphere. Vapors are the volatile form of substances that are normally in a solid or liquid state at room temperature and pressure. Vapors are gases in that true vapors are atomic or molecular in nature.

- **Chemical hazards**

Harmful chemical compounds in the form of solids, liquids, gases, mists, dusts, fumes, and vapors exert toxic effects by inhalation (breathing), absorption (through direct contact with the skin), or ingestion (eating or drinking). Airborne chemical hazards exist as concentrations of mists, vapors, gases, fumes, or solids. Some chemicals are toxic through inhalation and some of them irritate the skin on contact while some other chemicals can be toxic by absorption through the skin or through ingestion. Some other chemicals are corrosive to living tissue.

The degree of employee's risk from exposure to any given substance depends on the nature and potency of the toxic effects and the magnitude and duration of exposure. Information on the risk to employees from chemical hazards can be obtained from the 'Material Safety Data Sheet (MSDS)' of the chemical. The MSDS is a summary of the important health, safety, and toxicological information on the chemical or the mixture's ingredients.

- **Physical hazard**

Physical hazards include excessive levels of ionizing and nonionizing electromagnetic radiation, noise, vibration, illumination, and temperature.

In occupations where there is exposure to ionizing radiation, time, distance, and shielding are important tools in ensuring employee safety. Danger from radiation increases with the amount of time one is exposed to it. Hence, the shorter the time of exposure the smaller the radiation danger.

Noise, another significant physical hazard, can be controlled by various measures. Noise can be reduced by installing equipment and systems that have been engineered, designed, and built to operate quietly; by enclosing or shielding noisy equipment; by making certain that equipment is in good repair and properly maintained with all worn or unbalanced parts replaced; by mounting noisy equipment on special mounts to reduce vibration; and by installing silencers, mufflers, or baffles.

Substituting quiet work methods for noisy ones is another significant way to reduce noise-for example, welding parts rather than riveting them. Also, treating floors, ceilings, and walls with acoustical material can reduce reflected or reverberant noise. In addition, erecting sound barriers at adjacent work stations around noisy operations reduce employees' exposure to noise generated at adjacent work stations.

Another physical hazard namely radiant heat exposure is very common in steel plants. Radiant heat exposure can be controlled by installing reflective shields and by providing protective clothing.

- **Ergonomic hazards**

The science of ergonomics studies and evaluates a full range of tasks including, but not limited to, lifting, holding, pushing, walking, and reaching. Many ergonomic problems result from technological changes such as increased assembly line speeds, adding specialized tasks, and increased repetition; some problems arise from poorly designed job tasks. Any of those conditions can cause ergonomic hazards such as excessive vibration and noise, eye strain, repetitive motion, and heavy lifting problems. Improperly designed tools or work areas also can be ergonomic hazards. Repetitive motions or repeated shocks over prolonged periods of time as in jobs involving sorting, assembling, and data entry can often cause irritation and inflammation of the tendon sheath of the hands and arms, a condition known as carpal tunnel syndrome.

Some general health hazards are caused as a result of contact between the pollutants and the body. These hazards are (i) eye irritation, (ii) headache, (iii) nose and throat irritation, (iv) irritability of respiratory tract. Gases like hydrogen sulphide, ammonia and mercaptans cause odor nuisance even at low concentrations. High temperature can cause fatigue and dehydration. Chronic pulmonary diseases like Bronchitis and asthma are aggravated by a high concentration of SO₂, NO₂, particulate matter and photo-chemical smog. Carbon monoxide combines with the hemoglobin in the blood and consequently increases stress on those suffering from cardiovascular and pulmonary diseases. Dust particles cause respiratory disease. Diseases like silicosis, asbestosis etc. result from specific dust. Carcinogenic agents like PAH's, hexavalent Cr, Cd etc. cause cancer. Hydrogen fluoride causes diseases of bone (fluorosis) and mottling of teeth. Certain heavy metals like lead, cadmium, mercury, chromium, nickel, manganese etc. enter into body by inhalation, skin absorption and through food chain. They cause acute and chronic poisoning.

Mechanical systems resulting in a constant flow of fresh air would add greatly to the comfort of the operative, and would in some cases improve his output. More important is the conservation of the employees' health, for the prevalence of dust may result in pulmonary disease. In certain manufacturing processes, the reduction of dust to a minimum should be made obligatory. More attention is also to be paid to the general cleanliness.

8.3.8.3 Management Measures of Occupational Health Hazard

There are two aspects of mitigating occupational health hazards. These are

- (i) **Preventive and**
- (ii) **Curative.**

Preventive actions consist of

- (i) Pre-employment and periodic medical examination,
- (ii) Removal of health hazards to the extent possible,
- (iii) Surveillance over certain classes of employees exposed to special risks,
- (iv) Emergency treatment for accidents,
- (v) Training of the employees in first aid, and



- (vi) Education of employees in health and hygiene.

The curative aspect begins once an employee suffers from ill health or disease.

While the curative side can be attended to, the basic difficulty associated with the preventive aspect is the general economic condition in the employee. There is a general fear among employees that a medical check-up may result in disqualification for continuing in employment if something adverse is detected.

In sum, occupational health encompasses a broad spectrum of the working environment. It is an integral part of a healthful work setting. Management is to place a high priority on using occupational health concepts in the plant since by recognizing and applying the principles of occupational health to the work environment, the workplaces in the plant become more healthful and safer.

8.4 Implementation of the Management Measures

The responsibilities for the implementation of the Management measures are delegated to the project-promoting institution. They must mobilize appropriate expertise to design diverse types of Management measures, not all of which may be available within the institution. They can collaborate with other institutions in the public and private sectors. Effective results in this regard can be obtained if the collaborators cooperate in the implementation of the Management measure.

8.5 Solid Waste Management

The operation of the project will produce domestic solid waste and production by product. The waste will include food packages, empty water bottles, used tissues, paper waste, food remains, etc. This solid waste will be collected in waste bins and will be transferred to Savar municipality.

The solid by products from the project will be sold to other industrial components for reusing that is 20% of the raw material and will be used in animal feed production, fatty acids from the skin will be used for soap manufacturing.

When wastes are not treated separately and carefully, it will have significant impact. For the case of project, the estimated domestic waste generation of solid waste will be minimal and as low as 1 kg (full occupancy) in final stage after reuse and composting. Based on this scenario, the issues related with management is concerned with waste collection system

Environmental Management with respect to solid waste management may be summarized as under:

- ✓ Separated bin should be provided on several places.
- ✓ Solid by products will be recycled in their targeted production.
- ✓ Store waste and don't throw here to there.
- ✓ Burning wastes should be strictly prohibited.
- ✓ Wastes should be handled and disposed by Savar Municipality.



8.6 Afforestation

Trees and plants are well known for trapping noise, particulate matters, and gaseous pollutants, in controlling soil erosion and groundwater charging. Green Belt has to be developed outside of plant premises adjacent to northern, western and southern boundary of the plant. The selection of plant species shall be made in consultation with local forest officials.

8.7 Safety & Fire Fighting

Safety

The main safety features associated with the proposed development will be as follows:

- a) The layout and firefighting systems will be upgraded as per NFPA and Bangladesh Fire code.
- b) Inner boundary of 1.0 m height, brick masonry wall with 0.6 m height barbed wire fencing have been provided in all directions.
- c) Approach roads of adequate width shall be provided and to avoid congestion and to have safe exit in emergencies.
- d) All electrical fittings should be provided in licensed areas are flame proof and intrinsically safe.
- e) No smoking should be allowed inside the diesel storage tank.
- f) Fixed Water Spray system will have been installed for Bitumen handling area.
- g) Suitable storm water drain will have been provided.
- h) Adequate ventilation should be provided to reduce temperature near the heater.

Fire Fighting Facilities

The firefighting system in the proposed facilities consists of Fire extinguisher, Fire Hydrant System and Emergency fire exit. Fire Hydrant rings covering all facilities will be upgraded as per NFPA.

Security

The following security arrangement should be provided within the project-

- a) The facilities should be guarded round the clock by efficient security personnel. They prevent any unauthorized entry inside the plant.
- b) Watch towers should have been provided and manned round the clock to watch unauthorized entry from outside.
- c) 3.0 m high boundary wall should be provided around the installation to resist any unauthorized entry.

8.8 Environmental Audit

In view of the high hazard potential of the plant, extreme care should be taken to maintain the safety needs of the installation. Safety and Environmental audits should be carried out regularly by a team consisting of experts from different discipline. The safety audit will include operating procedures, housekeeping, provision of firefighting and safety gadgets, mock drills etc.

Green Light Program



It involves the installation of energy efficient lighting system which reduces indirectly generation of oxides of Carbon, Nitrogen and Sulphur. However, there shall not be any compromise with required illumination at working places.

Energy Star Program

Use of energy-efficient electrical appliances including computer etc. are adopted. The plant authority should pay proper attention to improve the working environment by adopting the principle of Ergonomics in the following line of action in order to maximize the working and skill capability of the work-men, the Environmental Management Plan considers the strategy and goal of Ergonomics. The application of ergonomics will reduce the Muscular Skeletal Disorder (MSD). Attempts shall be made to make the Working Environment to fit the Workmen instead of forcing a workman to adopt the Working Environment.”

8.9 Costing of EMP

Costing of EMP includes:

- Capital cost for installation of Effluent Treatment Plant (ETP) for implementation other mitigation measures require for the project-
- Noise and water Quality Monitoring
- Organizational management cost.

The capital investment cost required for organizational management cost for implementation of EMP.

Organizational management costs for implementation of EMP include-

- Installation of ETP
- Initial investment cost for energy
- Cost for technical personnel

Resource cost which consists of mainly laboratory equipment for monitoring.

Table 8:1 Environmental Management Action plan for Construction Phases

Environmental Impact	Mitigation Measures	Time Frame	Location	Responsibility
Air pollution	<ul style="list-style-type: none"> ➤ All materials transported to and from the construction site should be covered; ➤ Temporary stockpiles of soil or other material should be covered or sprayed with water on a regular basis, particularly during dry or windy conditions; ➤ Water should be used to suppress dust on temporary roadways and other exposed areas; ➤ The project site should be surrounded by boundary wall (If possible); ➤ Workers in the site should be issued with dust masks during dry and windy conditions; ➤ Vehicles and other machinery should clear off mud before leaving the site; 	Throughout construction phase	Project site	Contractor
Soil Erosion and siltation	<ul style="list-style-type: none"> ➤ Prefer dry season for starting construction work in case of working in rainy season install barrier net; ➤ Re-cover exposed soils with grass and other appropriate species as soon as possible; ➤ Pile up spoil soil on flat surface away from drain; 	Throughout construction phase	Project site	Contractor



Noise and vibration	<ul style="list-style-type: none"> ➤ 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 earplugs while working with noise device; 	Throughout construction phase	Project site	Contractor
Impact on groundwater	<ul style="list-style-type: none"> ➤ Ensure minimum extraction of groundwater; ➤ Wastage of water should be avoided through monitoring; 	Throughout construction phase	Project site	Contractor
Solid waste	<ul style="list-style-type: none"> ➤ Provide space for temporary disposal of solid waste in the site and dispose of the waste properly; ➤ Arrange adequate sanitation facilities for workers; ➤ Follow up to ensure appropriate waste disposal and sanitation practices by contractor and construction workers; 	Throughout construction phase	Project site	Contractor
Impact on Biodiversity	<ul style="list-style-type: none"> ➤ Avoid unnecessary cutting of trees; ➤ Allocate space for green belt development; 	Throughout construction phase	Project site	Contractor
Impact on traffic volume	<ul style="list-style-type: none"> ➤ Control vehicle movement in an organized way and follow local traffic instructions; 	Throughout construction phase	Material Transport Route	Driver



Fire/Explosion	<ul style="list-style-type: none"> ➤ Establish own firefighting system and maintain collaboration with government firefighting and civil defense department locally; ➤ Organize fire drills and training for construction staff; 	Throughout construction phase	Project site	Contractor
Employment generation	<ul style="list-style-type: none"> ➤ Employment only construction workers; 	Throughout construction phase	Project site	Contractor
Occupational Health and safety risk	<ul style="list-style-type: none"> ➤ Create awareness of safety issues among workers and contractors; ➤ Monitoring the practice of following safety guidelines by workers and contractors; ➤ Ensure the use of appropriate PPE while working on the construction site and display proper safety signs in the project site; 	Throughout construction phase	Project site	Contractor



Table 8:2 Environmental Management Action plan for Operation Phases

Environmental Impact	Mitigation Measures	Time Frame	Location	Responsibility
Air pollution	<ul style="list-style-type: none"> ➤ 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; ➤ Plant tree near boundary line or in the green area; ➤ Monitoring SPM every 06 Months; 	Throughout Operation phase	Project site	Representative of project proponent
Water pollution	<ul style="list-style-type: none"> ➤ 150m³/day wastewater will be treated by 6.3m³/hr ETP ➤ Per day around 5 m³ of water will be used for the drinking and sanitation purposes ➤ Septic tank and soak pit for sewage treatment; 	Throughout Operation phase	Project site	Representative of project proponent
Solid waste	<ul style="list-style-type: none"> ➤ Apply 3R method for waste management of the project; ➤ Train employees on waste control and disposal procedures; ➤ Segregates wastes at source and stores in demarcated places; ➤ Spent lube oil will be sold to DoE approved vendor only; 	Throughout Operation phase	Project site	Representative of project proponent
Noise and Vibration	<ul style="list-style-type: none"> ➤ Air plugs will be provided to workers while near to noise generating equipments or working in noise area; ➤ Conduct periodic maintenance of generator; 	Throughout Operation phase	Project site	Representative of project proponent



	<ul style="list-style-type: none"> ➤ Will procure noise monitoring device and monitor noise condition in and outside the project premises; ➤ Monitoring noise conditions every 06 months; 			
Impact on soil or land	<ul style="list-style-type: none"> ➤ Trained employees on spillage control; ➤ Maintain Cleanliness of the yard and store solid waste in waste bin; ➤ Green belt development for enhancing the natural aesthetic of the site; 	Throughout Operation phase	Project site	Representative of project proponent
Impact on traffic volume	<ul style="list-style-type: none"> ➤ Control vehicle movement in an organized way and follow local traffic instructions; 	Throughout Operation phase	Project site	Representative of project proponent
Fire/Explosion	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ Conduct job safety analysis; ➤ Use of personal protective equipment such as hard helmet, musk, boot, eye glass, etc.; ➤ Aware and train employees on using safety devices; 	Throughout Operation phase	Project site	Representative of project proponent
Statutory requirements	<ul style="list-style-type: none"> ➤ Meet all statutory requirements with DoE within the time frame; 	Throughout Operation phase	Project site	Representative of project proponent



Table 8:3 Environmental Management Action plan

Issue/Concern	Potential negative environmental impacts	Mitigation measures	Environmental Monitoring	Responsible actors	Time frame
Water Pollution	- Surface and ground water pollution -Occupational illness	- 6.3m ³ /hr ETP - water filtration - Water recycling - Will establish	-Monitoring of water quality	-Authority & workers - Health and safety officer	- Quarterly reporting
Solid waste	- Air, water and soil pollution -Poorly disposed waste may block drainage	- Proper solid waste management system - Sale of solid waste to third party. - Solid waste collection, storage and transportation system - Awareness and training campaign	- Regular monitoring of the solid waste management facilities	-Authority & workers - Health and safety officer - Neighbors and - The general Public	-Must be keep inventory/daily register for solid waste - Quarterly reporting
Air Pollution	- Deterioration of indoor air quality -Occupational illness/health impact	- Proper stack height for generator Generators -Use of PPE	-Monitoring of AIR quality	-Authority & workers - Health and safety officer	- Half yearly Air quality monitoring
Noise Pollution	- Hearing loss -Reduced productivity and efficiency -Fatigue, headache, nervousness,	- Implementation an effective noise control and hearing conservation program -Noise measurement	-Determine Noise levels from time to time	-Authority & workers - Health and safety officer - Neighbors and - The general Public	- Half yearly Noise level monitoring



	irritability and high pretension resulting in accidents at workplace	-Providing suitable hearing protection to all workers -Training of workers			
Occupational hazards	<ul style="list-style-type: none"> - Injury to employees on site -Injury to visitors - Reduced productivity - Plant and equipment damage -Negative corporate image 	<ul style="list-style-type: none"> - Good and sound housekeeping practices -Provision of appropriate working tools and equipment -Use of PPE -Timely repair and maintenance of plant and equipment -Employee training -Use appropriate elevators and other lifting machinery 	<ul style="list-style-type: none"> -Accident and incident records -Record of employee training 	<ul style="list-style-type: none"> -Authority & workers - Health and safety officer 	<ul style="list-style-type: none"> - The mitigation measures proposed should be put in alongside project implementation and daily operations, continuously improved on and sustained throughout the operation life of the project.

Chapter 9: Emergency Response and Disaster Management Plan

9.1 Disaster Impact Assessment

9.1.1 Overview

Accidental risk involves the occurrence or potential occurrence of some accident consisting of an event or sequence of events resulting in fire, natural calamities like flood and cyclone, explosion, or toxic hazards to human health and environment. Risk Assessment (RA) provides a numerical measure of the risk that a particular facility poses to the public. It begins with the identification of probable potential hazardous events in the industry and categorization as per the predetermined criteria. The consequences of major credible events are calculated for different combinations of weather conditions to simulate the worst possible scenario. These consequence predictions are combined to provide numerical measures of the risk for the entire facility. MCA stands for Maximum Credible Accident or in other words, an accident with maximum damage distance, which is believed to be probable. MCA analysis does not include quantification of the probability of occurrence of an accident. In practice, the selection of accident scenarios for MCA analysis is carried out based on Engineering judgment and expertise in the field of risk analysis, especially in accident analysis. The detailed study helps in plotting the damage contours on the detailed plot plan to assess the magnitude of a particular event. A disastrous situation is the outcome of fire, natural calamities, and explosion or toxic hazards in addition to other natural causes that eventually lead to loss of life, property, and ecological imbalances.

9.1.2 Methodology of MCA Analysis

The MCA analysis involves ordering and ranking various sections in terms of potential vulnerability. The data requirements for MCA analysis are:

- Operating manual
- Flow diagram and P&I diagrams
- Detailed design parameters
- Physical and chemical properties of all the chemicals
- Detailed plant layout
- Detailed area layout
- Past accident data

Following steps are involved in the MCA analysis:

- Identification of potential hazardous sections and representative failure cases.
- Visualization of release scenarios considering the type and the quantity of the hazardous material.
- Damage distance computations for the released cases at different wind velocities and atmospheric stability classes for heat radiations and pressure waves.
- Drawing of damage contours on plot plan to show the effect due to the accidental release of chemicals.



9.1.3 Past Accident Data Analysis

Analysis of events arising out of the unsafe conditions is one of the basic requirements for ensuring safety in any facility. The data required for such an analysis has either to be generated by monitoring and/or collected from the records of the past occurrences. This data, when analyzed, helps in the formulation of the steps towards mitigation of hazards faced commonly. Trends in the safety of various activities can be evaluated and actions can be planned accordingly, to improve safety.

9.1.4 Hazard Identification

Identification of hazards is an important step in Risk Assessment as it leads to the generation of accidental scenarios. The merits of including the hazard for further investigation are subsequently determined by its significance, normally using a cut-off or threshold quantity. Once a hazard has been identified, it is necessary to evaluate it in terms of the risk it presents to the employees and the neighboring community. In principle, both probability and consequences should be considered, but there are occasions where either the probability or the consequence can show to be sufficiently low or sufficiently high, decisions can be made on just one factor. During the hazard identification component, the following considerations are taken into account.

- Location of process unit facilities for hazardous materials.
- The types and design of process units
- The quantity of material that could be involved in an airborne release and
- The nature of the hazard (e.g. airborne toxic vapor or mists, fire, explosion, large quantities stored or processed handling conditions) is most likely to accompany hazardous materials spills or releases.

9.1.5 Fire and Explosion Index (FEI)

Fire and Explosion Index (FEI) is useful in the identification of areas in which the potential risk reaches a certain level. It estimates the global risk associated with a processing unit and classifies the units according to their general level of risk. FEI covers aspects related to the intrinsic hazard of materials, the quantities handled, and operating conditions. This factor gives index value for the area which could be affected by an accident, the damage to property within the area, and the working days lost due to accidents.

9.1.6 MCA Analysis

MCA analysis encompasses defined techniques to identify the hazards and compute the consequent effects in terms of damage distances due to heat radiation, toxic releases, vapor cloud explosion, etc. A list of probable or potential accidents of the major units in the complexities arising due to the use, storage, and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed. Hazardous substances, on release, can cause damage on a large scale. The extent of the damage is dependent upon the nature of the release and the physical state of the material. In the present report, the consequences for flammable hazards are considered and the damages caused due to such releases are assessed with recourse to MCA analysis.

Flammable substances on release may cause Jet fire and less likely unconfined vapor cloud explosion causing possible damage to the surrounding area. The extent of damage depends upon the nature of the release. The release of flammable materials and subsequent ignition result in heat radiation waves or vapor clouds depending upon the flammability and its physical state. Damage distances due to the release of hazardous materials depend on atmospheric stability and wind speed. It is important to visualize the consequence of the release of such substances and the damage caused to the surrounding areas.

9.1.7 Fire Scenarios

Combustible materials within their flammable limits may ignite and burn if exposed to an ignition source of sufficient energy. On the proposed project, fire may cause from Gas cylinder explosion or electric short-circuit.

9.1.8 Natural Calamities

Natural calamities like floods, cyclones, and earthquakes can occur within the zone. The project site falls under earthquake zone II which indicates the medium intensity of the earthquake.

In 1897, an earthquake of magnitude 8.7 (recently modified to be 8.0) caused serious damages to buildings and lives in the northeastern part of India including Bangladesh. Historical records have revealed that there are areas of high seismic activity over the north and east of Bangladesh and some of the major earthquakes originating in these areas affect adjacent parts of Bangladesh.

9.2 Disaster Management Plan (DMP)

9.2.1 Approach to Disaster Management Plan

Onsite Emergency or disaster is an unpleasant sudden event of such a magnitude that may cause extensive damage to life and property, due to in-plant emergencies resulting from deficiencies in operation, maintenance, design, and human error; natural calamities like flood, cyclone and earthquake; and deliberate and other acts of a man like sabotage, riot, war, etc. Every industry needs to have a well-documented Emergency Plan to meet any major untoward incident or disaster. Because of this, an approach to Disaster Management Plan (DMP) to tackle the emergencies', Proposed project has been delineated in the following sections. The roles and responsibilities of key personnel have also been defined in the plan.

9.2.2 Formulation of DMP and Emergency Services

Proposed **Bangladesh JW Animal Protein Co. Ltd.** will formulate a Disaster Management Plan for better and safe management of their plants. The DMP is related to the final assessment and it is the responsibility of the plant management document including the following elements.

- Assessment of the size and nature of the events foreseen and the probability of their occurrence;
- Formulation of the plan and liaison with authorities, including the emergency services.
- Procedures for raising the alarm and communications both within and outside the works;
- Appointment of key personnel and their duties and responsibilities, especially for works incident controller and works main controller;



- Emergency control center;
- Action on-site;
- Action off-site;

The plan is prepared to set out how designated people at the site of the incident can initiate supplementary action both inside and outside the works at an appropriate time. An essential element of the plan must be the provision for attempting to make safe the affected unit, for example by shutting it down. On a complex site, the plan includes the full sequence of key personnel to be called in from other sections or from off-site.

9.2.3 Need for Disaster Management Plan

The proposed project will not produce any potentially hazardous material to human beings, flora, and fauna, and environment as a whole. Despite these, the possibility of accidents cannot be ruled out. Human errors and mechanical, electrical, instrumental, or system failures have, on occasion, led to severe disasters. Following are the general types of Emergency /Disaster that lead to the preparation of a disaster management plan:

- Fire from gas cylinder explosion
- Fire from electric short circuit
- Fire from furnace and woven
- Earthquake
- Flood
- Cyclone

9.2.4 Objectives of Disaster Management Plan

The purpose of DMP is to give an approach to detail organizational responsibilities, actions, reporting requirements, and support resources available to ensure effective and timely management of emergencies associated with production and operations on the site. The overall objectives of DMP are to:

- Ensure the safety of people, protect the environment and safeguard commercial considerations
- Immediate response to the emergency scene with effective communication network and organized procedures
- Obtain early warning of emergency conditions to prevent impact on personnel, assets, and environment
- Safeguard personnel to prevent injuries or loss of life by protecting personnel from the hazard and evacuating personnel from an installation when necessary.
- Minimize the impact of the event on the installation and the environment, by:
 - Minimizing the hazard as far as possible
 - Minimizing the potential for escalation

➤ Containing any release

- To guide to help stock holders take appropriate action to prevent accidents involving hazardous substances and to mitigate adverse effects of accidents that do nevertheless occur.

9.3 Emergency Response and Disaster Management Plan

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

- Assist personnel in determining the appropriate response to emergencies.
- Provide personnel with established procedures and guidelines.
- Notify the appropriate company emergency response team personnel and regulatory Govt. agencies.
- Manage public and media relations.
- Notify the next-to-kin of accident victims.
- Promote inter-departmental communications to ensure a “Companywide” Coordinated emergency response.
- Minimize the effects that disruptive events can have on company operations by reducing recovery times and costs.
- Respond to immediate requirements to safeguard the subtending environmental 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

III. External factors

- Food poisoning/water poisoning
- Sabotage

9.3.1 Six Steps in Emergency Response

First Step:

This step determines the potential hazards associated with the incident, substance or circumstances and take appropriate action identify the type and qualities of dangerous goods involved and any known associated hazards.

It also determines potential hazards stemming from local conditions such as inclement weather water bodies etc. and ensure that the initial response team is aware of these conditions.

Second Step:

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

Third Step:

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

Fourth Step:

Initiate redress procedures.

Fifth Step:

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

Sixth Step:

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

9.3.2 Emergency Response and Fire Management Plan

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 extinguish a fire is a voluntary act. Only persons who are properly trained and feel confident in the use of a portable extinguisher should contemplate their use. Improper use of a portable extinguisher can lead to severe injury or death.

9.3.3 Types of Fire

There are five types of fire such as

Class A – Ordinary combustibles (wood, paper, plastics, etc.)

Class B – Combustible liquids (oils, gas, cooking oil, etc.)

Class C – Electrical (energized equipment – appliances, wiring, etc.)

Class D – Combustible metals (aluminum, magnesium, zinc, etc.)

Class E – Commercial cooking equipment (Cooking oils, Animal fats, Vegetable fats)

It is extremely important to choose the properly rated fire extinguisher for the class of fire that is burning.

		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
		Flammable Liquids	Grease, Oil, Paint, Solvents
		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
		Combustible Metal	Magnesium, Aluminum, Etc.
		Commercial Cooking Equipment	Cooking Oils, Animal Fats, Vegetable Oils

Figure 9:1 Pictorial View of Different Types of Fire

9.3.4 Fire Safety Risk Assessment

A fire safety risk assessment is an organized and methodical look at the premises, the activities within the premises, the potential for a fire to occur, and the harm it could cause to the people in and around the premises. The prescribed process is available for inside or indoor fire risk assessment. The following fire risk assessment process can be followed and executed twice a year.

Table 9:1 Fire Risk Assessment Process

Fire Risk Assessment	
1	Identify fire hazards Identify: Sources of Ignition Sources of Fuel Sources of Oxygen
2	Identify People at Risk Identify: People in and around the premises People especially at Risk
3	Evaluate, Remove, Reduce and Protect from Risk Evaluate the risk to people from fire Remove or Reduce the Risks to people Detection and warning Fire-fighting Escape routes Lighting Signs and notices Maintenance
4	Record, Plan, Inform, Instruct, and Train Record significant findings and action taken Prepare an emergency plan Inform and instruct relevant people co-operate and co-ordinate with others Provide training
5	Review Keep assessment under review Revise where necessary
<i>Source: Pronab Kumar Debnath, Project Paper, IDM, KUET</i>	

9.4 Emergency Response Plans to Disaster

Emergency response plans are developed to address a range of plausible risk scenarios and emphasize the tasks required to respond to a physical event. The emergency response plan (ERP) for the proposed factory has been developed listing various actions to be performed in a very short period in a pre-determined sequence if it is to deal effectively and efficiently with any emergency, major accident, or natural disaster. The primary objective of the plan is to keep the loss of life, material, machinery/equipment damage, and impacts on the environment to a minimum.

9.4.1 Alarm system

The alarm system varies and will depend on the size of the works area - simple fire bell, hand-operated siren – break open type, fire alarm, etc.

9.4.2 Communication System

Communication is a key component to control an emergency. The following communication system may be provided in the project:

- Walky-talky
- Telephone
- Cell phone
- Intercom/paging
- Runners (verbal or written messages)

9.4.3 Siren for emergency

Siren for emergency should be different from a normal siren. The emergency siren should be audible to a distance of 5km radius. The emergency siren should be used only in case of an emergency.

9.4.4 Escape Route

The escape route from each and every plant should be clearly marked. The escape route is the shortest route to reach out of the factory area to the open area, which leads to assembly point. This route should be indicated on the layout plan attached to the on-site management plan.

9.4.5 Evacuation

All non-essential staff should be evacuated from the emergency site. As soon as the emergency siren rings the workers have to shut down the units and move to the assembly point. The shutdown procedure in case of emergency should be prepared and kept ready and responsible persons should be nominated for the purpose.

9.4.6 Counting of personnel

All personnel working in the industry should be counted. Time office persons should collect the details of personnel arriving at the assembly point. These should be checked with the attendances of regular workers; contract workers present in the site on the day of emergency. The accident control should be informed and arrangement should be made for searching missing persons in the emergency affected area. The employees address, contact number of next to kin should be maintained in the time office so that during emergency relatives of those affected due to emergency may be informed accordingly. Information in respect of emergency should be given to the media and other agency.



9.4.7 All clear signal

After control of emergency the work incident controller will communicate to the works main controller about the cessation of emergency. The main controller can declare all clear by instructing the time office to sound “All Clear Sirens”.

9.4.8 Emergency facilities

The following facilities should be provided to tackle any emergency at any time.

- ✓ Fire protection and firefighting facilities
- ✓ Emergency lighting and standby power
- ✓ Emergency equipment and rescue equipment
- ✓ Breathing apparatus with compressed air cylinder
- ✓ Fire proximity suit
- ✓ Resuscitator
- ✓ Water gel blanket
- ✓ Low-temperature suit
- ✓ Fire aid kit
- ✓ Stretchers
- ✓ Torches
- ✓ Ladders
- ✓ Safety equipment



Chapter 10: Public Consultation

10.1 General

The process of public participation and consultation was endorsed in the United Nations Conference on the Environment and Development (UNCED) in 1992 through one of the key documents of the conference - Agenda 21. Stakeholder consultation is a means of involving all stakeholders in the project's decision-making process to address their concerns, improve project design, and give the project legitimacy. Stakeholder consultation, if conducted in a participatory and objective manner, is a means of enhancing project sustainability.

Listening to stakeholder concerns and feedback can be a valuable source of information that can improve project design and outcomes and help a company to identify and control external risks. It can also form the basis for future collaboration and partnerships. For stakeholders, a company's consultation process is an opportunity to get information, as well as to educate company staff about the local context in which a project will take place, to raise issues and concerns, ask questions, and potentially help shape the project by making suggestions for the company to consider and respond to.

Through the public consultation process, **Bangladesh JW Animal Protein Co. Ltd.** hopes to:

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

10.2 Methodology

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

- Formal meetings with communities in the surrounding areas.
- A questionnaire survey.

Stakeholders were consulted through formal meetings held in the project area at the initial stage. Then a questionnaire survey was carried out to reach out to more people from the nearby community to understand their perception of the project.



10.3 Information Disclosure and Consultations

The consultation process during the formal meeting was carried out in the Bangla language. During these meetings, a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition to providing communities with information on the proposed project, their feedback was documented during the primary stakeholder consultation. The issues and suggestions raised were recorded in field notes for analysis and interpretation. A semi-structured questionnaire was prepared to consult with the community people in person and get their individual views about the project. Before asking questions about the project, a general description of the project and its impact, both social and environmental, were mentioned by the surveyor.

The project proponent will hold a public consultation meeting accompanied by GETTS and DoE officials if the DoE requires it after reviewing the EIA report.

Chapter 11: Environmental Monitoring Plan

11.1 Monitoring Requirement

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

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

There are two basic forms of monitoring:

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

In the case of industrial projects in general, monitoring is done by physical measurement of some selected parameters like air, water, soil, noise, etc. It should be mentioned here that the monitoring program should be such so that it can ensure compliance with national environmental standards. The importance of this monitoring program is also for ensuring that the project does not create adverse environmental changes in the area and providing a database of operations and maintenance, which can be utilized if unwarranted complaints are made.

11.2 Monitoring Indicators

Environmental monitoring requires set of indicators that could be conveniently measured, assessed and evaluated periodically to observe the trends of change in base line environment quality. A list of parameters to be tested, sample number and sampling frequency are given in Table-11.1. Here it may be mentioned that parameters are selected according to the requirement of DOE as indicated in the environment quality standard (EQS) for concerned industries.

Table 11:1 Monitoring Parameter and Frequency

Issue	Parameters	Location	Monitoring Frequency
ETP	pH, BOD, COD, TDS, TSS	ETP outlet	Half yearly
Stack Emissions Generator	SPM	Final exhaust	Half yearly
Ambient air quality	PM10	Around the project site	Half yearly

Noise level	Noise at different locations at day & night	Around the project site	Half yearly
Drinking water quality	Total Coliform	Drinking water outlet	Half yearly
Work place noise level	Noise level at work place	Noise at different locations at work place	Half yearly

To be an environmentally acceptable project, the proposed project should have its own environmental monitoring unit/cell with trained manpower with the necessary equipment and other logistics along with required budget. **Bangladesh JW Animal Protein Co. Ltd.** should develop a working relationship with the Department of Environment (DOE) by undertaking a joint monitoring program to monitor above parameters.

11.3 Monitoring Plan

All monitoring activities should be carried out by the plant Authority unless specified otherwise. A network should be formed with the workers and employees of the plant for specific purposes.

Water Pollution

- Monitor and control wastewater discharge to the natural drain.
- Monitor compliance of water quality with DoE Standards during construction and operational period.

Table 11:2 DoE Water Quality Standard for Inland Surface Waters

Parameter	Unit	Recreation activity	Fisheries
pH	-	6.5-8.5	6.5-8.5
BOD mg/l	mg/L	3 or less	6 or less
DO mg/l	mg/L	5 or more	5 or more
Total Coliform	No. /100mL	200 or less	-

Air Quality

Monitor actions taken by the plant authority to reduce air pollution and meet DoE guidelines.

Table 11:3 DoE Standards for Air

Categories of Area	Microgram per cubic meter			
	SPM	Sulphur dioxide	Carbon monoxide	Nitrogen
Industrial and Mixed	500	120	5000	100
Commercial and Mixed	400	100	5000	100
Residential and rural	200	80	2000	80
Sensitive	100	30	1000	30

Noise Pollution

Monitoring actions taken by the authority of plant to reduce noise and meet DoE guidelines.

Table 11:4 DoE Standards for Sound

Category of areas	Standard determined at dBa unit	
	Day (6AM-9PM)	Night (9 PM-6AM)
Silent zone	45	35
Residential area	50	40
Mixed area	60	50
Commercial area	70	60
Industrial area	75	70

Solid Waste Management

Solid waste management system should be well developed to carry the hazardous and non-hazardous waste. Solid waste collection, transportation and dumping in proper way should be ensured by the authority of the Bangladesh JW Animal Protein Co. Ltd.

Proper Drainage

Proper drainage system should be maintained for both the sewerage water, household water and storm water. Separate drainage system should maintain for the sewerage water and household and storm water.

Health and Safety

Monitor Environmental compliance and provide health and safety measures to the workers during operational period.

Chapter 12: Cost Estimation for Environment Mitigation Measures and Monitoring

12.1 Environment Management Cost

Most of the mitigation measures require contractors/project authorities to accept good practices, which should be part of the usual procedures, so the cost of compliance is unlikely to be high. Relaxation, which is the proponent's and the contractor's responsibility, is given as part of the management of the project. The following table shows the cost estimate of environmental mitigation measures and annual cost monitoring.

Table 12:1 Cost estimation of mitigation measure

SI No	Potential Environment Management Measure	Cost (Annual)
Preconstruction Phase		
01	Land acquisition, Losses of land, livelihood and income source	Already been done by Proponent
02	Resettlement Action Plan & Monitoring	No resettlement Need
03	Side boundary wall	Included in construction cost
Construction Phase		
04	Provision of Personal Protective Equipment to all labor involved in the construction of proposed off-site developments	Included in construction cost
05	Construction of Labor camps	Included in construction cost
06	Construction of Toilets & Septic Tanks/Soak Pits	Included in construction cost
07	Construction of Temporary stormwater drainage system	Included in construction cost
08	Safety & Quality inspections	Included in construction cost
09	Construction of ETP	Included in construction cost

**Table 12:2 Environmental Monitoring Cost**

Parameters	Est. Number of Samples/Sites (per year)	Unit cost @ (BDT)	Total cost (BDT)/year
Ambient air quality (SPM; SO _x ; NO _x)	2	12,000.00	24,000.00
Surface water quality: BOD, COD, pH, TDS, TSS	2	13,000.00	26,000.00
Waste management system	-	-	20,000.00
Establishment of Greenbelt	-	-	5,000.00
Establishment of ETP (6.3 m ³ /hr)			50,00,000.00
Total cost			50,75,000.00



Chapter 13: Conclusions and Recommendations

13.1 Conclusions

Bangladesh JW Animal Protein Co. Ltd. is a private owned company intends to build and operate edible gelatin manufacturing at Taksur, Mirzanagar-1344, Ashulia, Savar, Dhaka.

This EIA has been prepared for the construction of the project according to the requirement of DoE for necessary environmental clearances as it is made mandatory in ECA'95 for any new industrial set up. This report has been prepared through identifying the potential impacts, assessing them and recommendation of possible mitigating and enhancing measures for negative and positive impacts, respectively.

The environmental analysis has revealed that the project can be set-up according to the proposed design and configuration in the proposed site and location. The environmental impacts are of limited nature, whereas the benefits of the project are more than the negative impacts.

The impact analysis revealed that, noise and dust will be the major environmental impact for the construction of the project. Adverse impacts on workers' health & safety due to construction and operation were found very negligible among all the adverse impacts. However, these impacts can be reduced to a negligible amount by proper Management measures.

It is expected that the construction and operation of the proposed project namely **Bangladesh JW Animal Protein Co. Ltd.** will comply with all the guidelines provided by the Department of Environment (DoE).

13.2 Recommendations

Given that the potential impacts are somewhat significant to environmental degradation, this EIA report presents a 'findings of some significance impacts' that can be effectively mitigated. It is therefore recommended that the proposed development project be allowed to proceed on strict condition that the impact mitigation measures highlighted below:

- The proponent will comply with occupational health and safety especially in construction phase and operation phase.
- The plant authority should provide appropriate personal protective equipment (PPE) and they should strictly monitor this PPE during the construction period.
- Follow the Management measures suggested in the chapter-7 during the construction and operation of the project.
- **Bangladesh JW Animal Protein Co. Ltd.** should undertake and expanded the tree plantation program inside the project area and surrounding environment.
- Disaster Management Plan should be prepared in case of emergency situations.
- A Fire safety plan needs to be prepared in case of emergency situations.



- The project proponent should conduct a post operational environmental study to evaluate the environmental impacts from the project and compare the findings with the outcomes of this EIA report.
- The authority should maintain regular incident register and proper corrective action plan.
- The plant authority should install automatic fire/heat detecting system in each area.
- The authority should declare the project a “no smoking zone”.
- The factory authority should arrange regular mock drills by the firefighting cells/groups.
- Arrange awareness program for the workers and employee for earthquake and other natural hazard emergency also arrange proper training of the employees about the importance of safety codes.
- The authority should regularly monitor and record air emission quality of the plant.
- They should regular monitor and record drainage system of the plant.
- The impact due to air emission, there are significant environmental issues of sensitive nature, which might have any potential of serious ill effects due to the plant in this area. Since it is understood that the authority is committed to take necessary steps to address any environmental problems, the selected location of **Bangladesh JW Animal Protein Co. Ltd.** is acceptable for the present project. Therefore, the authority should regular monitor and record the air quality parameters in the facility premises.
- The company has to appoint skilled personnel to take care and advice about the Environmental Management System.
- The authority should develop Environmental Management System Team in the facility.
- The project proponent should conduct a post operational environmental study to evaluate the environmental impacts from the project and compare the findings with the outcomes of this EIA report.

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