ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) OF TORSIFA INDUSTRIES LIMITED

AT HOLDING NO. 121/1, BLOCK –H, WORD NO-07, BERAIDERCHALA, SREEPUR, GAZIPUR, BANGLADESH

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Bangladesh is one of the emerging economies countries of the World and has witnessed rapid industrial growth over the last two decades that has contributed significantly to the rise in the country’s Gross Domestic Product (GDP). At the same time, it also needs to be noted that Bangladesh is vulnerable to risks related to environmental pollution and climate change impacts (in the form of natural disasters like floods, cyclones) that are enhanced by man-made activities. Some of the common Environmental & Social concerns include converting paddy fields into industrial land, filling of water bodies for other purposes, encroaching into forest lands, pollution that need to be discouraged for the sake of environmental and social sustainability of the country. All these issues have significant adverse impacts on human health and flora and fauna.

Environmental and Social Impact Assessment (ESIA) is a guiding document for set-up a project in any selected location. The Environmental and Social study is conducted to address suitability of the location for the project. According to Environmental Conservation Act’ 1995 and subsequent amendments; ESIA is a Legal Obligation for getting environmental clearance from a Red category project under Environmental Conservation Rules’ 1997 and subsequent amendments because according to ECR, 1997, a composite industry has been categorized as Red. In light of ESSF, IDCOL the intervention in relevant to installing sewing machine, boiler and energy management system, seems to be a Low Risk contribution. Similarly, Environmental and Social Guidelines of JICA, has concluded the intervention as C category.

ESIA of the Tosrifa Industries Limited (TIL) is such kind of activity which points out the potential key impacts, management and relevant mitigation measures. The project office and site visit, stakeholder consultation, survey is the main source of project related data for this study.

Global Sustainable Certification Services Ltd. (GSCS) are grateful to the project authority of Tosrifa Industries Limited and others officials to support our team in every step of doing the study. Great appreciation from our side goes to respective stakeholders. Finally the contribution of team member is highly acknowledged.

With Regards,

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ABBREVIATIONS

1. BB - Bangladesh Bank
2. BBS - Bangladesh Bureau of Statistics
3. BMD - Bangladesh Meteorological Department
4. BNBC - Bangladesh National Building Code
5. CO - Carbon Monoxide
6. DAP - Detailed Area Plan
7. DMDP - Dhaka Metropolitan Development Plan
8. DoE - Department of Environment
9. ECA - Environmental Conservation Act
10. ECC - Environmental Clearance Certificate
11. ECR - Environmental Conservation Rules
12. EHSMS - Environmental, Health and Safety Management System
13. EMP - Environmental Management Plan
14. EQS - Environmental Quality Standards
15. ESIA - Environmental & Social Impact Assessment
16. FGD - Focus Group Discussions
17. GDP - Gross Domestic Product
18. GLCs - Ground Level Concentrations
19. GoB - Government of Bangladesh
20. IEE - Initial Environmental Examination
21. IFC - International Finance Corporation
22. ISO - International Organization for Standardization
23. MoEF - Ministry of Environment and Forest
24. NEMAP - National Environmental Management Action Plan
25. NOC - No Objection Certification
26. NOx - Oxides of Nitrogen
27. PPE - Personal Protective Equipments
28. RAJUK - Rajdhani Unnayan Kartripakhha
29. SEI - Significant Environmental Impacts
30. SOx - Oxide of Sulfur
31. TFL - Tosrifa Industries Limited
32. WB - World Bank
**GLOSSARY**

**Air pollution:** Air is made up of a number of gases, mostly nitrogen and oxygen and, in smaller amounts, water vapour, carbon dioxide and argon and other trace gases. Air pollution occurs when harmful chemicals and particles are emitted to the air – due to human activity or natural forces – at a concentration that interferes with human health or welfare or that harms the environment in other ways.

**Air quality:** A measure of the level of pollution in the air.

**Biodiversity:** A short form of the phrase ‘biological diversity’, which means the variety of life on this planet and how it interacts within habitats and ecosystems. Biodiversity covers all plants, animals and micro-organisms on land and in water. See also ecosystem, habitat and organism.

**CFCs:** Short for ‘Chlorofluorocarbons’, which are chemicals used in manufacturing and, in the past, in aerosol cans and refrigerators, which can damage the ozone layer.

**Environment:** That which surrounds.

**Environmental change:** A natural or man-induced alteration in the environment.

**Environmental criteria:** Summaries and syntheses of existing relevant information on physical, biological, sociological, and economic responses to environmental stresses.

**Environmental effect:** A man-induced environmental change.

**Environmental impact:** A change in environmental quality (the word 'impact' implies that a value judgment has been made on the importance of an environmental effect or change).

**Environmental impact assessment:** An activity designed to identify and predict the impact on the bio-geophysical environment and on man's health and well-being of legislative proposals, policies, programs, projects, and operational procedures, and to interpret and communicate information about the impacts.

**Environmental Impact Statement:** A term defined formally in the United States National Environment Policy Act as a summary of the environmental impact of an action and alternatives, including the non-action state.

**Environmental quality:** The state of the environment as perceived objectively in terms of measurements of its components, or subjectively in terms of its attributes such as beauty and worth.

**Environmental standards:** Limiting conditions of environmental quality, often expressed in numerical terms and usually with legal standing, that have been set by a jurisdiction to protect man's health and well-being.

**Environmental Management System (EMS):** An Environmental Management System (EMS) is a framework that helps a company achieves its environmental goals through consistent control of its operations. The assumption is that this increased control will improve the environmental performance of the company. The EMS itself does not dictate a level of environmental...
performance that must be achieved; each company's EMS is tailored to the company's business and goals.

**Effluent:** Liquid wastes such as sewage and liquid waste from industries.

**Greenhouse gases:** Gases such as carbon dioxide and methane, which tend to trap heat radiating from the Earth’s surface, so causing warming in the lower atmosphere. The major greenhouse gases that cause climate change are carbon dioxide (CO\textsubscript{2}), methane (CH\textsubscript{4}) and nitrous oxide (NO\textsubscript{2}). See also greenhouse effect and global warming.

**Hazardous waste:** Waste that poses a risk to human health or the environment and needs to be handled and disposed of carefully. Examples include oil-based paints, car batteries, weed killers, bleach and waste electrical and electronic devices.

**Particulate matter:** Fine solid or liquid particles that pollute the air and are added to the atmosphere by natural and man-made processes at the Earth’s surface. Examples of particulate matter include dust, smoke, soot, pollen and soil particles.

**Noise pollution:** Noises that disturb the environment and people’s ability to enjoy it, for example continually sounding house alarms, loud music, air conditioning or other electrical units and aircraft or motor engines.

**Recycle:** To break waste items down into their raw materials, which are then used to re-make the original item or make new items.

**Sewage:** Liquid wastes from communities, which may be a mixture of domestic effluent from homes and liquid waste from industry.

**Smog:** Air pollution consisting of smoke and fog, which occurs in large urban and industrial areas and is mainly caused by the action of sunlight on burned fuels, mostly from car exhausts. Smog can cause eye irritations and breathing problems and damage plant life.

**Social Impact Assessment:** It includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions.

**Waste management:** The management of waste collection, handling, processing, storage and transport from where it is produced to where it is finally disposed. See waste prevention.

**Waste prevention:** An aspect of waste management that involves reducing the amount of waste we produce and minimizing the potential harm to human health or the environment from packaging or ingredients in products.

**Zero emissions:** An engine, motor or other energy source that does not produce any gas or release any harmful gases directly into the environment.
Tosrifa Industries Limited (TIL) is setting-up a dyeing unit with knitting facility of total 28 MT per day. The project is located at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh.

As per environmental Conservation Rules 1997 (amended 2002), a composite industry is scheduled under “Red category”. So an Environmental & Social Impact Assessment (ESIA) has been carried out for this project as per requirement of the World Bank fund to be disbursed by Bangladesh Bank. The Global Sustainable Certification Services Ltd. (GSCS) has commissioned to conduct the ESIA study of the project. In light of ESSF, IDCOL the intervention in relevant to installing sewing machine, boiler and energy management system, seems to be a Low Risk contribution. Similarly, Environmental and Social Guidelines of JICA, has concluded the intervention as C category.

Baseline condition
Tosrifa Industries Limited, a sister concern of Northern Tosrifa Group is setting-up a Dyeing Project at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. After implementing the full project TIL can employs more than 500 well compensated workers in an excellent working environment provided with meals, medical facility as well as child care facility. In this Fabric dyeing project total land area is about 1,256.55 decimal and after Implementing the full project per day dyeing production capacity will be 28 MT. The project area has situated at Sreepur Upazila of Gazipur District. The GPS Location of the project site is 24°11´ 41. 30´N & 90°24´ 48.89´´E.

Baseline Environment Survey
The ESIA primarily comprises of a detailed baseline analysis through measurements of different environmental parameters like air quality, noise level and the quality of ground and surface water in the vicinity of the project site. A baseline survey (including physical, ecological surveys) was conducted during August-October 2017 covering areas in and around the project site (i.e., the study area), in order to update information on “baseline” environment. Informal discussions were held with people living and working in the surrounding areas. The purpose of the baseline survey was to document the existing conditions of physical and biological environment and prevailing socio-economic conditions of the project areas. During field visits, discussions were held with the TIL officials and engineers on different issues relevant to project, capacity and institutional arrangements for environmental management of the proposed project.

Public Consultation
Public Consultation held at project locations, which were participated by a wide range of stakeholders. The participants expressed their opinions regarding different issues including their knowledge about the proposed dyeing project, socio-economic condition of people in their localities, possible impacts of the proposed project on the existing environment and in
their localities, and mitigation measures to address adverse impacts. In addition, public consultations (in the form of informal discussion) were also carried out during field visits.

Environmental and Social Impact Evaluation
As a part of the Environmental and Social Impact Assessment (ESIA), environmental impacts of the specific project activities on different ecological, physical, chemical and socio-economic related parameters, both during the construction phase and the operation phase, have been identified and assessed.

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

Socio-economic impacts
Possible socio-economic impacts from the project activities to be carried out may include the following: (a) traffic safety (b) public health and (c) generation of employment and commercial activities.

Physical and chemical impacts
Possible physical and chemical impacts from the project activities to be carried out may include the following: (a) Noise pollution, (b) Air pollution (c) Environmental pollution from solid/construction waste.

Environmental and Social Management Plan
Environmental Management Plan (ESMP) has been prepared for construction and operation phase which comprise mitigation measures plan for minimizing the negative impacts and enhancement plan for increasing the benefits of the positive impacts.

Disclosure
As per World Bank's policy on access to information, Tosrifa Industries Limited will make the ESIA document available to the public by publishing it in their websites. In addition, hard copies of these documents in English will be made available in publicly accessible locations in the project site as well as in the head office of Tosrifa Industries Limited.
1.0 INTRODUCTION

1.1 Background

**Tosrifa Industries Limited (TIL)** is establishing an Eco friendly dyeing unit (Green Project) with capacity of total 28 MT per day. Presently TIL is depending on others for its fabric dyeing; with the installation its own dyeing unit the company can reduce these expenses and also its shipment lead time. It will be a source of employment thus socio-economic development will be an outcome of the project. It will follow environment friendly manufacturing process having minimal emission, noise, water pollution & proper health and safety management of the worker, Medical and Child Care Facility of the worker.

To set-up the unit, TIL has imported machineries from Europe, Turkey and Japan. The dyeing unit is equipped with energy efficient machines and are considered one of best in the world.

The total cost of the project is estimated to be USD 27.37 million – in 1st phase USD 20.56 million for set-up dyeing facility of 15 MT per day, in 2nd phase USD 6.81 million for set-up dyeing facility of 13 MT per day with knitting factory building. The plant will run by technical experts and industry professionals ensuring highest quality products. One of the key aspects that the management is focused on Eco Friendly (Green Project). The choice of machinery and the factory design has been made with careful consideration of reducing carbon foot print. The location was selected with considering availability electricity & gas, economical labor and communication facilities.

The project is established on land area of 1,256.55 decimal where 437.87 decimal owned by TIL and 818.68 decimal taken leased from Northern Knit Limited (NKL) for 25 years. NKL is a sister concern of TIL under common directorship. The lands were purchased from willing sellers at market values over the period from 2005 to 2016. As there is no land acquisition and community impact, resettlement, livelihood, income of the local people will not be negatively affected by implementing the project, so project will not trigger World Bank OP-4.12. In this area no tribal and indigenous people will be affected by the project operation, So World Bank OP-4.10 will not be triggered as well.

1.2 Brief Description of the project

**TIL** is setting-up a dyeing unit with knitting facility which will be LEED certified. The state of the art dyeing unit has a capacity of total 28 MT per day completed through 2 (two) phases.

**1st Phase:** The construction and machinery set-up of 1st phase for dyeing capacity with 15 MT per day has been completed and the commercial operation of 1st phase started from 30 November 2017.

**2nd Phase:** In 2nd phase there will have another dyeing capacity of 13 MT per day with a knitting factory building and the required civil works and machinery set-up of 2nd phase is under process.
1.3 Objectives of ESIA study
The ESIA is a formal process to examine and determine the Environmental and Social consequences of a proposed major development. The ESIA examines problems, conflicts and natural resources constraints that could affect the viability of the project. It investigates how the project might harm or benefit for the people in relation to their households or livelihoods. It also provides important feedback into the design to minimize negative impacts and enhance positive ones.

The objectives are to ensure that the activities undertaken in the project:
- Enhance positive environmental and social outcomes
- Prevent negative environmental and social impacts
- Identify and mitigate with appropriate measures, the adverse impacts that might arise
- Ensure compliance with the World Bank’s environmental and social safeguards policies.

1.4 Consistency with DoE Guidelines
Environmental Conservation Act 1995 is presently the main legislative article relation to environmental protection and conservation in Bangladesh. Under this act no industrial unit or project shall be established or adopted without obtaining ECC. In the manner prescribed by the rules, from the DG; Compliance with the provision of this act is the liability of DoE. A set of significant rules to execute the ECA has recently been promulgated in 1997.

The rules incorporate inclusion lists of project requiring varying degree of environmental research e.g.- the entire new project under red category generally will require two steps assessment process firstly IEE for site clearance and secondly a full environmental Impact Assessment (ESIA for Technical Clearance).

1.5 Consistency with World Bank Safeguard Policy/Guidelines
WB Safeguard policies, incorporating environmental and social principles, are designed to protect the interests of the various stakeholders from adverse impacts of World Bank-assisted projects. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. The Safeguards are designed to protect the environment from possible adverse effects of its projects. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The World Bank has some environmental, social, and legal safeguard policies.

1.6 Consistency with Bangladesh Bank Guidelines
As per Bangladesh Bank Guidelines - an E&S Management System is a set of policies, procedures, tools and internal capacity to identify, monitor and manage a Bank/FI’s exposure to the E&S risks of its clients. An E&S Management System states a Bank/FI’s commitment to E&S management, explains its procedures for identifying, assessing and managing E&S risk of financial transactions, defines the decision-making process, describes the roles, responsibilities and capacity needs of staff in doing so and states the documentation and recordkeeping requirements. It also provides guidance on how to screen transactions, categorize transactions based on their E&S risk, conduct E&S due diligence and monitor the client’s E&S performance.
Introduction

The ESMS includes the financial institution’s environmental and social policy and designated roles and responsibilities of its staff.

1.7 Scope of present study
This Environmental and Social Impact Assessment (ESIA) is a part of the environmentally and socially sound study for the existing TIL project. The objective of the study is to assess the current environmental condition of the project and helps to make an Environmental and Social Monitoring Plan (ESMP) to achieve their “Environmental” and “Social” vision. The study is to verify the impact of the existing project on environment and on social. The ESIA study of the project has been identified the potential environmental impacts/issues and also provides outline of suggestions of effective measures to mitigate the adverse impact and enhance the positive environmental potential.

1.8 Tosrifa Industries Limited Commitments
Tosrifa Industries Limited understands its responsibilities towards the society, human resource and environment. Hence, we ensure conservation of resources as per the prescribed laws and regulations as per the (ISO: 14001) environment management system. From social point of view, TIL will assure an Ethical & responsible environment for our employees & our society, by adhering Government Legislations & Customer COC’s & other recommendations govern by other parties. TIL will also deliver the social economic benefits to employees & our dependents to uplift their livelihood.

1.9 Methodology
A team of multidisciplinary specialists has been employed to prepare the ESIA Report. Both secondary and primary data were used in the preparation of the ESIA Report. The ESIA study has been conducted and the present report prepared based on the information provided by Tosrifa Industries Limited as well as all possible secondary information and data collected from all relevant sources and from the field through observation, primary data collection, stakeholder’s consultation, survey and certain degree of field validation.

During this process, the following steps have been followed
- Review of literature and identify areas to focus in the study.
- Collect information from project area related to study.
- Detail understanding of scope of assignment, activities involved and the intervention areas and its surrounding environment.
- Engage resources persons/field staff for the assignment.
- Collect all possible data on the environmental, social, health and natural resource components and parameters of necessity.
- Collection and review of pertinent reports and other references. This particularly included DoE EIA Guidelines for industries 1997, Environmental policies, strategies and acts.
- Collect samples, as necessary (air, water, noise) from predetermined points and areas within the study area and analyzes relevant parameters;
Develop and utilize different information gathering tools as necessary or deemed appropriate.
- Critical analysis of proposed project documents and others information.
- Identification of source of environmental and biodiversity degradation and disturbance of significance.
- Identification of Potential Environmental Impacts
- Presentation of an outline of environmental management plan for future handle the environmental, biological, Social and health related issues.
- Formulate Environmental Monitoring Plan
- Preparation of Draft ESIA report
- Review of the report by experience reviewer
- Prepare final ESIA report and submit to the concern authority.

In the process of preparing the ESIA, ESIA Guidelines of World Bank for Textile industries have been specially consulted and considered.

1.10 Report Structure
The Report is being prepared in meeting with the requirements of TIL as well as the Bangladesh Bank/World Bank Standard/ DoE Standard. The outline of the report structure is given below:

- Chapter-1 presents the “Introduction” which will deal with the “background” and other aspects of the study.
- Chapter-2 covers the “Policies and legislation” applicable to developments of this type of project in Bangladesh. It describes briefly the Regulatory Framework, Environmental Policy, Energy and Power Policies, Environmental standards, Environmental Clearance Requirements, World Bank Social and safeguard policies and World bank-IFC Environment, Health and safety guidelines.
- Chapter-3 describes the “Description of the Project”.
- Chapter-4 covers the “Baseline Information of Environment”.
- Chapter-5 describes “ Public Consultation’s”
- Chapter-6 describes the “ Identification, Prediction, Evaluation of potential Impacts and Mitigation measures”
- Chapter-7 describe the “ Environmental Management Plan”
- Chapter-8 describe the “Risk Management and Disaster Management Plan
- Chapter- 9 describe the “Conclusions and Recommendations”
- Chapter- 10 deals with “References”
- Chapter – 11 deals with “Annexure”

1.11 ESIA Study Team
The Present ESIA study has been conducted by the Environmental consulting firm named Global Sustainable Certification Services Limited (GSCS). The ESIA team consists of multidisciplinary experts. The details of the ESIA Team members are described in Annexure: XXV.
Environmental Standard
The standards, commonly known as Environmental Quality Standards (EQS), are legally binding. There is a separate schedule on industry specific standards, other than the general industrial emission and effluent standards.

For reference, the Bangladesh standards for ambient air, noise, industrial effluent and industrial emission are furnished hereinafter as separately included in Annexure-I.

Industrial Policy 1992
Industrial Policy, 1991 seeks to liberate the industry from the shackles of licensing system Drastically reduce the role of public sector and encourage foreign participation in industrial development.

National Environmental Policy, 1992
The concept of environmental protection through national efforts was first recognized and declared with the adoption of the Environmental Policy, 1992 and the Environmental Action Plan, 1992. The importance of policies in beefing up the environmental regime is recognized in a number of international instruments including the World Conservation Strategy in 1980 and the Brundtland Commission Report, 1987. Paragraph 14 of Chapter 8 of Agenda 21 underscored the necessity of formulation of national policies as well as laws for environmental protection and sustainable development.

National Conservation Strategy 1992
National Conservation Strategy 1992 was endorsed to balance a country’s economic development with the conservation and use of their natural resources. This important step came none too soon, as the nation faces numerous environmental problems that constrain its efforts to meet people’s needs.

National Environmental Management Plan (NEMAP), 1995
The National Environment Management Action Plan (NEMAP, 1995), based on a nationwide consultation program identified the main national environmental issues, including those related to the water sector which EA practitioners should note.

Convention, Treaties and Protocols
The Equator Principles of World Bank, 2013
The Equator Principles is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects. It is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The Equator Principles apply globally, to all industry sectors and to four financial products 1) Project Finance Advisory Services 2) Project Finance 3) Project-Related Corporate
Loans and 4) Bridge Loans. The Equator Principles Financial Institutions (EPFIs) will only provide Project Finance and Project-Related Corporate Loans to Projects that meet the requirements of prescribed Principles.

Legal Requirement

Department of Environment, Bangladesh
According to the Bangladesh Environmental Conservation Rules’97, a composite industry is usually categorized as Red category requiring to obtain “Environmental Clearance Certificate” from Department of Environment prior to commence commercial run.

Infrastructure Development Company Ltd.
Environmental and Social Safeguards Framework (ESSF) defines a composite project as a Moderate risk project in consideration of its project specific impact. But in case of only installing some sewing machines, boiler and environmental management system, where there is no issue with significant land acquisition and land development; air, water and noise pollution, this portion of the project can be specifically concluded as a Low Risk intervention.

JICA Guidelines
In 2010, Japan International Cooperation Agency (JICA) has introduced Environmental and Social Considerations Guidelines (ESC Guidelines). It is a master document with the objectives to guide that set forth JICA’s responsibilities and required procedures, together with obligations of partner countries and project proponents, in order to put ESC into practice. By running projects with appropriate ESC put into practice in accordance with the ESC Guidelines, JICA promotes inclusive and dynamic development. The ESC Guidelines, in languages including English, Chinese, French, and Spanish, as well as related documents such as Frequently Asked Questions are available on JICA’s website. http://www.jica.go.jp/english/our_work/social_environmental/guideline/index.html

JICA’s partners, including host countries, borrowers, and project proponents (hereinafter referred to as “project proponents etc.”), bear the primary responsibility for ESC. JICA’s role is to examine the ESC undertaken by the project proponents etc. in their development projects and to provide necessary support to ensure that the appropriate ESC are put into practice and that adverse impacts are avoided or minimized to an acceptable level.

ESC Guidelines have three categories of project in consideration of scale of impacts: A, B, C. Based on this categorization, it seems that installation of some sewing machines, boiler and environmental management system might be a C type project.
3.1. Project Overview

General Information about the Project is given below:

**Table 3.1: General Information of the Project**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Tosrifa Industries Limited (Fabric Division)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of business/operation</td>
<td>Fabric dyeing with knitting facility</td>
</tr>
<tr>
<td>Project Location</td>
<td>Holding no. 121/1, Block -H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh.</td>
</tr>
<tr>
<td>Total land area</td>
<td>1,256.55 decimal</td>
</tr>
<tr>
<td>Production Capacity</td>
<td>28 MT Fabric dyeing per day</td>
</tr>
<tr>
<td>Water Source</td>
<td>Own Deep Tube wells</td>
</tr>
<tr>
<td>Total Water use (Per/day)</td>
<td>375000 L/day for all the purpose</td>
</tr>
<tr>
<td>ETP Capacity</td>
<td>60 m3/hr</td>
</tr>
<tr>
<td>Factory Running Time</td>
<td>24 hours</td>
</tr>
<tr>
<td>Energy Requirements - Electricity</td>
<td>4 MVA from REB</td>
</tr>
</tbody>
</table>

3.2 Type of the Project and Capacity

3.2.1 Project Activities

Tosrifa Industries Limited is a composite textile manufacturing project. In the composite manufacturing process has different activities like- knitting, Dyeing, Dyeing Finishing, Cutting Sewing and Finishing. The Process Flow Diagram is shown in Annexure II.

3.2.2 Project Capacity

3.2.2.1 List and quantity of raw materials used (Input)

Tosrifa Industries Limited will use some raw material for the production of knit garments product. The list of raw material are shown in below-

- Knit Fabrics
- Yarn
- Color
- Soda
- Ash
- Caustic Soda
- \( \text{H}_2\text{O}_2 \)
- Enzyme
- Various dyes
- Salt

3.2.2.2 List and Quantity of finished product (Output)

This Composite textile industry will produce mainly Grey knit Fabrics and Finished Fabrics. After that, they will produce knit garments. The factory will produce 28MT fabrics dyeing daily
considering 24 hours production and sewing garments production capacity 19,718,400 pieces per year.

### 3.3 Project Location and Description of the site
Gazipur District (Dhaka division) area 1741.53 sq km, located in between 23°53´ and 24°21´north latitudes and in between 90°09´ and 92°39´ east longitudes (Figure 3.1). It is bounded by mymensingh and Kishorgonj Districts on the north, Dhaka, Narayangonj and Narsingdi district on the south east, Dhaka and Tangail district on the west. Population Total 2031891; male 1067722, female 964169; Muslim 1872943, Hindu 137678, Buddhist 20124, Christian 235 and others 911. Water bodies River 17, canal 84, dighi 12, beel 413, Lake 3 (artificial), jalmahal 14; main main rivers Old Brahmaputra, Shitalakshya, Turag, Bangshi, Balu, Banar. Administration Gazipur District was formed in 1984.

Although there is no impact on social issue for continuation of the project as mention previous chapter-1. No Indigenous people will be affected for this project construction and operation as mention earlier. There are some beneficial impact of the project such as create job opportunity for local people, increase the life standard of the people around the project area.

<table>
<thead>
<tr>
<th>Area (sq km)</th>
<th>Upazila</th>
<th>Municipality</th>
<th>Union</th>
<th>Mouza</th>
<th>Village</th>
<th>Population</th>
<th>Density (per sq km)</th>
<th>Literacy rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1741.5</td>
<td>5</td>
<td>4</td>
<td>45</td>
<td>768</td>
<td>1162</td>
<td>929770</td>
<td>1231</td>
<td>56.4</td>
</tr>
</tbody>
</table>

### Others Information of District

<table>
<thead>
<tr>
<th>Name of upazila</th>
<th>Area (sq km)</th>
<th>Municipality</th>
<th>Union</th>
<th>Mouza</th>
<th>Village</th>
<th>Population</th>
<th>Density (per sq km)</th>
<th>Literacy rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kapasia</td>
<td>356.98</td>
<td>-</td>
<td>11</td>
<td>166</td>
<td>230</td>
<td>321454</td>
<td>900</td>
<td>56.4</td>
</tr>
<tr>
<td>Kaliakair</td>
<td>314.14</td>
<td>1</td>
<td>9</td>
<td>181</td>
<td>287</td>
<td>267003</td>
<td>850</td>
<td>48.4</td>
</tr>
<tr>
<td>Kaliganj</td>
<td>158.79</td>
<td>1</td>
<td>8</td>
<td>151</td>
<td>198</td>
<td>239527</td>
<td>1508</td>
<td>54.9</td>
</tr>
<tr>
<td>Gazipur Sadar</td>
<td>446.38</td>
<td>2</td>
<td>8</td>
<td>183</td>
<td>261</td>
<td>866540</td>
<td>1941</td>
<td>62.6</td>
</tr>
<tr>
<td>Sreepur</td>
<td>465.24</td>
<td>-</td>
<td>9</td>
<td>81</td>
<td>186</td>
<td>337367</td>
<td>725</td>
<td>47.7</td>
</tr>
</tbody>
</table>


Tosrifa Industries Limited is located at Holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. It is at 1 hour and 32 minutes driven and 42.1 km away from Harzat Shahjalal International Airport. It is surrounded by industry, land and road. The Project will enjoy the infrastructure facilities such as electricity, telecommunication and road transports facilities. Ground Water is the main sources of water of TIL. The study area for the ESIA of Tosrifa Industries Limited is shown in Figure 3.2 and 3.3.
Figure 3.1: Location Map of Gazipur District including project site
Figure 3.2: Sreepur Upazila and Project Site
Figure 3.3: Tosrifa Industries Limited Project Site
3.3.1 Land Ownership Detail
TIL requires land area of 1,256.55 decimal where 437.87 decimal owned by TIL and 818.68 decimal taken leased from Northern Knit Limited (NKL) for 25 years. NKL is a sister concern of TIL under common directorship. The lands were purchased from willing sellers at market values over the period from 2005 to 2016. Land ownership documents are shown in Annexure-III.

3.3.2 Surroundings and Accessibility
It is situated in Holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. So the site is surrounded by vacant low lying area, house, Industry, road and agricultural land. The Proposed site is easily accessible by road.
The project area is situated at Sreepur Upazila of Gazipur District. The GPS Location of the project site is 24°11´ 41. 30´´N & 90°24´ 48. 89´´E. In this Project –
1. North side: Ansar Road & Aswad Composite Mills Limited (Unit-1)
2. South Side: Vacant Land and low lying area
3. East Side: 8-10 Feet wide rural road and Designtex knitwear Limited
4. West side: Vacant Land

3.4 Plant Layout
Total Land required for this factory will be 1,256.55 decimal. Total area will include production unit, admin building, Store house, training and day care centre, Substation and generator, ETP, WTP and Chemical store, Husk Boiler, Solid wastage storage area, Rainwater Harvesting area and require open spaces.

The Plant Layout are shown in below table 3.3

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Building Name</th>
<th>Area (Sft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Production Building</td>
<td>117,412</td>
</tr>
<tr>
<td>2</td>
<td>Utility Building</td>
<td>18,882</td>
</tr>
<tr>
<td>3</td>
<td>WTP &amp; Chemical Store</td>
<td>33,318</td>
</tr>
<tr>
<td>4</td>
<td>ETP</td>
<td>14,384</td>
</tr>
<tr>
<td>5</td>
<td>Husk Boiler Building</td>
<td>16,750</td>
</tr>
<tr>
<td>6</td>
<td>Knitting Building</td>
<td>81,180</td>
</tr>
<tr>
<td>7</td>
<td>Yarn Store Building</td>
<td>23145</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>305,071</strong></td>
</tr>
</tbody>
</table>

The master Layout plan of the project is shown in figure-3.4; Master plan with septic tank location and their out let connection, ETP Connection with canal and Drainage Network for storm water management of the project are shown in Annexure IV.
Figure 3.4: Project Master Layout Plan
3.5 Present Status of the project

This dyeing project was planned to be executed through 2 (two) phases. The present status of the project is as under:

<table>
<thead>
<tr>
<th>Phases</th>
<th>Details</th>
<th>Present Status</th>
</tr>
</thead>
</table>
| **Phase-1:**
  Establishment of Dyeing Capacity – 15 MT per Day
  Machinery Installations: Dyeing Machines For 15 MT dyeing per day, Finishing Machines, Lab Equipment, Blower for ETP, Boilers, Generators, Electrical Sub-stations, Utility Connections, Solar Panel | Commercial operation started from 30 November 2017 |
| **Phase-2:**
  Enhancement of Dyeing Capacity of another 13 MT per day
  (Started in October 2017 and Continued ..... ) | Construction and Civil Works: Construction of Knitting Building, Civil Works in Production Building for installing enhanced capacity dyeing machines
  Machinery Installations: Dyeing Machines For 13 MT dyeing per day, Knitting Machines and Washing Machines, Lab Equipment | Knitting building construction under process, LCs opened for machinery. It is expected that the commercial operation of Phase-2 can be started by December 2018. |

The project already have site clearance certificate (SCC) from DOE, NOC from Sreepur pourashava, NOC from Bangladesh Electrification board, NOC from Titas Gas Company. All this are included in Annexure-V, Annexure-VI, Annexure-VII, and Annexure –VIII. The present conditions of the factory are shown by different pictures.

TIL Project will use different flow meters in their ETP and others area of the factory for calculation of water used. The flow meter arrangements (Types and specification) are given in Annexure-IX.

For the continuation of the project they will use 3 generators, 1 Gas boiler, 1 Thermo oil Heater and 1 Husk Boiler. The Generator and Boiler arrangements (Types and specification) are given in Annexure-X.
Figure 3.5: Present condition of the project
3.6 ETP and Other Treatment Plants

Water is the most vital elements among the natural resources, and is crucial for the survival of all living organisms. The environment, economic growth and developments of Bangladesh are highly influenced by the quality of surface and ground water. The increasing urbanizations and industrializations of Bangladesh have negative implications for water quality. Considering the environment & sustainability, Tosrifa Industries Limited, Ansar Road, Beriaderchala, Sreepur, Gazipur, is going to install a Modernized Biological ETP by using “Up-flow Anaerobic Sludge Blanket (UASB) and Bio-Filtration process” and operating this ETP to comply with national and international standard of the discharged water quality. The ETP Specifications and Design calculation are included in Annexure- XI and Annexure XII.

3.6.1 General Information about ETP

Location : Ansar Road, Beriaderchala, Sreepur, Gazipur
Land Area : 25000 sft
Power Consumption : 200 KW
Type of Effluent : Textile Effluent
Quantity of Effluent : 60 m3/Hr
Treatment Hours : 24 Hrs/Day
Treatment Concept : UASB and Bio-Filtration process with Aerobic Biodegradation Process.

3.6.2 Inlet & Outlet Characteristics

Expecting Inlet Wastewater Characteristics

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>INLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>12-14</td>
</tr>
<tr>
<td>DO mg/L</td>
<td>0.0</td>
</tr>
<tr>
<td>BOD, mg/lit.</td>
<td>200-600</td>
</tr>
<tr>
<td>COD, mg/lit.</td>
<td>500-1200</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS), mg/lit</td>
<td>200-450</td>
</tr>
<tr>
<td>TDS</td>
<td>2000-4000</td>
</tr>
<tr>
<td>Oil and Grease, mg/lit</td>
<td>25-60</td>
</tr>
<tr>
<td>Color</td>
<td>Black</td>
</tr>
</tbody>
</table>

3.6.3 Desire Outlet Treated Wastewater Characteristics

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>OUTLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7 – 7.5</td>
</tr>
<tr>
<td>DO mg/L</td>
<td>4.5-8 mg/l</td>
</tr>
<tr>
<td>BOD, mg/lit.</td>
<td>&lt;30</td>
</tr>
<tr>
<td>COD, mg/lit.</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>Total Suspended solids (TSS), mg/lit</td>
<td>&lt; 30</td>
</tr>
<tr>
<td>TDS</td>
<td>&lt;2000</td>
</tr>
<tr>
<td>Oil and Grease, mg/lit</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Color</td>
<td>Clear</td>
</tr>
</tbody>
</table>
Anaerobic treatment is widely used around the world as a biological stage for industrial waste water treatment plant. The two principal advantages of anaerobic treatment over the aerobic treatment are production of biogas which can be used as fuel, and lower rate of production bio-mass which results in lower maintenance cost for the plant. The Up-flow Sludge Blanket Process is a suitable for Tropical regions as it works better under mesophilic conditions. It does not need any supporting structure for the development of micro-organisms which grow in the form of granules.

The Up-Flow Anaerobic Sludge Blanket-Bio Filtration Process is a high quality one having some favorable opportunities such as; low cost, simple operational mechanism and produces very negligible amount of sludge, and the organic matter can be converted into energy in the form of biogas. Therefore, anaerobic process is a highly beneficial process in terms of environmental protection and the process is economically viable. In Bangladesh, anaerobic process is completely a novel technology. It can reduce environmental pollution and can achieve energy in terms of biogas from wastewater. In this process in absence of oxygen, it converts organic compounds to CH4 and CO2.

This CH₄ is an alternative source of bio-energy which will be utilized for power generation or domestic usage for cooking. This anaerobic digestion is a promising process used widely for the treatment of textile wastewater in tropical and subtropical countries like India, Brazil, Mexico and Malaysia. The successful application of anaerobic technology for treating textile wastewater depends on high-rate bio-reactors which achieve a high reaction rate per unit reactor volume by retaining the biomass in the reactor for long period. The ETP specifications and design calculation are included in Annexure- XI and Annexure XII. Solid retention time (SRT) is not dependent on the hydraulic retention time (HRT). Tosrifa Industries Limited ETP Plant process flow diagram and line diagram area shown in below figure 3.6 and Combine drainage (Storm water, Septic Tank Location and waste water) layout pan are included in Annexure- XIII.

a) ETP Process Diagram of TIL

![ETP Process Diagram of TIL](image-url)
Figure 3.6: Biological Effluent Treatment Plant (ETP) of Tosrifa Industries Limited a) Process diagram b) Line diagram of ETP of TIL.
3.6.4 Sludge Management Process of TIL

Tosrifa Industry Limited is constructing a 60 m³/h biological effluent treatment plant for treatment of waste water from dyeing section. After the treatment of wastewater, they have some sludge. The excess sludge production will be minimum and finally it will be managed by using sludge dry bed and the minimal dry sludge will be stored at least 6 months in the besides of ETP site as per DoE sludge management guidelines and sent it to their vendor like City Corporation or other as per above Sludge management guidelines.

3.7 Lists of Machinery

Tosrifa Industries Limited will use some machinery for the manufacturing of textile fabric dyeing and dyeing finishing. The machinery lists of the project are given in below-

<table>
<thead>
<tr>
<th>SI</th>
<th>Item Name with Specification</th>
<th>Brand</th>
<th>Country of Origin</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ERBATECH CONTINUOUS OPEN-WIDTH BLEACHING AND WASHING MACHINE &quot;SCOUT TR1/D2/I1/2PW 1.6&quot;</td>
<td>ERBATECH</td>
<td>Germany</td>
<td>1 Set</td>
</tr>
<tr>
<td>2</td>
<td>ERBATECH DYE PADDER &quot;SCOUT-COLOR DP/KN&quot;</td>
<td>ERBATECH</td>
<td>Germany</td>
<td>1 Set</td>
</tr>
<tr>
<td>3</td>
<td>ERBATECH BATCH HANDLING 30AF/3RS/3HJ</td>
<td>ERBATECH</td>
<td>India</td>
<td>1 Set</td>
</tr>
<tr>
<td>4</td>
<td>HT SAMPLE DYEING MACHINE</td>
<td>DILMENLER</td>
<td>Turkey</td>
<td>1 Set</td>
</tr>
<tr>
<td>5</td>
<td>BRUCKNER HIGH CAPACITY SINGLE-LAYER STENTER TYPE POWER-FRAME VN SFP</td>
<td>BRUCKNER</td>
<td>Germany</td>
<td>1 Set</td>
</tr>
<tr>
<td>6</td>
<td>ROPE OPENER AND SLITTING LINE</td>
<td>BIANCO</td>
<td>Italy</td>
<td>1 Set</td>
</tr>
<tr>
<td>7</td>
<td>OPEN WIDTH KNIT FABRIC FELT COMPACTING RANGE</td>
<td>LAFA</td>
<td>Italy</td>
<td>1 Set</td>
</tr>
<tr>
<td>8</td>
<td>RAISING MACHINE</td>
<td>LAFA</td>
<td>Italy</td>
<td>1 Set</td>
</tr>
<tr>
<td>9</td>
<td>REVERSING MACHINE WITH AIR FOR TUBULER FABRIC</td>
<td>MERSAN</td>
<td>Turkey</td>
<td>2 Sets</td>
</tr>
<tr>
<td>10</td>
<td>AUTOMATIC TD-LAB DYE DISPENSER MACHINE</td>
<td>Dysin Int'l</td>
<td>Germany</td>
<td>1 Set</td>
</tr>
<tr>
<td>11</td>
<td>MATHIS 2-ROLL LABORATORY PADDERS</td>
<td>MATHIS</td>
<td>Switzerland</td>
<td>1 Set</td>
</tr>
<tr>
<td>12</td>
<td>LAB TESTING equipments</td>
<td>SDL ATLAS</td>
<td>Hong Kong</td>
<td>1 Lot</td>
</tr>
<tr>
<td>13</td>
<td>LAB TESTING EQUIPMENTS</td>
<td>DATA COLOR</td>
<td>Hong Kong</td>
<td>1 Lot</td>
</tr>
<tr>
<td>14</td>
<td>AIR COMPRESSURE - ROTERY SCREW TYPE AIR COOLED VARIABLE SPEED DRIVE AIR</td>
<td>ATLAS COPECO</td>
<td>Belgium</td>
<td>4 Sets</td>
</tr>
<tr>
<td>15</td>
<td>COMBIPAC SYSTEM BOILER MODEL CPFD 60 WITH CAPACITY 60000 KG/HR</td>
<td>THERMAX</td>
<td>India</td>
<td>1 Set</td>
</tr>
<tr>
<td>16</td>
<td>SKY LIGHT SHEET</td>
<td>APLOS GLOBAL LTD</td>
<td>USA</td>
<td>62 Pcs</td>
</tr>
<tr>
<td>17</td>
<td>BK type industrial Roots Blower</td>
<td>Supreme Step Development Ltd</td>
<td>China</td>
<td>1 set</td>
</tr>
<tr>
<td>18</td>
<td>SANTASHRINK PROGRESS DRYER (5 CHAMBERS)</td>
<td>SANTEX AG</td>
<td>Switzerland</td>
<td>1 Set</td>
</tr>
<tr>
<td>19</td>
<td>FIRE FIGHTING EQUIPMENTS</td>
<td>SFFECO</td>
<td>UAE</td>
<td>1 Lot</td>
</tr>
<tr>
<td>20</td>
<td>1,250 KVA PRIME DIESEL</td>
<td>Powerco Systems International</td>
<td>UK</td>
<td>1 Set</td>
</tr>
<tr>
<td>21</td>
<td>POWER BUSBER TRUNKING SYSTEM AND STANDARD ACCESSORIES</td>
<td>FINE TREN D LTD</td>
<td>Turkey</td>
<td>1 Lot</td>
</tr>
<tr>
<td>22</td>
<td>FABRIC ROLLING MACHINE</td>
<td>SUNITECH INDUSTRIAL INT'L LTD</td>
<td>CHINA</td>
<td>12 SET</td>
</tr>
<tr>
<td>23</td>
<td>BOILER</td>
<td>WINNER TECH KOREA CO., LTD</td>
<td>Korea</td>
<td>1 set</td>
</tr>
<tr>
<td>24</td>
<td>TREATMENT PLANT</td>
<td>Supreme Step Development Ltd</td>
<td>China</td>
<td>1 set</td>
</tr>
</tbody>
</table>

Figure 3.7: Machinery lists of Tosrifa Industries Limited
3.8 Human Resource Development
Tosrifa Industries Limited values its workers and employees and strives to maintain high standard of labor practices to ensure congenial work environment for its workers and employees. After implementing 1st phase this project has employed 330 full time employees and after execution of 2nd phase the number of employee will be around 500. In dyeing industry, due to heavy physical works, females are not interested to work in dyeing factory but the Company TIL always highly appreciate female workers. It is notable that in garments division of TIL, more than 90% workers are female. When full project completed, in order to consider the woman empowerment in society the Company has plan to employ as much as possible females in suitable administrative jobs in project. The Company has a well-designed compensation package for the employees to encourage professionalism, greater productivity and stimulate teamwork. The Company provides the following benefits to the workers in addition to the monthly salary and wages which are illustrated below-

- Workers Profit Participation Fund
- Earn Leave Benefit
- Overtime & Bonus
- Medical Facilities
- Medical Insurance Benefit
- Day Care Facility
- Maternity Benefit
- Group Insurance Benefit

The project ensures enough safety measures and good working environment for the workers hired by the conductors/suppliers who work in the project for civil construction and machinery installations.

The Company maintains positive views regarding human resource development. In the garments division practices various vaccination programs for workers and a day care center established for female workers which will be available also in the fabric division.
4.0 General Consideration

Environmental baseline is considered by examining the existing environment of the project site against which potential impacts from development activities of the project both during implementation and operation phases can be compared. Further, the objective of establishing the baseline for Important Environmental Components (IECs) such as water, air, soil, noise is influenced by the project intervention. The following sections describe the existing physical components of the project area.

Baseline Information on the Environment is essential to keep record of the existing environmental condition and to identify the impact; prediction and evaluation of impacts. The task is generally achieved by reviewing all available materials on the project and environmental settings and by performing field reconnaissance of the site or sites of the project. Field Work for collecting data has been carried out by adopting standard method of sampling and analysis in accordance with procedure carried out by recognized agency. Baseline study includes conditions of the physical resources, Environmental, biological resources and socio-economic status of the project area.

The specific objectives of the baseline study were:

- To document the existing condition of physical and biological environment and prevailing socio-economic condition of the project areas;
- To identify the significant environmental and social aspects that are likely to be affected by the proposed project activities; and
- Setting of baseline parameters in order to identify possible adverse and beneficial impacts due to the proposed project activities.

This Chapter describes the baseline physical, biological and social environment of project areas based on the findings of the baseline surveys. The possible environmental impacts of the proposed project have been evaluated against these baseline environmental conditions.

4.1 Project Boundary

It is situated at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. So the site is surrounded by Industrial area, residential area and Road. Total area of the project is 37.65 Bigha. The project site is easily accessible by road.

<table>
<thead>
<tr>
<th>Side</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>North side</td>
<td>Ansar Road &amp; Aswad Composite Mills Limited (Unit-1)</td>
</tr>
<tr>
<td>South Side</td>
<td>Vacant Land, residential area and low lying area</td>
</tr>
<tr>
<td>East Side</td>
<td>8-10 Feet wide rural road and Designtex knitwear Limited</td>
</tr>
<tr>
<td>West side</td>
<td>Vacant Land/ Agricultural Land</td>
</tr>
</tbody>
</table>
Baseline Information of Environment

North side of the project - Ansar Road & Aswad Composite Mills limited (Unit-1)

South Side of the project - low lying area, vacant land, residential area

East Side of the project - Road and Designtex Knitwear Limited
4.2 Physico-Chemical Environments

Physical Environmental Resources include topography, geological, soil, meteorological condition, and hydrology; in the following sections this aspect in the project area is discussed.

4.2.1 Geology and Land

The Project area is located holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. Within the 1 km radius most of the land is used for fisheries, agricultural, bare, industrial and commercial purpose. There are few industry are situated within the periphery of the project. No high rise building, monuments or site of historic archeological interest were observed near the site. Scattered patches of forests are found in the different side of the project. From the nature the surrounding areas, the land use pattern considered as industrial and residential and some are fallow bare land and agricultural land and scattered forest land. There is no other installation of environmental concern exists around the site.

4.2.2 Land use and Soil Composition

The land of the planning area is composed of alluvial soil of the Pleistocene period. The height of the land gradually increases from the east to the west. The Southern part is composed of alluvial soil of the Bongshai River and Turag River. Main Rivers are the Bongshai, The Turag, the Dhaleshwari, the Shitalakhya, the Buriganga, and the Balu River.

The soil formation in Bangladesh is remarkably homogeneous in appearance, both vertically and laterally. It comprises layer of unconsolidated clay, about 10 m thick near Dhaka, but apparently thinner to the east and possibly much thicker in the west of the Rajshahi district. The sand mineralogy in this area is broadly similar to that of the tertiary hill sediments. Mineral contents of the soil are high in quartz, relatively low in feldspar and mica, and with zircon, tourmaline, kyanite, staurolite, sillimanite, and epidote dominating the heavy mineral fractions. The content of easily weatherable minerals ranges from 4 to 9%. The soil of Bangladesh can broadly be classified into seven tracts: (1) Madhupur Tract or Red Soil Tract, (2) Barind Tract, (3) Tista Silt, (4) Brahmaputra Alluvium, (5) Gangetic Alluvium, (6) Coastal Saline Tract, and (7) Hill Tracts. Figure 4.14 shows the position of the project site on the soil tract map of Bangladesh.
Madhupur tract or red soil tract comprises the former greater districts of Dhaka and Mymensingh and some isolated area in Chittagong, Comilla and Sylhet district. The pH Value ranges from 5.5 to 6.0 in the top soil.

### 4.2.3 Meteorology

Bangladesh is located at the central part within the Asiatic monsoon region where the climate is tropical. Relatively small size of the country and generally low-lying area cause moderate spatial variation of temperature, precipitation, relative humidity, wind speeds and other climatic variables.

However, the climate of Bangladesh exhibits pronounced temporal variability. This is because of the moisture-laden monsoon winds flowing predominantly from the south-west during summer and the comparatively dry and colder north-western winds during winter.

There are two marked seasons: the rainy seasons from May to October, during which more than 85% of the total annual rainfall occurs and the dry season from November to April. The beginning of the rainy season vary from year to year, heavy rains may commence anywhere between mid-April and early June and may end anywhere between the end of September and mid-November. Usually winter season is dry with occasional rains. The early summer season is considered from March-April. During summer the air becomes hot with very low humidity. Early summer is also dominated by Baishaki cyclone and rains.

The climatic variables monitored at the Bangladesh Meteorological Organization, Dhaka station have been assumed to represent the climatic condition of the project area. Different meteorological data like rainfall, temperature, relative humidity and wind speeds monitored at the meteorological station in Dhaka are described in the following sub-sections and summarized in Table 4.1.

| Table 4.1: Monthly Averages of Climatic Variables at the Dhaka BMD Station, 2001-2013 |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Month                  | Jan    | Feb    | Mar    | Apr    | May    | Jun    | Jul    | Aug    | Sep    | Oct    | Nov    | Dec    |
| Rainfall (mm)          | 5      | 14     | 29     | 111    | 212    | 326    | 350    | 290    | 316    | 155    | 19     | 11     |
| Mean Temp (°C)         | 18.0   | 21.9   | 26.0   | 28.1   | 28.5   | 28.4   | 28.3   | 28.5   | 28.2   | 27.1   | 23.7   | 19.9   |
| Max Temp (°C)          | 28.3   | 32.3   | 36.0   | 36.7   | 36.5   | 35.7   | 34.8   | 34.8   | 35.0   | 34.8   | 32.3   | 29.2   |
| Min Temp (°C)          | 10.1   | 12.4   | 16.5   | 19.3   | 20.6   | 22.7   | 23.9   | 24.0   | 23.7   | 26.0   | 15.8   | 11.8   |
| Humidity (%)           | 69     | 60     | 59     | 68     | 72     | 80     | 81     | 80     | 76     | 70     | 70     | 71     |
| Sunshine (Hours)       | 5.7    | 7.3    | 7.5    | 7.7    | 6.8    | 3.4    | 4.0    | 4.5    | 4.2    | 5.7    | 6.8    | 5.8    |
| Solar Radiation (Cal/cm²/min) | 166   | 207    | 231    | 244    | 229    | 175    | 189    | 192    | 172    | 183    | 174    | 146    |
| Evaporation (mm/d)     | 2.6    | 4.0    | 5.0    | 5.5    | 5.3    | 4.1    | 3.8    | 3.8    | 3.6    | 3.5    | 3.3    | 2.5    |

*Source: Bangladesh Meteorological Organization (BMO)*
4.2.4. Water Quality

4.2.4.1 Surface Water quality

The primary surface water body in the area is pond; however there are some ditches and canals around the area. As there are substantial industrial and urban activities on the bank of the river and discharges from these are largely unregulated, the water quality of the canal becomes quite poor in the dry seasons but the water quality improves in the rainy season due to dilution from increased flow. The surface water quality parameter in the study area has been tested from GECL Laboratory. The tested parameters are given below in Table 4.2 and Test report is included in Annexure XIV. The GPS location of two samples of surface water was 24°11'33.88" N & 90°24'39.01" E and 24°11'46.52" N & 90°24'41.43" E.

Table 4.2: Analysis of surface water samples collected from different locations of the study areas.

<table>
<thead>
<tr>
<th>SI NO.</th>
<th>Water Quality Parameter</th>
<th>Unit</th>
<th>Concentration Present</th>
<th>DoE (Bangladesh) Standard for Inland Surface Water</th>
<th>Method of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sample 1 (Canal water near Standard Garments)</td>
<td>Sample 2 (Canal Water Near Aswad composite Mills Unit-1)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>pH</td>
<td>-</td>
<td>6.21</td>
<td>6.79</td>
<td>pH Meter</td>
</tr>
<tr>
<td>2</td>
<td>Color</td>
<td>Hazen</td>
<td>17.31</td>
<td>14.21</td>
<td>UV visible conductivity Prove</td>
</tr>
<tr>
<td>3</td>
<td>Turbidity</td>
<td>NTU</td>
<td>39.32</td>
<td>36.21</td>
<td>UV visible</td>
</tr>
<tr>
<td>4</td>
<td>Total Dissolved Solid (TDS)</td>
<td>mg/l</td>
<td>912</td>
<td>778</td>
<td>Vernier conductivity Prove</td>
</tr>
<tr>
<td>5</td>
<td>Chloride (Cl)</td>
<td>mg/l</td>
<td>23.41</td>
<td>32.19</td>
<td>Titrimetric</td>
</tr>
<tr>
<td>6</td>
<td>Total Suspended Solid (TSS)</td>
<td>mg/l</td>
<td>43</td>
<td>65</td>
<td>Gravimetric with 42 no filter paper</td>
</tr>
<tr>
<td>7</td>
<td>Dissolved Oxygen (DO)</td>
<td>mg/l</td>
<td>1.1</td>
<td>0.9</td>
<td>Azide modification</td>
</tr>
<tr>
<td>8</td>
<td>Ammonia-Nitrogen (NH3-N)</td>
<td>mg/l</td>
<td>73</td>
<td>82</td>
<td>UV visible at 410 nm</td>
</tr>
<tr>
<td>9</td>
<td>Biochemical Oxygen Demand (BOD5)</td>
<td>mg/l</td>
<td>86</td>
<td>91</td>
<td>Dilution</td>
</tr>
<tr>
<td>10</td>
<td>Chemical Oxygen Demand (COD)</td>
<td>mg/l</td>
<td>335</td>
<td>357</td>
<td>COD Reflection</td>
</tr>
<tr>
<td>11</td>
<td>Electrical Conductivity (EC) at 25°</td>
<td>µS/cm</td>
<td>1822</td>
<td>1553</td>
<td>Vernier conductivity Prove</td>
</tr>
</tbody>
</table>

Note: Field Sampling, 31st January, 2018
4.2.4.2 Groundwater Quality

Ground water level exists at moderate (generally below 9 m) depth which is being recharged mainly by infiltration of rainwater. Ground water is a stable source of domestics and industrial purposes in this area. Ground water is used for Irrigation purposes in this area. There is no complaint regarding non availability of Ground water in this area. Figure 4.2 shows the location of the TIL project site on the groundwater zoning map of Bangladesh. It can be seen from the map that groundwater is available at the project site around 15.0 - 20.0 m below the ground surface.

Figure 4.2: Location of the TIL project site on the Groundwater Zoning Map 2010 of Bangladesh (map source: Bangladesh Agricultural Development Corporation)

Tosrifa Industries Limited will use ground water for all the purposes. They will need 375 cubic meter water per day. Tosrifa Industries Limited will have Dyeing, washing activities in their facility and have waste water. They have 60 m3/h Biological Effluent Treatment plant to treat waste water from different production process. The Sludge from the ETP has managed as per
DoE Sludge Management Guidelines. The ground water quality parameter in the study area has been tested from Environmental Engineering Laboratory (BUET). The tested result is shown below in Table 4.3 and Ground water test report is included in Annexure- XV.

Table 4.3: Summary of ground water Quality in the study area

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>-</td>
<td>6.45</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>2</td>
<td>Color</td>
<td>Pt-CO</td>
<td>3</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Turbidity</td>
<td>NTU</td>
<td>0.8</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Total Hardness (as CaCO3)</td>
<td>Mg/l</td>
<td>54</td>
<td>200-500</td>
<td>500</td>
</tr>
<tr>
<td>5</td>
<td>Chloride (Cl)</td>
<td>Mg/l</td>
<td>14</td>
<td>150-600</td>
<td>250</td>
</tr>
<tr>
<td>6</td>
<td>Total Dissolved Solid (TDS)</td>
<td>Mg/l</td>
<td>129</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>7</td>
<td>Manganese (Mn)</td>
<td>Mg/l</td>
<td>0.008</td>
<td>0.1</td>
<td>0.4</td>
</tr>
<tr>
<td>8</td>
<td>Iron (Fe)</td>
<td>Mg/l</td>
<td>0.02</td>
<td>0.3-1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>9</td>
<td>Total Coliform (TC)</td>
<td>CFU/100ml</td>
<td>Nil</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Fecal Coliform (FC)</td>
<td>CFU/100ml</td>
<td>Nil</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>Arsenic (As)</td>
<td>Mg/l</td>
<td>0.001</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>12</td>
<td>Amonia-Nitrogen (NH3-N)</td>
<td>Mg/l</td>
<td>&lt;MDL</td>
<td>0.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Note: Field Sampling, 17th August, 2017

4. 2.5 Air Quality

Air quality in the Gazipur City and its adjacent areas is deteriorating from natural and manmade reasons. Air pollution is one of the major environmental pollutions commonly reported in every industrial towns and cities. Air quality standards prescribe pollutant levels (REF: DoE, 1997) that cannot be legally exceeded during a specific time period in a geographical area. The emissions of air pollutants therefore need to be controlled so that the ground level concentrations (GLCs) for these pollutants do not exceed the ambient air quality. Air quality depends on the presence of pollutants in atmosphere in higher concentration than standard. This pollutant includes gases (SO₂, NO₂, CO and SPM).

The local area may be classified as mixed industrial areas defined and found from survey. Air quality, based on analysis carried out by sampling at site shows the SPM, CO, SO₂ & NOx concentrations in the ambient air is far below the allowable limit except SPM. According to the Air quality standard the Suspended Particulate Matter (SPM) is high in the project site because of construction project. The weather was Sunny. Since the wind direction was from the south-east to north-west corner and still has reasonable buffer/assimilation capacity to absorb air pollutants to a certain extent. Therefore, these are within the prescribed limit of the National Air Quality Standards. The analysis report is tested from GECL Laboratory and is furnished...
below in Table-4.4 and Test report is included in **Annexure XVI**. The Table includes the Air pollutants by the existing Project site and figure 4.3. GPS Location of two points of Air quality is 24°11 37.712” N & 90°24 57.197” E and 24°11 40.88” N & 90°24 48.93” E.

Table 4.4: Average Ambient Air Quality inside the project area

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Test Parameter</th>
<th>Units</th>
<th>Method of Analysis</th>
<th>Project Main Gate area</th>
<th>In front of Building 6</th>
<th>DoE’ 2005 Standard for Ambient Air</th>
<th>IFC/World Bank Standard’ 2007</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SO₂</td>
<td>µg/m³</td>
<td>West-Gaek</td>
<td>23</td>
<td>21</td>
<td>365</td>
<td>125</td>
<td>Acceptable</td>
</tr>
<tr>
<td>2</td>
<td>NOₓ</td>
<td>µg/m³</td>
<td>Jacob and Hochheiser</td>
<td>26</td>
<td>29</td>
<td>100</td>
<td>200</td>
<td>Acceptable</td>
</tr>
<tr>
<td>3</td>
<td>CO</td>
<td>µg/m³</td>
<td>CO Meter</td>
<td>176</td>
<td>185</td>
<td>10000</td>
<td>NYS</td>
<td>Acceptable</td>
</tr>
<tr>
<td>4</td>
<td>SPM</td>
<td>µg/m³</td>
<td>Gravimetric</td>
<td>291</td>
<td>283</td>
<td>200</td>
<td>NYS</td>
<td>Not Acceptable</td>
</tr>
<tr>
<td>5</td>
<td>PM₁₀</td>
<td>µg/m³</td>
<td>Gravimetric</td>
<td>91</td>
<td>87</td>
<td>150</td>
<td>150</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>

**Source:** Field Sampling, 17th August, 2017

**Note:** 
SO₂ = Sulfur dioxide;  
(NO+NO₂) = Nitrogen Oxides  
CO = Carbon Monoxide,  
CO₂ = Carbon Dioxide,  
SPM = Suspended Particulate Matter,  
PM₁₀ = Particulate Matter 10,  
NYS= Not Yet Set.
4.2.6 Air Temperature and Humidity

Air temperature is a computation of how hot or cold the air is it. It is the most frequently measured weather parameter. The temperature of the country is related to the period of rainfall. In the month of December – January the temperature remain cold but the temperature is increasing in the month of March, April. We found the temperature of Dhaka from Bangladesh Meteorological Organization during last 13 years (Table 4.5). Here we found maximum temperature 35.6 °C in the year of 2009 and minimum temperature was 21.8 °C in the year of 2003.

Table 4.5: Monthly maximum and minimum temperature near the Project area 2000-2012

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>24.6</td>
<td>25.5</td>
<td>30.9</td>
<td>32.8</td>
<td>32.3</td>
<td>32.5</td>
<td>31.8</td>
<td>32.1</td>
<td>32.0</td>
<td>31.1</td>
<td>29.6</td>
<td>26.4</td>
<td>32.8</td>
<td>24.6</td>
</tr>
<tr>
<td>2001</td>
<td>24.4</td>
<td>28.7</td>
<td>32.7</td>
<td>34.4</td>
<td>32.0</td>
<td>31.0</td>
<td>31.7</td>
<td>32.4</td>
<td>31.9</td>
<td>31.6</td>
<td>28.9</td>
<td>25.9</td>
<td>34.4</td>
<td>24.4</td>
</tr>
</tbody>
</table>
4.2.6.1 Tested Air Temperature and Humidity

According to OSHA 3154 (1998) Standard for Temperature (26.7 °C - 35.0 °C) and Humidity (30% - 60%). The results of the workplace Temperature Level ranges between 33.9 °C to 35.0 °C and Humidity level ranges between 57.9 % RH to 60.0 % RH. The highest temperature level measured is 35.0 °C in Near ETP area and the lowest temperature level measured is 33.9 °C in Near Husk Boiler area. The highest humidity level measured is 60.0 % RH in Near Husk Boiler area and the lowest humidity level measured is 57.9 % RH in Near ETP area.

So the Temperature & Humidity level of Tosrifa Industries Limited was satisfactory and acceptable according to OSHA Standard. The Temperature and Humidity ranges are shown in Table 4.6 and Sampling Picture is shown in Figure 4.4 and Test report is shown in Annexure XVII.

Table 4.6 Show the Temperature and Humidity level Measurement inside the project area.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Sections</th>
<th>Location</th>
<th>Obtained Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Temperature (°C)</td>
</tr>
<tr>
<td>1</td>
<td>North Side of the Project</td>
<td>Around the project area</td>
<td>34.9</td>
</tr>
<tr>
<td>2</td>
<td>East Side of the Project</td>
<td></td>
<td>34.0</td>
</tr>
<tr>
<td>3</td>
<td>South side of the Project</td>
<td></td>
<td>34.7</td>
</tr>
<tr>
<td>4</td>
<td>West side of the Project</td>
<td></td>
<td>34.6</td>
</tr>
<tr>
<td>5</td>
<td>Middle Point of the project</td>
<td></td>
<td>34.4</td>
</tr>
<tr>
<td>6</td>
<td>Construction area</td>
<td></td>
<td>34.8</td>
</tr>
<tr>
<td>7</td>
<td>Near Factory Main gate</td>
<td></td>
<td>34.0</td>
</tr>
<tr>
<td>8</td>
<td>Near Husk Boiler area</td>
<td></td>
<td>33.9</td>
</tr>
<tr>
<td>9</td>
<td>Near ETP area</td>
<td></td>
<td>35.0</td>
</tr>
<tr>
<td>10</td>
<td>Near Main Production building area</td>
<td></td>
<td>34.1</td>
</tr>
</tbody>
</table>

Source: Bangladesh Meteorological Organization (BMO)

Source: Field Sampling, 17th August, 2017

Sampling Picture:
4.2.7 Noise Quality

Existing ambient noise levels in the vicinity of the TIL was monitored using a noise level meter. The sample locations were selected based on factors such as: sensitivity to noise and proximity to the project site. The Environmental quality standard for Bangladesh Noise Control Rules 2006 has set noise guidelines for industrial sites in Bangladesh. Noise level should not exceed 75 dB (A) Leq* in the daytime and 70 dB (A) Leq* at night. Facility operation should ensure in some area that those noises do not exceed more than 50 meters away from the facility. Hearing protection should be provided to workers where noise levels exceed 80 dBA. The Project site has started construction activities and they have many activities. The existing noise levels in the proposed area are within the range of Bangladesh Environmental quality standard for industrial zone. During Field visit maximum and minimum recorded noise level in the site is 62.0 dBA and 79.0 dBA accordingly. The noise level is measured a noise level meter. The noise level test report is incorporated in Annexure XVIII. The Sampling Picture is shown in Figure-4.5. Table 4.7 Show the Noise Level Assessment inside the project area.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Sections</th>
<th>GPS Location</th>
<th>Obtained value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>North Side of the Project</td>
<td>24°11 39.90” N 90°24 51.13” E</td>
<td>66.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>2</td>
<td>East Side of the Project</td>
<td>24°11 36.04” N 90°24 57.54” E</td>
<td>64.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>3</td>
<td>South side of the Project</td>
<td>24°11 39.99” N 90°24 48.70” E</td>
<td>67.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>4</td>
<td>West side of the Project</td>
<td>24°11 44.31” N 90°24 41.71” E</td>
<td>55.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>5</td>
<td>Middle Point of the Project</td>
<td>24°11 41.79” N 90°24 46.65” E</td>
<td>63.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>6</td>
<td>Construction area</td>
<td>24°11 39.76” N 90°24 50.45” E</td>
<td>79.0</td>
<td>Not Acceptable</td>
</tr>
</tbody>
</table>

According to Noise Pollution Control Rules 2006 recommendation value for sound level is 75 and 70 dB (A) Leq* at day and night.
<table>
<thead>
<tr>
<th></th>
<th>Location Description</th>
<th>Latitude</th>
<th>Longitude</th>
<th>dB</th>
<th>Acceptance Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Near Factory Main gate</td>
<td>24°11'35.78&quot; N</td>
<td>90°24'57.20&quot; E</td>
<td>62.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>8</td>
<td>Near Husk Boiler area</td>
<td>24°11'42.83&quot; N</td>
<td>90°24'41.66&quot; E</td>
<td>65.0</td>
<td>Acceptable</td>
</tr>
<tr>
<td>9</td>
<td>Near ETP area</td>
<td>24°11'45.24&quot; N</td>
<td>90°24'44.69&quot; E</td>
<td>68.5</td>
<td>Acceptable</td>
</tr>
<tr>
<td>10</td>
<td>Near Main Production building area</td>
<td>24°11'41.99&quot; N</td>
<td>90°24'46.06&quot; E</td>
<td>66.5</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>

Source: Field Sampling, 17th August, 2017

4.2.8 Soil Quality

This section of the report deals with the soil quality inside the project area. Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitation. Soil quality is said to be a measure of the condition of soil relative to the requirements of one or more biotic species and or to any human need or purpose.

Soil quality reflects how well a soil performs the functions of maintaining biodiversity and productivity, partitioning water and solute flow, filtering and buffering, nutrient cycling, and providing support for plants and other structures. Soil management has a major impact on soil
quality. Tosrifa Industries Limited has tested their soil quality from Bangladesh Council of Scientific and Industrial Research (BCSIR). The Soil sample has collected from 2 points inside the Project area. The result of the soil test is given below table 4.8 and Test Result is shown in Annexure- XIX.
Table 4.8: Soil Test report of Tosrifa Industries Limited

<table>
<thead>
<tr>
<th>SL</th>
<th>Parameters</th>
<th>Results</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sampling-1 Near Production area</td>
<td>Sampling -2 Near Factory Main gate</td>
</tr>
<tr>
<td>1</td>
<td>Arsenic (As)</td>
<td>4.68</td>
<td>3.92 ppm</td>
</tr>
<tr>
<td>2</td>
<td>Cadmium (Cd)</td>
<td>0.99</td>
<td>0.89 ppm</td>
</tr>
<tr>
<td>3</td>
<td>Chromium (Cr)</td>
<td>6.13</td>
<td>14.99 ppm</td>
</tr>
<tr>
<td>4</td>
<td>Lead (Pb)</td>
<td>7.48</td>
<td>19.32 ppm</td>
</tr>
<tr>
<td>5</td>
<td>Mercury (Hg)</td>
<td>26.69</td>
<td>21.58 ppb</td>
</tr>
<tr>
<td>6</td>
<td>pH</td>
<td>3.95</td>
<td>5.14</td>
</tr>
</tbody>
</table>

Sources: Analytical Lab (BCSIR, 2017)

4.2.9 Solid Waste

The solid waste generated during construction and operation phase of the project has been mostly generated by industrial, residential, commercial and institutional sources and activities. The various types of solid wastes are wood and bamboo, wastage rod, pieces of steel etc. The biodegradable and non-biodegradable waste is collected, segregated, transferred, and disposed of as per the standard. Tosrifa Industries Limited will follow the Solid Waste Management procedures during construction which are shown in Figure 4.6.

Figure 4.6: Solid Waste Management of Tosrifa Industries Limited during construction

4.2.10 Seismicity

The Seismic Map of Bangladesh shows the epicenter location have been conformity with the presenting knowledge of faulting and other structural behaviors of the resign. Earthquake event in the shelf zone are random and follow the occurrence of the surface fault. Gazipur is too much vulnerable of earthquake disaster due to some reasons. First of all the population density
is very high in Gazipur city. Secondly, it is predicted that the secondary hazard like fire break out from gas and electricity line will have more disastrous impact after earthquake.

Thirdly, not only building codes are not maintain during construction time of most of the high rise apartment buildings and most garment factory buildings but also they have been constructed without open spaces and most have encroached upon the streets and roadways. As a result, the collapse of these structures will block streets, further hindering rescue operations. But Tosrifa Industries Limited has maintained all the rules and regulations for building/Shed construction.

![Earthquake Zones](image)

**Figure 4.7: Earthquake Zone of Bangladesh**

### 4.3 Biological Environment

#### 4.3.1 Background

This section of the report deals with flora and fauna near the proposed project area. The consultant made ecological assessment of existing flora and fauna around the study area. The study area is rich in plant and faunal diversity. The ecological setting of the project is mostly homestead and roadside vegetation & scattered forests etc. This report is prepared on the basis of field trip, available published and unpublished information. The project site is located outside of the area of the Bhawal National Park and also excluded from forbidder mouza’s of Gazipur District.
4.3.2 Ecological and Conservation Designations

4.3.2.1 Overview
The Bangladesh Wildlife (Preservation) Order, 1973, promulgated under Presidential Order No.23 has been enacted and amended in two phases as the Bangladesh Wildlife (Preservation) Amendment) Act. This provides for the establishment of national parks, wildlife sanctuaries, game reserves, and private game reserves. Each of these designations is briefly described below:

4.3.2.2 National Parks
A National Park is defined in Bangladesh as “a comparatively large area of outstanding scenic or natural beauty, in which the protection of wildlife and preservation of the scenery, flora and fauna in their natural state is the primary objective, and to which the public may be allowed access for recreation, education and research”. Activities prohibited in the country’s National Parks include hunting, trapping, felling, destroying or burning plants or trees, cultivation, mining or pollution of waterways. National Parks does not exist in the Area of Influence (AOI) of the project.

4.3.2.3 Wildlife Sanctuaries
In Bangladesh, Wildlife Sanctuaries represent an area closed to hunting and maintained as an undisturbed breeding ground. Such sites are primarily for the protection of wildlife including all natural resources such as vegetation, soil and water. Under Article 23, Wildlife Sanctuaries are assigned a greater degree of protection than National Parks in Bangladesh although the restrictions on activities are broadly similar. Such establishments are also not available in the AOI.

4.3.2.4 Game Reserves
These represent an area in which wildlife is protected to enable populations of important species to increase. Here the capture of wild animal is prohibited although hunting and shooting may be allowed on a permit basis. The proposed project site is not situated in or near any reserve forest.

4.3.2.5 Private Game Reserves
A private game reserve is an area of land set aside by the owner to broadly fulfill the same purpose as any other game reserve. The owner who shall exercise all the powers of an officer under this Act establishes such areas following application. The proposed project site is not situated in such reserves.

4.3.2.6 Reserve Forest
The Forest Act, 1927, 1994 enables the government to declare any forest or waste land to be reserved for protected forest. Most activities are generally prohibited in reserve forests although certain actions such as the removal of forest produce may be permitted under license in protected forest. Prohibited activities include enlargement of clearings, cultivation and quarrying etc. The existing project site is not situated in or near any reserve forest.
4.3.2.7 Other Designations
Bangladesh is also a party to the Convention concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), which it accepted on 3 August 1983. The Sunderbans mangrove forests, Naluar Haor represent the areas in Bangladesh represent World Heritage Sites/ Ramsar Sites. These sites are located in other districts of Bangladesh and far away from the project AOI.

4.3.2.8 Ecological and Conservation Designations in the Project Area
Location of the project area in relation to the country’s forests and protected areas. No protected habitats or reserve forests occur within 1 km of the site. It is, therefore, concluded that these areas are outside of the project’s AOI.

4.4 Terrestrial Ecology

4.4.1 Terrestrial Flora
There are few patches natural forest near the project site as industrial and commercial establishments is dominating the area. These forestlands of this area are now well conserving; the composition of plant community is slow growing and herbaceous vegetation as well as other flora. Floral Species of the study area are given below in table 4.9.

Table 4.9: Some Floral Species in the study area

<table>
<thead>
<tr>
<th>English Name</th>
<th>Scientific Name</th>
<th>Local Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass</td>
<td><em>Spontaneum</em></td>
<td>Khar</td>
<td>Fuel/Covering</td>
</tr>
<tr>
<td></td>
<td><em>Scharum</em></td>
<td>Gash</td>
<td>Soil binder</td>
</tr>
<tr>
<td></td>
<td><em>Cynodon Dactylon</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lichi</td>
<td><em>Lichi Chinensis</em></td>
<td>Lichu</td>
<td>Fruit</td>
</tr>
<tr>
<td>Mango</td>
<td><em>Mangefira Indica</em></td>
<td>Alm</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Bate Plam</td>
<td><em>Phoenix Sylvestris</em></td>
<td>Khejur</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Black Berry</td>
<td><em>Syzgium Cumin</em></td>
<td>Jam</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Jack Fruit</td>
<td><em>Heterophyllum</em></td>
<td>Khatal</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Cocunut</td>
<td><em>Cocos unifera</em></td>
<td>Pape</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Guaba</td>
<td><em>Pasidium Suajva</em></td>
<td>Piara</td>
<td>Fruit/fuel</td>
</tr>
<tr>
<td>Banana</td>
<td><em>Musa Sepaientum</em></td>
<td>Kala</td>
<td>Fruit/Timber</td>
</tr>
<tr>
<td>Wood Tree</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber/Fuel Wood</td>
<td><em>Shorea Rubasta</em></td>
<td>Shil koroi</td>
<td>Fuel/Timber</td>
</tr>
<tr>
<td>Mehagani</td>
<td><em>Salmalia Malabaricum</em></td>
<td>Shik Cotton</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Visit, 2017
4.4.2 Terrestrial Fauna
A number of species were observed in the AoI including many common birds typical of the open countryside such as the roller Coracaisbenghalensis, and the bee eaters Meliops supercilious, and meliops Orientals, crow, parakeet, eagle, *shalik*, sparrow etc. Besides this avian species, the habitats are likely to have variety of reptile, mammals and invertebrates. No record of wild animals and endangered species are found in the project area. The Faunal Species are shown in Table 4.10 and Fish Species Table 4.11.

**Table 4.10: Faunal Species in the project study areas**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>English Name</th>
<th>Local Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bofo melanostictus</em></td>
<td>Common Toad</td>
<td>Bang</td>
</tr>
<tr>
<td><em>Rana Cyanophyctis</em></td>
<td>Skipper Frog</td>
<td>Bang</td>
</tr>
<tr>
<td><strong>Mammals:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Callosciurus sp</em></td>
<td>Squirrel</td>
<td>Kat Biral</td>
</tr>
<tr>
<td><em>Funmbalus pennant</em></td>
<td>Mongoose</td>
<td>Kat Brial</td>
</tr>
<tr>
<td><em>Herpestes</em></td>
<td>Field Mouse</td>
<td>Bheji</td>
</tr>
<tr>
<td><em>Auropuncatus</em></td>
<td>House Mouse</td>
<td>Idur</td>
</tr>
<tr>
<td><em>Mus musculus</em></td>
<td></td>
<td>Nengti Idur</td>
</tr>
<tr>
<td><strong>Avian:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Copsyclus saularis</em></td>
<td>Ribon</td>
<td>Doel</td>
</tr>
<tr>
<td><em>Corvus splendens</em></td>
<td>House Crow</td>
<td>Kak</td>
</tr>
<tr>
<td><em>Egretta gazatta</em></td>
<td>Great Egret</td>
<td>Baro Bak</td>
</tr>
<tr>
<td><em>Dirrurus adsimilies</em></td>
<td>House Sparrow</td>
<td>Choroi</td>
</tr>
</tbody>
</table>

**Table 4.11: Fish species in the project area**

<table>
<thead>
<tr>
<th>English Name</th>
<th>Scientific Name</th>
<th>Local Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prawn</td>
<td><em>Macrobrachium malcolmsooni</em></td>
<td>Icha</td>
</tr>
<tr>
<td>Cat Fish</td>
<td><em>Mystus Vittatus</em></td>
<td>Tengera</td>
</tr>
<tr>
<td></td>
<td><em>Mystus Vittatus</em></td>
<td>Golisha Tenga</td>
</tr>
<tr>
<td>Major Carp</td>
<td><em>Labeo rohita</em></td>
<td>Rui</td>
</tr>
<tr>
<td></td>
<td><em>Catal catal</em></td>
<td>Catla</td>
</tr>
<tr>
<td></td>
<td><em>Cirrhinus mrigala</em></td>
<td>Mrigal</td>
</tr>
<tr>
<td>Minor Carp</td>
<td><em>Puntius sp</em></td>
<td>Puti</td>
</tr>
<tr>
<td>Snakehead</td>
<td><em>Channa Puncttus</em></td>
<td>Taki</td>
</tr>
<tr>
<td>Eel</td>
<td><em>Mastacembelus armatus</em></td>
<td>Bain</td>
</tr>
</tbody>
</table>

Source: Field Visit, 2017
During the ecological survey some flora and fauna has found in the study area these are given below in figure- 4.8.
Figure 4.8: Floral and Faunal composition in the study area
4.5 Socio Economic Condition

This Section Discuss socio economic condition of the project area. Both Primary and Secondary sources data were utilized for understanding socio economic condition at the project area.

4.5.1 Population and Social Structure

The total population of Gazipur district is 34,039,12 (Male-17,75,310 and Female-16,28,602), sex ratio 109:100, population density 1884/Sq Km and annual growth rate is 5.21% (BBS, 2011).

4.5.2 Living and Cultural Condition

The study area is connected to Dhaka-Mymensingh highway. The Transportation facilities are available in the study area. Most of the branch roads are generally pacca and remaining are kacha road. All kind of heavy vehicles use this highway and light weighted vehicles like Scoter, cars, Rickshaw play on both highway and branch roads.

The Study area located beside the city of Gazipur. Presently it is dedicated area for industrial development. Major housing of this area is of semipaka, multistoried, Kacha. Average Literacy Rate of Gazipur district is 62.60% (Male-66.00% and Female-58.90%), School attendance rate is 42.50% for 5 to 24 years age group. The culture of the area is a composite and has assimilated influences of Hinduism, Buddh, Islam, and Christianity. The Project will not interfere on the physical and cultural heritage.

4.5.3 Agriculture

Agriculture work signifies all activities of holder and his/her labour force doing planning, management, and operation of a holding. It includes land preparation, sowing, weeding, harvesting, feeding and tending livestock & poultry, kitchen gardening, supervising agricultural workers, keeping farm records & accounts, preparing agriculture products for marketing (including packaging), repairing farm equipment, constructing farm buildings & fences, and engaging in land reclamation and improvement and other related activities. It excludes home and other family domestic chores.

4.5.4 Public Health

There are significant numbers of different types of clinic and medicine shops established beside the proposed project area where the doctor also privately practicing. Moreover The Government hospital is not far from the project site.

4.5.5 Industry and Commerce

As Mention earlier, there are a number of different types of industries already existing in the study area. These includes mostly textile, Ready mate garments, Washing, Dyeing etc.
4.5.6 Archeological Heritage

There are no historical sites or Structures of archeological paleontological or architectural significance within the project areas.

4.5.7 Life Pattern

Life pattern near about the project area is good because this area is gradually developed and expanding to job opportunity for local People.

4.6 Social Safeguard

Social safeguard policies are essential tools to prevent and mitigate undue harm to people during the development process. When identifying and designing a project, safeguards should help assess the potential social risks and impacts (positive or negative) associated with a development intervention. TIL requires land area of 1,256.55 decimal where 437.87 decimal owned by TIL and 818.68 decimal taken leased from Northern Knit Limited (NKL) for 25 years. NKL is a sister concern of TIL under common directorship. The lands were purchased from willing sellers at market values over the period from 2005 to 2016. The project has plan to purchase further around 150 decimal land for project requirements from willing sellers at market price. Out of total land area in 1st phase 35% land used for production building and other utility buildings. In 2nd phase 10% land used for knitting building and rest 55% land will be used for internal road, gardens and free spaces. The areas of the project are segmented into different building area are shown in table- 4.12

Table 4.12: Layout description of Tosrifa Industries Limited Project

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Building Name</th>
<th>Area (Sft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Production Building</td>
<td>117,412</td>
</tr>
<tr>
<td>2</td>
<td>Utility Building</td>
<td>18,882</td>
</tr>
<tr>
<td>3</td>
<td>WTP &amp; Chemical Store</td>
<td>33,318</td>
</tr>
<tr>
<td>4</td>
<td>ETP</td>
<td>14,384</td>
</tr>
<tr>
<td>5</td>
<td>Husk Boiler Building</td>
<td>16,750</td>
</tr>
<tr>
<td>6</td>
<td>Knitting Building</td>
<td>81,180</td>
</tr>
<tr>
<td>7</td>
<td>Yarn Store Building</td>
<td>23145</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>305,071</strong></td>
</tr>
</tbody>
</table>

This project is established in a vacant land area owned by villagers around the project. In time of project planning the Company management made an informal baseline survey as like community meeting with the villagers. It appeared that the relevant stakeholders had the positive view to this project. The villagers think that this project will bring about many positive returns for them – job opportunity, increase of economic activities in community, house-rent income form workers who will work in this project, CSR activities of the project and other socio-economic benefits. There were also appeared some negative views as sound pollution, traffic...
congestion, road damage, impacts from labor influx and environmental impact. The project management was able to convince the relevant stakeholders that the Company will take required steps to manage and mitigate the impacts when needed.

4.7 Working Conditions of Labor
Working conditions cover a broad range of topics and issues, from working time (hours of work, rest periods, and work schedules) to remuneration, as well as the physical conditions and mental demands that exist in the workplace. During Construction and Operation, TIL will provide all the facility to workers and have some policy as per Bangladesh Labor Law 2006 and Labor Rules 2015 and World Bank Guidelines.

In dyeing industry, due to heavy physical works, females are not interested to work in dyeing factory but the Company TIL always highly appreciate female workers. It is notable that in garments division of TIL, more than 90% workers are female. When full project completed, in order to consider the woman empowerment in society the Company has plan to employ as much as possible females in suitable administrative jobs in project.

During construction stage the Company tries to recruit as much as possible labors from local community but for skilled workers it needs to bring migrated workers in the project. Out of total 1078 workers in different time periods, 395 from local community and 683 were migrated from outsides. The labor camps were arranged for 534 migrated workers and 149 labors arranged their accommodation in locality around the project. The company tries at level best to manage these migrated workers that they cannot create any kind of negative social and environmental impacts in the local community.

During construction stage, many workers hired by the conductors and suppliers. The wages, salaries and other facilities of the third party hired workers not settled with the Company but settled with the relevant conductors and suppliers.

The project runs for 24 hours dividing 3 shifts 8 hours each. The monthly remuneration for the project is USD 0.08 million. There is no child labor and the project follows minimum wage policy prescribed by labor law of Bangladesh.

The present project worker strength is as under:

<table>
<thead>
<tr>
<th>SL No</th>
<th>Designation</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Workers</td>
<td>143</td>
</tr>
<tr>
<td>2</td>
<td>Security</td>
<td>41</td>
</tr>
<tr>
<td>3</td>
<td>Cook</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Operator</td>
<td>55</td>
</tr>
<tr>
<td>5</td>
<td>Administration Officer</td>
<td>39</td>
</tr>
<tr>
<td>6</td>
<td>Production Staff</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>330</td>
</tr>
</tbody>
</table>
The field survey team visited the Tosrifa Industries Limited at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh and its adjoining areas and collected the ideas of different types of stakeholders about both the adverse and beneficial impacts and its probable mitigation measures. More specifically, this was aimed at improving; the study taking into account, the opinions from the people of the impacted areas. Local community people of concerned areas were identified, contacted and gathered for public consultation meeting. The report included the lists of stakeholders; their name, address, profession, cell number and signature where available and signature sheet of public consultation (Annexure XX and Annexure XXI). The opinion of people that has been recorded during field study and survey are given below. Field Survey form is included in Annexure-XXII.
Survey Summary: The field visit team collected the information from local people as sample basis. The summary of the survey are as under:

- Meeting Date: 27 October 2017
- Meeting Venue: Beraiderchala, Sreepur, Gazipur
- 80% people know about the project, 20% do not know.
- 100% people ensured that there was no forest land in project area before project establishment.
- 100% people ensured that there was no agricultural land in project area before project establishment.
- 95% people think that the local people will be benefited from the project.
- Percentage of public opinion regarding potential impacts:

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Problem</td>
<td>22%</td>
</tr>
<tr>
<td>Air Pollution</td>
<td>30%</td>
</tr>
<tr>
<td>Water Pollution</td>
<td>27%</td>
</tr>
<tr>
<td>Noise Pollution</td>
<td>22%</td>
</tr>
<tr>
<td>All</td>
<td>16%</td>
</tr>
</tbody>
</table>

- Percentage of public opinion regarding risk factors:

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollutions</td>
<td>38%</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>12%</td>
</tr>
<tr>
<td>Health Hazard</td>
<td>31%</td>
</tr>
<tr>
<td>All</td>
<td>13%</td>
</tr>
</tbody>
</table>

- Percentage of public opinion regarding opportunities from the project:

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Opportunity</td>
<td>78%</td>
</tr>
<tr>
<td>Business Opportunity</td>
<td>52%</td>
</tr>
<tr>
<td>Social Development</td>
<td>56%</td>
</tr>
</tbody>
</table>

- Percentage of public opinion regarding demands from the project:

<table>
<thead>
<tr>
<th>Demands</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution free environment</td>
<td>95%</td>
</tr>
<tr>
<td>Job preference for local people</td>
<td>80%</td>
</tr>
<tr>
<td>Road/Communication development</td>
<td>72%</td>
</tr>
</tbody>
</table>

The field visit team also meet the government officials of Rural Development Department, Statistics Department and Fisheries Department in Upazilla Office. The government discussed details to know about the project activities. After discussion they opined that this project will help the local community for their socio-economic development. They also advised to take necessary steps to manage the social and environmental impacts of the project.
Findings of Public Consultation
The findings of the public consultation are as under:

<table>
<thead>
<tr>
<th>Issues Raised by Local Community</th>
<th>Company Views/Commitments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage of local roads for project activities</td>
<td>The company informed the local people that there are other industrial projects in area, so only this project is not only liable for road damage. But the company has plan to sit with other factories of the area that all can collective make a good solution to solve the problem.</td>
</tr>
<tr>
<td>Traffic congestion</td>
<td>It is assured in the meeting that the company will use its extra people to convey its vehicles to solve traffic congestion if made by this project.</td>
</tr>
<tr>
<td>Air pollution</td>
<td>The meeting informed the local people that use of clean fuel for generator will reduce the pollutant concentration in air emission. Proper and regular maintenance of generator will be done. There was a question regarding odor created from ETP. It was informed in the meeting that it will be Biological ETP so there will be no chance of health hazard. Odor Meter will be used to detect the problem and special boundary system will be made to mitigate this impact.</td>
</tr>
<tr>
<td>Water pollution</td>
<td>A state of the art Biological ETP and drainage system have been set-up in the project to manage the water treatment. There will be effective treatment of sewage wastewater streams by proper management.</td>
</tr>
<tr>
<td>Noise pollution</td>
<td>It was informed in the meeting that this project is established with modern noise free machinery. The company assured the local community that they will train the workers to follow the best ways in construction and operation regarding noise problem.</td>
</tr>
<tr>
<td>Job preference for local people</td>
<td>It was ensured in the meeting that the local people will get preference regarding job opportunities in this project.</td>
</tr>
<tr>
<td>Corporate Social Responsibility</td>
<td>It was requested by local people to donate in local mosque which was under construction. The company committed to donate a remarkable fund to build this mosque. According to discussions in the meeting, the company committed to the local community that it will participate in educational and social organizations in this community when need.</td>
</tr>
<tr>
<td>Labor Influx</td>
<td>It was informed in the meeting that general workers will be recruited from local people and there will need to recruit skilled workers from other areas which might create labor influx. These outside workers will accommodate in shelter camps of the project as much as possible and some will accommodate around the project. This type of labor influx will have some positive impacts on local community – as like house-rent income, increase of economic activities in locality, local market development. The company ensured that they will manage its own workers as well as workers hired by suppliers/conductors that they cannot create any kind of problem for local community.</td>
</tr>
</tbody>
</table>

The overall opinions of the participants which expressed during public consultation is positive toward construction and operation of the project. They welcome the project to be implemented as soon as possible.
6.1 General Consideration

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

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

6.2 Scoping impacts

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

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

6.2.1 Checklist of Potential Impact

The Checklist of potential Impact of Tosrifa Industries Limited is given in below table 6.1
<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Action Affecting Environmental Resources</th>
<th>SEIs without mitigation measures</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Selection</td>
<td>Land use value depreciation</td>
<td>×</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Loss of and displacement from homestead land</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of agricultural land</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Damage to nearby operation</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disruption to drainage pattern</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encroachment into precious ecology</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Phase</td>
<td>Generation of dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removal of top soil</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soil erosion</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Siltation of nearby drainage or surface water body</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water pollution from construction waste materials disposal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air emission from construction machineries operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase volume of local traffic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extraction of groundwater</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise generation from construction activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment generation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occurrence of accidental event</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1: Checklist of Potential Impacts
### Identification, Prediction and Evaluation of Potential Impacts and Mitigation

#### Project Phase

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Action Affecting Environmental Resources</th>
<th>SEIs without mitigation measures</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>Minor</td>
<td>Medium</td>
</tr>
<tr>
<td>Operational Phase</td>
<td>Occurrence of disturbance to nearby community and resources</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient air pollution from dust and gaseous emission</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indoor air pollution from in house activities</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface water/ Ground water pollution from sewage disposal</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface water/ Ground water pollution from disposal of liquid effluent from any activities</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise Generation</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibration from odor machine operation</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solid waste generation</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment generation</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occurrence of accidental event and Environmental health and safety issue</td>
<td>×</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase volume of local traffic</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Immigration</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Odor hazard</td>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depreciation of environmental aesthetic</td>
<td>×</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.3 Environmental Impacts Identification and Mitigation Measures

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

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

Anticipated environmental impacts due to project location, construction and operation of the existing Composite textile manufacturing unit have been identified. It can be seen from the checklist that the major environmental components that will be adversely affected by the project activities are air quality, water quality and noise pollution.

Socioeconomic environment is considered to be affected positively of the project activities that had created job opportunities for the local people and the area has developed and commercial activities has increased in the locality. All these impacts have contributed to improve the quality of life of the local community. Mitigation measures of the adversely affected parameters are discussed in the subsequent sections.
Table 6.2: Summary Matrix of Predicted Impacts and Mitigation Measures during construction and operation

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Components</th>
<th>Potential Impacts</th>
<th>Potential Source Of Impact</th>
<th>Controls through EMP &amp; Design</th>
<th>Impact Evaluation</th>
<th>Remedial Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Groundwater Quality</td>
<td>Ground water Contamination</td>
<td>Sewage disposal on land</td>
<td>Effluent sludge to be sent for Suitable disposal</td>
<td>Negative impact on ground water quality envisaged. Not significant</td>
<td>In an unlikely event of soil and groundwater contamination remediation measures shall be implemented.</td>
</tr>
<tr>
<td>02</td>
<td>Groundwater Quality</td>
<td>Ground Water Depletion</td>
<td>Water during the operation phase will be met partly from underground source and partly from recycled water.</td>
<td>Rain &amp; Storm water collection and Holding it in the area. TIL already have the plan of Rain water Harvesting.</td>
<td>Significant impact on ground water quantity because withdrawal of entire water from the aquifer.</td>
<td>ITL will reuse the water for different purpose of the project. TIL Environmental Personnel will trained up the workers about reuse of water</td>
</tr>
<tr>
<td>03</td>
<td>Surface Water Quality</td>
<td>Surface water Contamination</td>
<td>If discharge wastewater to surface water body.</td>
<td>Wastewater treatment scheme developed to treat the waste water so that it can be disposed to environment after proper treatment.</td>
<td>Significant impact on water quality because the facility have dyeing &amp; washing activities.</td>
<td>Used ETP and In case of any event of Discharge of water from the site, the applicable water quality standards will be Maintained as per ECR 1997.</td>
</tr>
<tr>
<td>04</td>
<td>Air Quality</td>
<td>Dust Emissions like SPM, PM10, SOx, NOx, CO2, CO.</td>
<td>Vehicular movement within the TIL, Generator, Chemical handling and operation</td>
<td>Fuel efficient vehicles will be used and proper record of Vehicles will be maintained. Environmental parameter testing will be done periodically and measures will be taken in case of any adverse effect.</td>
<td>Long term significant negative Impact.</td>
<td>Maintain record of vehicles Exhausts from vehicles will be minimized by use of fuel-efficient vehicles. Air filter will be used in generators, masks will be provided to workers.</td>
</tr>
</tbody>
</table>
| 05 | Noise Environment | Noise pollution | Noise from vehicles movement, generator, Boiler, Compressor etc. | Generator, Boiler, Compressor will be made sound proof. | Significant as nearest receptor would be at a distance of 20 m from the noisy area. | Ear plugs and Ear muff will be provided to the workers directly affected from the noise source.

06 | Land Environment | Soil contamination | Dumping of liquid sludge, effluent, domestic waste on land. | Used a functional waste Management system for waste collection, segregation and Disposal. | Since waste is handled on the site, waste dumping would not be allowed. Not Significant. | The waste should be segregated and disposed as per the solid waste management procedure.

07 | Socio-Economic Environment | No displacement | Site operation | Employees will be provided direct employment opportunities. In addition employment opportunities will be provided for persons engaged in operation and maintenance and allied activities. | Beneficial Impact |

08 | Odor Hazards | Odor Pollution | Odor may be generated in the work place due to poor house keeping | Odor may be controlled by proper management of housekeeping | No significant negative Impact. | Maintain good housekeeping Practices

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6.4 Evaluation of Predicted Adverse Impacts & Mitigation Measures

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

6.4.1 Impact due to Project Location

It was earlier mentioned that Tosrifa Industries Limited at at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh is located in their own land which was empty land previously. The site was fully vacant and then developed as required, no abundant structures has been demolished due to construction of the project. If the existing environmental situation is considered as baseline condition, there would be no significant adverse impacts due to project location.

6.4.2 Potential Impacts during Construction phase

A) Impacts on physical Environment

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

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

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

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

6.4.2.3 Solid and Liquid waste generation: In construction time have some solid wastes some are hazardous and some are non-hazardous.
Mitigation Measures:
- Provided space for temporary disposal of solid waste on the site and dispose the wastes properly
- Used 3R Method for solid waste management
- Arrange adequate sanitary facilities for worker
- Monitor/follow up to ensure appropriate waste disposal and sanitation practice by contractor and construction workers.

B) Impact Mitigation on Biological Environment

The site is allocated for setting up industry so minimal impact anticipated on biodiversity. Mitigation Measures:
- Avoid unnecessary cutting of trees
- Allocate space for greenbelt development
- Avoid noisy activities and keep limited illumination during right time

C) Impact Mitigation on socio-economic Environment

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

Mitigation Measures: N/A

6.4.2.5 Accident/exposure to health hazard
Accidental event may occur in construction phase. Mitigation Measures:
- Create awareness on safety issue among workers and contractors.
- Monitor the practice of following safety guidelines by worker and contractor.
- Ensure use of appropriate PPE while working in the construction site.

6.4.3 Potential Impact during operational activities

6.4.3.1 Air pollution

Source of Impacts
Ambient air quality is being affected due to emission of flue gases from the generator. The existing project is using diesel generator. Diesel and gas burning from the operation of generator is affecting the air quality. The situation becomes aggravated when gas, chemicals, contains high percentage of impurities like sulfur, hydrocarbon, nitrogen etc.

The high temperature of flue gas also produces impacts on the air quality in terms of thermal pollution. The combustion of diesel for power generation inevitably results in emission of gaseous pollutants to the atmosphere.
Gaseous pollutants to the atmosphere
The major pollutants of potential concern are sulfur dioxide (SO$_2$), oxides of nitrogen (NOx), carbon monoxide (CO), Carbon dioxide (CO$_2$) emissions cause greenhouse effect giving rise to global temperature.

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

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

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

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

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

Residual Impacts
Residual impacts of noise pollution and vibration can be reduced to a minimum level provided the suggested mitigation measures are undertaken and properly implemented.
6.4.3.3 Water pollution
Water is a vital element for our daily activities. That is why water quality is a principal environmental concern and therefore, understanding the consumption, source and characteristics of the wastewater and selection of adequate treatment options are crucial from the management viewpoint. The main source of water pollution of TIL is dyeing, washing, Domestic and sewerage water.

Mitigation Measures
Most of the measures that is required to minimize impacts of wastewater includes the following-
- Installed ETP to treat waste water
- Limiting overall water consumption
- Effective treatment of sewage wastewater streams by proper management
- Regular monitoring of surface water quality
- Installation of rainwater harvesting system at least of the office buildings.
- Reuse of process water if found viable
- Adopt zero discharge schemes if found feasible.

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

- Poorly disposed waste fabrics, waste paper & especially plastic waste can block drainage;
- Empty chemical drums & containers if not disposed properly can pollute solid & water of the receiving environment;
- Odor emanating from degradable waste especially kitchen waste can pollute local ambient air;
- Poorly managed and disposed kitchen waste can attract dieses vectors;
- Decomposing kitchen waste can pollute local ambient condition;
- Poorly managed electrical, mechanical and chemical wastes can pollute soil, water and air.

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

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

- Solid waste to be handled, managed and disposed according to the waste management regulations;
Waste handling bin to be provided, each bin should have a lid which should always be covered;
- Color code to be used to distinguished Waste bins of different waste;
- Waste to be sorted at source;
- All scrap metal and wood to put in a designated handling area which should be away from active areas, the area should also be marked and labeled appropriately and preferably have some form of enclosure;
- Paving of unpaved areas, regular sprinkling of water on dusty areas and regular sweeping of fine particles from paved areas can address the issue of dust and fine particles emanating from paved and unpaved areas within the facility;
- Daily disposal of food based waste before decomposition and production of odor;
- Plastic waste should be collected and handled separately in closed waste receptacles;
- Prompt maintenance of sewer line, appropriate location of soakage pits away from boreholes will avoid contamination of ground water resources;
- There should be no scattering of waste during transportation disposal to disposal site.

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

**6.4.3.5 Impacts on Health and Safety, Natural & Accidental Incidents**

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

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

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

**Mitigation Measures**

**Chemical Storage and Management**
- In case of chemical storage, proper segregation scheme should be strictly followed.
- Designated storage area with spill collection system.
Layout of the plant is important from environment and safety point of view, location of chemical storage sections should be proper & in line with the emergency management planned.

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

**Occupational Health and Safety**

- The layout of the project should be such that the high-risk zone (such as production, storage of chemicals/products, incinerators etc.) are separated from the low-risk zones (such as administration, laboratories, canteen etc.). Green belt development shall be at the periphery and not within the plant area- the plant area should have an open lawn.
- Road inside the plan area should be broad and spacious so that fire bridges can operate smoothly. All high risk zones must be easily accessible.
- Hazard and risk-prone area should be identified and characterized by conducting risk assessment.
- On-site and off-site risk disaster management plans, based on impact magnitude and its severity, need to be prepared.
- Pre job risk assessment must be done for new and hazardous work. This should be also followed by work permits specifying risks, management option and persons responsible to take corrective actions.
- Personal protective equipment (hand gloves, safety goggles, nose masks and helmets) to be provided to all the employees working in the plant.
- Training for employees to educate them about the hazardous nature of chemicals used in the process.
- Supervision of high risk jobs should be ensured.
- There should be provision for delegation of supervision to ensure more safety.
- Workers can be rotated within jobs so that they not face continuous noise exposure for a long period of time.
- Trained medical personnel and first aid facilities as well as safety equipment such as fire extinguisher and fire alarms to be made available at place of work.
- Medical examinations to be conducted for the workers from time to time. If significant occupational health problems are observed, the management should take appropriate measures.
- Identification and implementation of management procedures including process safety, training, management of change, incident investigation, employee participation, contractor training and oversight.
6.4.4 Impact on Indigenous People
No indigenous or tribal people were observed in the project area and therefore World Bank OP 4.10 will not be triggered.

6.4.5 Impact Due to Land Acquisition
Tosrifa Industries Limited has constructed their buildings on their own land. No Land acquisition is required. therefore World Bank OP-4.12 will not be triggered. So there should be no impact on the baseline condition.

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

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

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

Mitigation Measures:
- Arrangement of labor camps as much as possible that the migrated workers have less impacts in the locality.
- Ensure better living standard of the migrated workers.
- Arrangement of training for migrated regarding impacts of labor influx.
- Recruit as much as possible from local community.
- Strong agreement arrangements with conductors and suppliers that they can manage their workers in such a way that they will not cause any hampers for local people.
6.4.8 Positive impact of the proposed project
Interview with the management and the workers reveals the results of the survey with regard to the impact of the existing project. Almost all the respondents provided positive answers regarding the operation of the project. These people showed their response by stating that they are ready to cooperate with Tosrifa Industries Limited for continuation of the project. Overall impact of the project is positive. It has created a lot of job opportunities for the surrounding people especially for the women. The life standard of these employees has increased because of the project operation. Positive impact has been resulted from implementation of the project which includes:-

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

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

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

7.2 Overview of the Project

Tosrifa Industries Limited is a sister concern of Northern Tosrifa Group is going to establish a LEED certified dyeing project with capacity of 28 MT dyeing per day.

7.3 Environmental and Social Impact Management Action Plan

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

The main benefits of the impacts mitigation plan are:

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

An implementation task list is formed and the important mitigation measures are included there with time frame, assigning responsibility and approximate cost in Table 6.1 and Table 6.2 for construction and operation period accordingly. Here implementation responsibility belongs to project proponent but the project proponent may assign a representative on behalf.
Table 7.1: Environmental and Social Management Action plan for Construction Phases

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Mitigation measures</th>
<th>Time frame</th>
<th>Location</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Air pollution                        | ▪ Surrounded project site by boundary wall  
▪ Access roads and exposed ground should be regularly wetted in a manner that effectively keeps down the dust  
▪ Stockpiles of fine materials should be wetted or covered with tarpaulin during windy conditions  
▪ Use of catalytic converter for fuel burning machineries  
▪ Vehicle and other machinery clear off mud before leaving the site  
▪ Materials covered by tarpaulin while carrying in truck or used covered van                                                                 | Throughout construction phase | Project site   | Representative of project proponent    |
| Noise and Vibration                  | ▪ Construction activities that will generate disturbing sounds should be restricted to normal working hours  
▪ If required local residents should be given noticed of indeed noise activities so as to reduce the degree of annoyances  
▪ Worker use ear plug while working with noisy device.                                                                                   | Throughout construction phase | Project site   | Representative of project proponent    |
| Impact on Ground Water               | ▪ Ensure minimum extraction of ground water  
▪ Wastage of water should be avoided through monitoring  
▪ Develop rain water harvesting system  
▪ Reuse of water  
▪ Harvested Rainwater                                                                                                                      | Throughout construction phase | Project site   | Representative of project proponent    |
| Solid and Liquid waste generation    | ▪ Provide space for temporary disposal of solid waste in the site and dispose the waste properly.  
▪ Arrange adequate sanitation facility for workers  
▪ Follow up to ensure appropriate waste disposal and sanitation practice by contractor and construction workers.                                          | Throughout construction phase | Project site   | Representative of project proponent    |
| Impact on Biodiversity               | ▪ Avoid Unnecessary cutting of Trees  
▪ Allocate space for Green belt Development  
▪ Avoid noisy activities and keep limited light level during night time                                                                 | Throughout construction phase | Project site   | Representative of project proponent    |
<table>
<thead>
<tr>
<th>Impact on Traffic Volume</th>
<th>▪ Control Vehicle movement in organized way and follow local traffic instruction</th>
<th>Throughout construction phase</th>
<th>Material Transport route</th>
<th>Driver</th>
</tr>
</thead>
</table>
| Fire/ Explosion          | ▪ Establish own firefighting system and maintain collaboration with government firefighting and civil defense department locally  
▪ Organize fire drill and training for construction staffs. | Throughout construction phase | Project site | Representative of project proponent |
| Employment Generation    | ▪ N/A                                                                            | Throughout construction phase | Project site | Representative of project proponent |
| Occupational Health and safety Risk | ▪ Create awareness on safety issue among workers and contractors  
▪ Monitoring the practice of following safety guidelines by workers and contractor  
▪ Ensure use of appropriate PPE while working in the construction site and display proper safety sign in the project site  
▪ Electrical Equipment/ wires should be properly maintained during construction | Throughout construction phase | Project site | Representative of project proponent |
| Impact on Labor Influx   | ▪ TIL authority has constructed temporary labor shelter for migrated workers.  
▪ Recruit workers as much as possible from local community.  
▪ TIL has contact agreement with migrated labors for control their behaviors and movements in the local community.  
▪ They have some policy and procedure to control the movements of migrated workers with local people.  
▪ Arrangement of training facilities for workers regarding labor influx issues. | Throughout construction phase | Around Project Site | Representative of project proponent |
### Table 7.2: Environmental and Social Management Action plan for Operational Phases

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Mitigation measures</th>
<th>Time frame</th>
<th>Location</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Water pollution          | ▪ Cooling Water  
▪ Septic tank and soak pit for sewage discharge.  
▪ Maintain cleanliness of production floor and yard  
▪ Proper maintenance and continuation of ETP. Waste water is treated before discharged to natural water. | Throughout operation phase       | Project site   | Representative of project proponent   |
| Sludge Management        | ▪ Sludge will be managed as per DoE Sludge Management Guidelines and detailed action to be taken after operating the ETP.  
▪ Some parameter of the sludge will be test after project operation. | Throughout operation phase       | Project site   | Representative of project proponent   |
| Generation of Solid waste| ▪ Apply 3R method for waste management of the project.  
▪ Trained employees on waste control and disposal procedures.  
▪ Segregates wastes at source and store in demarcated place.  
▪ Use separate demarcated bin for kitchen and office waste and develop waste disposal system.  
▪ Scrap metal, packing materials, plastic, can etc. sale to scrap dealer  
▪ Spent lube sell to DoE approved vendor only. | Throughout operation phase       | Project site   | Representative of project proponent   |
| Noise and Vibration      | ▪ Air plug will be provided to worker while near to noise generating equipments or working in noise area.  
▪ Arrangement for separate generator and compressor room with canopy wall or install canopy shield for generators.  
▪ Procure and use low noise generating machineries.  
▪ Regulation of vehicle movement  
▪ Conduct periodic maintenance of equipment, replace warn out parts lubricate rotating parts.  
▪ Install stock absorber, damper/isolator (where necessary).  
▪ Will procure noise monitoring device and monitor noise condition in and outside the project premises. | Throughout operation phase       | Project site   | Representative of project proponent   |
| Air Pollution            | ▪ Provide adequate ventilation and exhaust fan in the workplace.  
▪ Spry water on bare soil.  
▪ Maintain open air exhaust for generator and set catalytic converter and faulty engine would be repair as soon as possible.  
▪ Regulate movement/speed of vehicle. | Throughout operation phase       | Project site   | Representative of project proponent   |
| Impact on Soil or Land | ▪ Plant tree with dense canopy on boundary line  
▪ Use low VOC chemicals | Throughout operation phase | Project site | Representative of project proponent |
|-----------------------|----------------------------------------------------------------|-------------------------------|--------------|----------------------------------|
| Impact on Soil or Land | ▪ Trained employee on spillage control  
▪ If oil and chemical mixed top soil then separate top soil, store and dispose properly  
▪ Maintain cleanliness of the yard and store solid waste in waste bin.  
▪ Green belt Development for enhancing natural aesthetic of the site | Throughout operation phase | Project site | Representative of project proponent |
| Impact on Traffic Volume | ▪ Control vehicle movement in organized way and follow local traffic instruction | Throughout operation phase | Project site | Representative of project proponent |
| Fire/ Explosion | ▪ Establish own firefighting system and maintain collaboration with government firefighting and civil defense department locally  
▪ Organize fire drill and training for construction staffs. | Throughout operation phase | Project site | Representative of project proponent |
| Occupational Health and safety Risk | ▪ Use of Personal Protective equipment such as Hard helmet, Musk, Boot, Eye glass etc.  
▪ Will formulate health safety measures and ensure use of safety devices  
▪ Aware and train employees on using safety devices | Throughout operation phase | Project site | Representative of project proponent |
| Impact on Labor | To mitigate labor impact of the project, TIL will have a plan some certification on Social and Environmental issue like BSCI, SADEX, WARP, OHSAS 18001 for worker safety, minimum wage, working condition, health and safety, environmental Management etc. To earn theses certifications after proper audit and checkings, the project needs to ensure to meet-up the required compliances regarding labor working conditions. So these kinds of certifications will help the project to mitigate negative impacts on labors. | Throughout operation phase | Project site | Representative of project proponent |
7.4 Environmental Monitoring Programmers

7.4.1 Monitoring Requirement

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

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide a means whereby impacts which were subjected to uncertainty at the time of preparation of EMP, 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 project in future.

There are two basic forms of monitoring:

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

In this case projects in general, monitoring is done by physical measurement of some selected parameters like air, water, noise etc. Some Picture of the ESIA Study and monitoring are included in Annexure- XXIII. It should be mentioned here that the monitoring program should be such so that it can ensure compliance with national environmental regulations and 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. Tosrfa Industries Limited will require that regular monitoring of possible change in environmental parameters to be undertaken during the operational life of the project.

7.4.2 Monitoring Indicators

Keeping in mind the pollution factors, there will be a need to put in place elaborate and sound environmental management system and mechanisms of monitoring on a continuous basis. Undertaking monitoring and auditing of key environmental parameters and putting in place of all approved recommendation of the environmental management plan and conditions of the license will achieve this.

7.4.3 Monitoring Parameters

Environmental Monitoring requires a set of indicators that could be conveniently measured, assess and evaluate periodically to establish trends of impacts. The indicators may be independent or may be functionally related. The monitoring program, in view of the possible impacts as assess earlier, should consider the indicators for the impact assessment related to following issues as presented in the tables in the following pages. Monitoring will involve
measuring, observing, recording and evaluation of physical, socio-economic and ecological variables within the project area and the neighborhood.

It is important for the facility management to set up regular monitoring programs to assess parameters of the environment as stipulated ECR 1997 and Bangladesh Noise Pollution control Rules 2006. This monitoring program will help to identify changes in the environmental situations giving opportunities for adopting appropriate control measures. A comprehensive checklist must be developed for operational usage. The basic activities for a sound-monitoring program should be least include:

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

Environmental and Social Monitoring Plan during Construction and Operation are given below in table 7.3 and 7.4 accordingly.
**Table 7.3: Environmental and Social Monitoring Plan (ESMP) during Project Construction**

<table>
<thead>
<tr>
<th>Activity</th>
<th>What parameter is to be monitored?</th>
<th>Where is the parameter to be monitored?</th>
<th>Frequency of monitoring as suggested in the EMP</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| 1 Noise Pollution and Vibration   | Sound pressure and sound intensity | Different Construction area and Inside the project | - Sound level is monitored by a Sound level meter in different noisy area.  
- During Construction area where the noise is exceed the standard use PPE for worker safety. | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) and Environmental Personnel of TIL |
| 2 Ambient air quality             | SPM, PM10 SO₂, NOₓ, CO             | - Ambient air quality to be monitored by Respirable Dust Sampler with attachment  
- During Construction where the area is exceeding the standard of air quality, use PPE for worker safety, especially musk. | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) & Environmental Personnel of TIL |
| 3 Drinking water quality          | pH, Color, Ammonia-Nitrate, Phosphate, Arsenic, Fecal Coliform, Manganese, TDS, Total Hardness | Drinking water | - Checking water for acceptable levels of parameters according to DoE and World Bank Standard from  
- Drinking water should test from BUET | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) & Environmental Personnel of TIL |
| 4 | Surface Water Quality | pH, Color, Turbidity, Cl, DO, BOD, COD, TDS, TSS, EC, Ammonia-Nitrogen (NH3-N) etc | Few Surface water Parameter to be monitor from GECL environmental laboratory. | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) & Environmental Personnel of TIL |
|---|---|---|---|---|
| 5 | Solid Waste | All the wastage during construction | Inside the project area  
- Training the workers on how to control and minimize the waste  
- Segregates wastes at source and store in demarcated place.  
- Solid waste to be handled, managed and disposed according to the waste management regulations; | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) & Environmental Personnel of TIL |
| 6 | Occupational Health and safety Risk | During construction | Inside the project area  
- Ensuring every worker wearing safety equipments such as hard helmet, Musk, Boot, Eye glass, apron etc.  
- All the fire extinguisher kept up to date and refill as per schedule. | Implementing: Tosrifa Industries Limited  
Supervising/Monitoring: Project Environment Consultant-Global Sustainable Certification Services Ltd. (GSCS) & Environmental Personnel of TIL |
| 7 | Social Impact monitoring on Labor Influx | During construction | Outside the project area  
- Monitoring of labor condition  
- Recruit local labor as much as possible instead of influx labor  
- Monitoring of health and safety issue  
- Monitoring of different trainings for worker | Implementing: Tosrifa Industries Limited |
<table>
<thead>
<tr>
<th>Activity</th>
<th>What parameter is to be monitored?</th>
<th>Where is the parameter to be monitored?</th>
<th>Frequency of monitoring as suggested in the EMP</th>
<th>When is the parameter to be monitored?</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Pollution and Vibration</td>
<td>Sound pressure and sound intensity</td>
<td>Generator, Compressor and boiler room/area, different production area</td>
<td>Sound level is monitored by a Sound level meter in different noise area. - According to intensity of sound ensuring that workers are using ear plugs especially in and near the generator and boiler area/rooms. - Regular maintenance of baffle type silencers in exhaust duct to arrest noise</td>
<td>Half yearly</td>
<td>Implementing: Tosrifa Industries Limited Supervising/Monitoring: Project Environment Consultant- Global Sustainable Certification Services Ltd. (GSCS) and Environmental Personnel of TIL</td>
</tr>
<tr>
<td>Ambient air quality/ Stack air emission</td>
<td>SPM, PM10, SO2, NOx, CO, CO2, O2</td>
<td>Different Production area, Generator and boiler</td>
<td>Stack Air Emission will be monitored by Testo-340 Flue Gas analyzer and Ambient air quality to be monitored by Respirable Dust Sampler with attachment - Checking diesel and gas emissions concentration of pollutants - Ensuring use of natural gas instead of diesel and clean diesel to be used - Proper maintenance of generators and boilers from time to time.</td>
<td>Annually</td>
<td>Implementing: Tosrifa Industries Limited Supervising/Monitoring: Project Environment Consultant- Global Sustainable Certification Services Ltd. (GSCS) , Environmental Personnel of TIL</td>
</tr>
<tr>
<td>Drinking water quality</td>
<td>pH, Color, Ammonia-</td>
<td>Drinking water</td>
<td>Checking water for acceptable levels of parameters according to DoE and</td>
<td>Annually</td>
<td>Implementing: Tosrifa Industries Limited</td>
</tr>
<tr>
<td></td>
<td>Environmental Management Plan</td>
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<tr>
<td>4</td>
<td>Waste Water Quality</td>
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<tr>
<td></td>
<td>pH, DO, BOD5, COD, TDS, TSS, EC etc</td>
<td>Effluent Water</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Checking waste water for acceptable levels of parameters according to DoE and World Bank Standard - Installed Flow Meter in the Inlet and outlet of ETP</td>
<td>Every 3 months later</td>
<td></td>
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<tr>
<td></td>
<td>Implementing: Tosrifa Industries Limited Supervising/ Monitoring: Project Environment Consultant- Global Sustainable Certification Services Ltd. (GSCS) &amp; Environmental Personnel of TIL</td>
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<tr>
<td>5</td>
<td>Sludge Management</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Monitor different parameter of sludge as per DoE Sludge Management Guidelines</td>
<td>ETP Sludge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Sludge should be managed as per DoE Sludge Management Guidelines</td>
<td>As per requirements of DoE Sludge Management Guidelines</td>
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<tr>
<td></td>
<td>Implementing: Tosrifa Industries Limited Supervising/ Monitoring: Project Environment Consultant- Global Sustainable Certification Services Ltd. (GSCS) &amp; Environmental Personnel of TIL</td>
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<tr>
<td>6</td>
<td>Solid Waste</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>All the wastage during operation</td>
<td>Inside the project area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Training the workers on how to control and minimize the waste - Segregates wastes at source and store</td>
<td>Monthly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementing: Tosrifa Industries Limited</td>
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</tbody>
</table>

ESIA Report of Tosrifa Industries Limited at Sreepur, Gazipur
<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Action</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Occupational Health and safety Risk</td>
<td>- Ensuring every worker wearing safety equipments such as hard helmet,</td>
<td>Implementing: Tosrifa Industries Limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Musk, Boot, Eye glass, apron etc.</td>
<td>&amp; Environmental Personnel of TIL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- All the fire extinguisher kept up to date and refill as per schedule.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Record of Fire Drill</td>
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<tr>
<td></td>
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<td>in demarcated place.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>- Solid waste to be handled, managed and disposed according to the waste</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>management regulations;</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Impact on worker or labor</td>
<td>- For worker security TIL will maintain different social standard like</td>
<td>Implementing: Tosrifa Industries Limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BSCI, SADEX, WARP, OSHAS 18001 and Labor Law 2006 and Labor Rules 2015</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>and World Bang Guidelines</td>
<td></td>
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<td></td>
<td>in demarcated place.</td>
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<td></td>
<td></td>
<td>in demarcated place.</td>
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</tr>
</tbody>
</table>
7.5 Environment and Social Management Plan (ESMP)

The purpose of the ESMP is to ensure that social and environmental impacts, risks and liabilities identified during the ESIA process are effectively managed during the construction, operation and closure of the proposed project. The ESMP specifies the mitigation and management measures to which the Proponent is committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled in Table 7.1 and 7.2. The key objectives of the ESMP are to:

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

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

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

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

7.6 Environmental and Social Monitoring Cost

Environmental and Social Monitoring requires a set of indicators that could be conveniently measured, assess and evaluate periodically to establish trends of impacts.

A comprehensive checklist must be developed for operational usage. The basic activities for a sound-monitoring program should be least include:

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

Table 7.5: Environmental Monitoring Cost

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Sector of Monitoring</th>
<th>Cost (Taka)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ETP Implementation and Operation Cost</td>
<td>6,50,00,000.00</td>
</tr>
<tr>
<td>2</td>
<td>Environmental Monitoring Cost</td>
<td>20,00,000.00</td>
</tr>
<tr>
<td>3</td>
<td>Solid Waste Management Cost</td>
<td>35,00,000.00</td>
</tr>
<tr>
<td>4</td>
<td>Occupational Health and Safety related cost</td>
<td>10,00,000.00</td>
</tr>
<tr>
<td>5</td>
<td>Tree Plantation Cost and Environmental Friendly Decorations cost</td>
<td>42,00,000.00</td>
</tr>
</tbody>
</table>
7.7 Institutional Arrangements
TIL shall develop an EHS management cell namely, environmental health and safety Management cell in order to manage all environmental and safety related activities on the Project site. This cell will may be headed by a Manager Environmental Compliance along with supporting staff and their related background. The company organogram are included in Annexure XXIV. TIL shall develop an ETP laboratory during operation of the project. With the existing manpower TIL could easily form environmental management cell. Each individual will have his responsibility and together the cell will perform the following functions:

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

7.8 Information and disclosure
Environmental and social Impact Assessment (ESIA) monitoring report of Tosrifa Industries Limited will be shared with Bangladesh bank on a quarterly basis. The ESIA report of TIL will be disclosed in the website of TIL and Bangladesh Bank.

7.9 Statement of Grievance Redress Policy, Procedure and Mechanism
The purpose of this statement is to define the procedure for managing stakeholder concerns and complaints (referred to as “grievances”) in a planned, timely, and respectful manner.

This grievance mechanism helps Tosrifa Industries Limited (TIL) fulfill the requirements of:

- Environmental and Social Impact Assessment (ESIA) process
- Operational Excellence Management System (OEMS)
- Human Rights Policy
- Labor Law, 2006
- Labor Rules, 2015
- Bangladesh Environment Conservation Act, 1995
- Periodical Public Consultation Meeting Minutes held at project

This grievance mechanism also ensures TIL alignment with best practices in stakeholders engagement.
Internal Grievance Mechanism
Internal Grievance Mechanism will be applicable for all TIL workers and staff members (Internal Stakeholders) working at fabric project.

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

7.9.1 Internal Grievance Mechanism
Tosrifa Industries Limited will be always careful about its workers complaint in an utmost care. The management will always keep in mind towards receive any complaint and find an appropriate solution to make a harmonious relationship between labor and management. In this case, countries existing labor Act and organization own policy will be followed properly.

In the respective project there will be a Workers Participatory Committee (WPC) to avoid any mishandling and deprivation of workers and employee. There will be a meeting of WPC every month to discuss about the working environment and future development of workers and employees. Complaint boxes will be kept in toilets that workers can submit their complaints in secrecy. After every meeting the complaint boxes will be opened in front of the Internal Grievance Committee and the committee will take the proper steps after investigations and analysis. The Internal Grievance Committee will be formed as under:

1. 2 (two) members from Workers Participatory Committee
2. Project Head
3. Head of Human Resource

7.9.2 External Grievance Mechanism
TIL will administer the external grievance mechanism by providing resources to handle correspondence, manage a log, and report to deal with the external stakeholders of the project in need. There will be created an External Grievance Committee, the complaints or any other issues related to external grievance will be submitted to this committee. After discussion with the relevant external stakeholders the committee will take proper measures to solve the issues raised by external stakeholders. The External Grievance Committee will be formed as under:

1. Project Head
2. Head of Admin
3. Compliance Manager
4. Ward Councilor
5. One teacher from local school
6. Imam of local mosque
7. One member from local community
CHAPTER 8
RISK MANAGEMENT AND DISASTER MANAGEMENT PLAN

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

8.1 Hazard categorization and potential hazard points
The potential hazards associated with the construction and functioning of the proposed Tosrifa Industries Limited have been screened and categorized based on some preliminary assessments. The potential hazard points are listed in Tables 8.1 below.

Table 8.1: Potential hazard points possessed in proposed project

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Hazards Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>Machineries which will be used during construction work</td>
</tr>
<tr>
<td>Electrical</td>
<td>Electrical works which will be done during construction work</td>
</tr>
<tr>
<td>Fire and Explosion</td>
<td>Gas pipe line, Production process during operation</td>
</tr>
</tbody>
</table>

8.2 Consequence analysis
The potential hazards, root causes and the consequences were identified through hazard assessment. Moreover, specific safety measures were identified for each of the identified hazards. Given the scope of this study, the findings of the hazard assessment with suggested safety plans are presented in Table 8.2 below.

Table 8.2: Hazard assessment for the proposed project

<table>
<thead>
<tr>
<th>Hazard point</th>
<th>Use</th>
<th>Potential Hazard</th>
<th>Root Causes</th>
<th>Consequence</th>
<th>Suggested Safety measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery and equipment</td>
<td>Site clearance activities</td>
<td>Accident</td>
<td>Unconsciousness, Mechanical failure.</td>
<td>Health injury, life loss</td>
<td>Regular inspection and maintenance</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Heights</td>
<td>Construction of building, steel structure and its foundation, painting works, drilling work, etc</td>
<td>Fall during works</td>
<td>Unconsciousness, Equipment failure.</td>
<td>Health injury, life loss</td>
<td>Fall protection, awareness</td>
</tr>
<tr>
<td>Motor vehicle</td>
<td>Transportation</td>
<td>Noise, accident</td>
<td>Noise from engine running, tire friction, hydraulic</td>
<td></td>
<td>Traffic safety measures, regular</td>
</tr>
</tbody>
</table>
### 8.3 Hazard and Risk Management Plan

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

<table>
<thead>
<tr>
<th>Operation</th>
<th>Hazard</th>
<th>Risk</th>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cutting and welding</strong></td>
<td>Cutting and welding</td>
<td>Unconsciousness</td>
<td>Checking, servicing and maintenance of vehicle, awareness</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td>Gas pipeline</td>
<td>Transports the gas efficiently over long distance</td>
<td>Fire hazard</td>
</tr>
<tr>
<td><strong>Generator</strong></td>
<td>Noise pollution</td>
<td>Generator not covered by canopy</td>
<td>Generator not covered by canopy</td>
</tr>
<tr>
<td><strong>Production process</strong></td>
<td>Use many chemical in the production process</td>
<td>Chemical hazard</td>
<td>Chemical spilled and misuse, accidental release</td>
</tr>
</tbody>
</table>
The plan should include the following:
- Fire safety plan
- Electrocution safety plan
- Medical emergency plan
- Hazardous material management plan

8.4 Emergency Response and Disaster Management Plan

Environmental emergencies are incidents or events that threaten public safety, health, and welfare and include hurricanes, floods, wildfires, industrial plant explosions, chemical spills, acts of terrorism, and others. While these events range in size, location, cause and effect, most have an environmental component. Emergency response is the organizing, coordinating, and directing of available resources in order to respond to the event and bring the emergency under control. The goal of this coordinated response is to protect public health by minimizing the impact of the event on the community and the environment. Purpose of Emergency Response Plan (ERP) is to:
- Assist personnel in determining the appropriate response to emergencies.
- Provide personnel with established procedures and guidelines.
- Notify the appropriate Company Emergency Response Team personnel and regulatory/Govt. agencies.
- Manage public and media relations.
- Notify the next-to-kin of accident victims.
- Promote inter-departmental Communication to ensure a “Companywide” Co-ordinate emergency response.
- Minimize the effects that disruptive events can have on company operations by reducing recovery time and costs.
- Respond to immediate requirements to safeguard the subtending environment and community.

Generally, the initial response is guided by three priorities Ranked in importance these priorities are:
1. People
2. Property
3. Environment

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

I. Emergency
   - Fire
   - Explosion
   - Medical Emergency

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

III. External Factors
- Food poisoning/water
- Sabotage, and
- War.

8.5 Six Steps in emergency response

Step 1)

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

Step 2)
Determine the source/cause of the event resulting to the emergency and prevent further losses.

Step 3)
Conduct an assessment of the incident site for any further information on hazards and remedies.

Step 4)
Initiate redress procedures.

Step 5)
Report the incidence its nature cause impact applied redress procedures and any further assistance required etc. to the appropriate company, government and/or land owner.

Step 6)
Take appropriate steps with respect to hazards to wildlife, other resources and addressing public and media concerns and issues, as applicable. Responses priorities are to protect human lives, property and the environment.

8.6 Emergency procedures in case of fire

1. Sound the alarm by activating the nearest fire alarm pull station and call the Fire Department from a safe location. You can also call the Fire Department, and other key personnel.
2. Alert your neighbors only if you can do so without delaying your exit.
3. Leave the building immediately, close doors behind you as you exit the building and proceed to the designated emergency evacuation meeting location.
4. If you have information on how the fire started or how the alarm was activated, report it to the Fire Department.

Do not try to put out the fire. Use your common sense. Your safety is more important than property.
8.6.1 Fire Extinguishment and Confinement
Fire Extinguishment is the responsibility of the fire department. Only after ensuring that the fire alarm has been activated and the fire department are notified, should an attempt be made to extinguish a small fire.
If a small fire cannot be extinguished with the use of a portable extinguisher or a fixed extinguishing system, or the smoke presents a hazard to the operator, then leave the fire area, ensure the fire department has been notified and wait in a safe area for the fire department.
Attempting to extinguish a fire is a voluntary act. Only person 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.

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

![Different parts of portable extinguisher](image)
8.7 Types of Fire

There are 4 types of fire such as:

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

8.8 Fire Safety Risk Assessment

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

The aims of the fire risk assessment are:

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

The 5 Steps Guide to Fire Safety Risk Assessment

1. Identify the fire risks
   - Sources of ignition
   - Sources of fuel
   - Sources of oxygen
2. Identify people at risk
3. Evaluate, remove, reduce and protect from risk
4. Record, plan, inform, instruct and train
• Record significant findings and action to be done

5. Review
• Keep assessment under review
• Review where necessary

8.9 Managing Fire Safety

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

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

Figure 8.2: Fire Safety Equipment

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

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

- Environmental Quality and Safety Manager (Team Leader)
- One Emergency Manager
- One Fire Safety Manager
- Two Safety Managers
- One Chief Security Officer
- Five Security Officers
- One Chief Medical Officer
- Five Medical Officers
- Ten Rescue Officers
8.12 Disaster Management Plan
The project authority will have to take necessary disaster management plan to protect the properties from water logging / flood etc. In this regard all construction works should be undertaken at a higher level taking the highest flood level into consideration. Disaster may occur if the environmental protection equipment fails works at normal condition. This situation may arise any of the following causes-

- When plant run abnormal situation such as emission level increases than its normal level.
- If liquid waste over flow and pollute the surrounding

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

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

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

This register should includes-
- Fire extinguisher servicing records
- EHS meeting schedules and training records
- Electrical instillation
- Generator inspection and maintenance record
- Waste disposal records
- Inventory Records
- Emergency response procedure.
9.0 Conclusions and Recommendation

9.1 Conclusions

The ESIA study of proposed Tosrifa Industries Limited has been concluded that the all environmental, metrological, geographical, biological aspects are well suited for the project. By adopting all documents of proposed project such as layout, total land, proposed activities (during construction and operational stage), project cost, utilities requirement, transportation mode the team found out the possible impact of project on surrounding environment, socioeconomic condition of project area. Observing all legal issues related to proposed project, the team gave a set of management plan to minimize the negative impacts and enhance the positive impacts. The management plan/mitigation measures have been given to run the proposed plant environment friendly way without damaging ambient conditions. 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 many.

In this study, the effects of the project activities on physico-chemical, ecological and socio-economic (i.e., human interest related) parameters during both construction and operation phases have been assessed. The impacts have been identified, predicted and evaluated, and mitigation measures suggested for both construction and operation phases of the proposed Tosrifa Industries Limited project. The important physico-chemical environmental parameters that are likely to be affected by the project activities include water quality, air quality and noise level.

The study suggests that most of the adverse impacts on the physico-chemical environment could be offset or minimized if the mitigation measures are adequately implemented. Noise level has been identified as a significant potential impact of the proposed Tosrifa Industries Limited during both the construction and operation phases. The noise generated from power Generators and construction activities might become a source of annoyance at the residential area located close to the project site if noise attenuation measures are not taken. Mitigation measures, including installing proper silencers and acoustically designed engine rooms have been suggested in order to reduce noise exposure. High level of noise is expected to be generated within the confines of the construction and generator installations. Prolonged exposure to such high level of noise may cause permanent hearing loss. Therefore, proper protective measures should be adopted during the operation and inspection of this equipment. The project workers should not be exposed to the noise produced by the construction equipment for a prolonged period to prevent permanent hearing loss. A rotational work plan is advised for the workers and operators of this equipment.
Some adverse impact during the construction and operation phase of the plant will come from SPM, NOx and SOx emission from the power generators. Ambient air quality in construction phase especially SPM is high due to different construction activities of the project.

The management of solid waste can become an issue during construction and operation phase. As per the EMP, the solid waste generated from the construction and production unit has to be segregated before sending it for disposal to landfill or selling it to other users. If the solid waste generated from production has leaching characteristics exceeding USEPA limit, special containment measures (such as in a lined pit) need to be adopted by TIL to safely dispose the waste.

There is no significant impact on social as discuss earlier of the chapter. Especially The proposed unit will be constructed within the 37.65 bigha land. No land acquisition is required, No indigenous people will be affected by the project construction and operation, No resettlement has done because it will construct TIL own land, TIL will manage temporary labor influx inside the project. During operation phase, no significant negative impact is anticipated on socio-economic environmental parameters. Significant positive impacts are expected due to improvement in job opportunity in the area. This will help the local people and contribute to the livelihood standard.

During public consultations carried out as a part of the ESIA study, people welcomed the proposed Tosrifa Industries Limited project at holding no. 121/1, Block –H, Word no-07, Beraiderchala, Sreepur, Gazipur, Bangladesh. However, they want to the project authority to improve local people life standard by getting job opportunity, education and medical facility.

9.3 Recommendations

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

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

- TIL should continuously (Preferably annually and half yearly) monitor the air, noise, and temperature and water quality to cope up with their environmental vision.
- TIL should undertake and expanded the tree plantation program inside the project area and surrounding environment.
- TIL workers to be given appropriate personal protective equipments (PPE) especially risky area
- All solid waste to be collected, handle and dispose properly in accordance to applicable waste management regulation.
CHAPTER – 10
REFERENCES

10. Dara, S.S. 1995: Environmental Chemistry and Pollution Control, S. Chand & Company Ltd., New Delhi, India.