Initial Environmental Examination (Final)

Project Number: 46904
August 2012

PRAN Agribusiness Project (Bangladesh)

Prepared by Bureau Veritas (Bangladesh) Pvt Ltd &
Environmental Quality and Management System

INITIAL ENVIRONMENTAL EXAMINATION (IEE)
OF
PRAN AGRICULTURE PROJECT

Prepared for:

Sylvan Agriculture Limited (SAL)

Prepared by:

Bureau Veritas (Bangladesh) Pvt Ltd.

&

Environmental Quality and Management System (EQMS)

Contents

ABBREVIATIONS

ADB	-	Asian development Bank
BARC	-	Bangladesh Agricultural Research Centre
BBS	-	Bangladesh Bureau of Statistics
BMD	-	Bangladesh Meteorology Department
BNBC	-	Bangladesh National Building Code
BOD	-	Biochemical Oxygen Demand
BUET	-	Bangladesh University of Engineering & Technology
BWDB	-	Bangladesh Water Development Board
COD	-	Chemical Oxygen Demand
CWASA	-	Chittagong Water Supply and Sanitation Authority
DAE	-	Department of Agricultural Extension
DO	-	Demand Order
DoE	-	Department of Environment
DoF	-	Department of Fisheries
DPHE	-	Department of Public Health Engineering
DTW	-	Deep Tube-well
DTW	-	Deep Tube-well
EA	-	Environmental Assessment
ECA	-	Environmental Conservation Act
ECL	-	Eastern Cables Ltd
ECL	-	Enviro-Consultants Ltd.
ECR	-	Environmental Conservation Rules
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EMP	-	Environmental Management Plan
EPZ	-	Export Processing Zone
EQS	-	Environmental Quality Survey
FD	-	Forest Department
FGD	-	Focus Group Discussions
FGD	-	Focus Group Discussion
GEM	-	General Electric manufacturing Company Ltd
GOB	-	Government of People's Republic of Bangladesh
HBB	-	Haring Bone Road (Brick Placing Road)
IEE	-	Initial Environmental Examination
IFC	-	International Finance Corporation
LA	-	Land Acquisition
LGED	-	Local Government Engineering Department

MP	-	Environmental Monitoring Plan
MT	-	Metric Ton
NEMAP	-	National Environmental Management Action Plan, 1992
NGO	-	Non Government Organization
PAP	-	Project Affected Person
PDB	-	Power Development Board
PMU	-	Project Management Unit
PWD	-	Public Works Datum
REB	-	Rural Electrification Board
RHD	-	Roads and Highway Department
ROW	-	Right of Way
RPF	-	Resettlement Policy Framework
SAL	-	Sylvan Agriculture Limited
SIA	-	Social Impact Assessment
SIA	-	Social Impact Assessment
SUB	-	State University of Bangladesh
TC	-	Training Centre
TDS	-	Total Dissolve Solids
TOR	-	Terms of Reference
TSP	-	Triple Super Phosphate Company Ltd
TSS	-	Total Suspended Solids
UZ	-	Upazila (Smaller secondary town)
PO	-	Purchase Order
IC	-	Inventory Controller
DIC	-	Depo Inventory Controller
GM	-	General Manager
AGM	-	Assistant General Manager

EXECUTIVE SUMMARY

I). Introduction

The PRAN Agribusiness Project is proposed to have three components: (i) a liquid glucose plant (ii) a flour mill, and (iii) a frozen food processing plant. It will be located in an industrial zone in Danga, 30 kilometers (km) from Dhaka and also an alternative site will be in Olipur, Habiganj District. The development is expected to happen in stages and will take about two years. The liquid glucose plant is expected to produce 45,000 tons of liquid glucose and 45,000 tons of starch annually. The flour mill will produce 54,000 tons of high-grade flour and 36,000 tons of medium-grade flour annually. About 597, 600 pieces of frozen foods will be also being produced daily. The production rate will start at 50% of capacity in the first year and raise 90% by the fifth year. About 1,800 people are expected to be directly employed by the project.

The objective of the assignment is to ensure that the project complies with ADBSafeguard Policy Statement (2009) and other social dimension requirements, as well as with that of the Government of Bangladesh (GoB), which may serve as input in the design of the Project being prepared for possible financing by the ADB. The project will be developed by Sylvan Agriculture Limited (SAL), a newly established company of PRAN.

II). Legislative Considerations

Regulatory requirements toward protection and conservation of environment have been enunciated by the GoB as well as the ADB and pertinent policies and regulations among these requirements are summarized as under:

- GoB Environmental Policy, Regulations, and Guidelines;
- National Environmental Policy, 1992;
- National Environment Management Action Plan, 1995;
- Environment Conservation Act, 1995;
- Environment Conservation Rules, 1997;
- The EIA Guidelines for Industry, 1997;
- Relevant Other National Polices;
- Bangladesh Labor Law, 2006;
- The Asian Development Bank (ADB) Safeguard Policy Statement ('the SPS') 2009.

III). Description of Project

The Project will develop 3 industries in two different sites namely Danga and Olipur, with industrial building and other environmental management facilities in order to

maintain the factory sites in a sustainable and hygienic manner. These facilities will include the following:

- Common amenities like playground for outdoor games, internal roads, tree plantation areas etc.
- Effluent treatment plant
- Storm water drainage
- Water supply system
- Sewerage connecting toilets and waste water
- Solid waste management
- Power supply
- Gas supply
- Telecommunication
- Health and safety measures

Category of the Project: According to ADB guidelines, the Sylvan Agricultural Project can be categorized as environment category "B" for IEE. According to Bangladesh Department of Environment (DOE), the factories can be classified as "Orange B" category. This initial environmental examination (IEE) for the project has been prepared in accordance withADB and the GoB guidelines.

IV). Description of Environment

The baseline data/information has been gathered for the following environmental components:

- Physical
- Biological
- Socio-economical
- Environmental risks

Primary data related to the environmental attributes like air, noise level, soil and water quality have been collected through field sources. Other environmental data/information have been gathered from secondary/ field sources.

A. Danga Site (Flour Mill & Food Processing Industry)

Physical Environment:

The proposed Danga Site (Flour Mill & Food Processing Industry) site of SAL is located at about 30 km far away from the Dhaka City, 10 km from Palash upazila office at Village: Kazir-Char, Union: Danga, UZ: Palash and District: Narshingdi

Total area of the proposed Danga Site (Flour Mill & Food Processing Industry) site is about 5 acres (2 hectares) which will accommodate all industrial building and other facilities.

The project area occurs within the south-central zone where rainfall is above 1,900

millimeters (mm) and temperature range is milder. According to the ambient air quality test results, the value of Suspended Particulate Matter (SPM) at the project area is higher than the standard limit of ECR'97 of DoE. This could be the resultant of the surrounding semi- urban environment and when the road dust is higher especially in the dry season. However, oxides of sulphur (SOx) and oxides of nitrogen NOx are well within the permissible limits as compared to ECR'95 of GoB. The ambient noise level is also higher than the standard limit of ECR'97 (subsequent amendment in 2006).The surface water just beside the site is Shitalkahya River which is good condition according to the biochemical oxygen demand (BOD) test results which are within BOD standard. The concentration levels of pH, Alkanity, Manganese (Mn), Arsenic (As), Iron (Fe), Ammonia Nitrate, Total Hardness, Chloride, Faecel Coliform (FC) and Total Coliform (TC) for tube well water were also found within the acceptable limit set by the DoE GoB for drinking water.

Like other rural areas in Bangladesh, there is no structured drainage system in the project area. During monsoon sewage and domestic waste water of the project area are drained out through the river.

In the northern side there is a LGED road which is mud made. It is connected to the Danga bazaar in the east side and Islam Para village at the west side. Access is through the river as it connects to all major places and nearby communities.

Biological Environment

There are homestead forests around the settlements in the PIA and major species found are Mango, Jackfruit, Coconut, and Banana etc. There are some bushes, woodland dependent wildlife species. The proposed site does not fall under the jurisdiction of any of the protected or sensitive areas in Bangladesh.

Environmental Risks

The project site is located on the relatively highland of Bangladesh and the area is virtually free from even high floods. The project area falls within Zone II, which is comprised of the middle regions of Bangladesh, and is the moderately seismically active region in the country. The site is cyclone and storm surges free zone.

B. Olipur Site (Liquid Glucose Industry)

Physical Environment

The proposed Olipur Site (Liquid Glucose Industry) site of SAL is located about 120 km far from Dhaka at Village: Olipur, Union: Sayestaganj, UZ: Habiganj Sadar and

District: Habiganj. Total area of the proposed Olipur Site site is about 5 acres (2 hectares) which will accommodate industrial building and other facilities. The site is empty with no structures. The proposed Olipur site is located in a mostly agricultural area, along a national highway.

The project area occurs within the south-central zone where rainfall is above 1,900 mm and temperature range is milder. According to the ambient air quality test results, the value of Suspended Particulate Matter (SPM), SOx and NOx are well within the permissible limits as compared to ECR'95 of GoB. The ambient noise level inside the project area was found lower but surrounding silent, mixed and residential zone is higher than the standard limit of ECR'97 (subsequent amendment in 2006). The surface water just beside the site is a canal which is stagnant in dry season. The test results are not in the limit of the BOD standard. And the concentration levels of pH, Alkanity, Manganese (Mn), Arsenic (As), Iron (Fe), Ammonia Nitrate, Total Hardness, Chloride, Faecel Coliform (FC) and Total Coliform (TC) for tube well water were found within the acceptable limit set by the DOE, GoB for drinking water.

Like most rural areas in Bangladesh, there is no structured drainage system in the project area. During monsoon sewage and domestic waste water of the project area are drained out through the river.

Biological Environment

The status of the flora and fauna of the PIA has been determined by specific assessment of both the terrestrial and aquatic environments, review of literature relevant to the location, and identification of species through primary (transit walk, interviews) and secondary sources.

V). Identification and Assessment of Potential Impacts

This IEE aims to predict and quantify the magnitude of impacts, evaluate and assess the importance of the identified changes, and formulate plans to monitor and mitigate the actual changes due to the project.

Impacts Identification: The potential impacts of the project on the environment will occur during the different phases of project cycle viz. pre-construction, construction and operation. The type and magnitude of the impacts however depend on the specific attributes of the given environment.

Key identified potential impacts and their significance is summarized in following table.

Issue	Potential Environmental Impacts
Construction Stage	
Air and dust pollution	– Air quality can be affected by vehicle exhaust emissions and combustion of fuels – Air quality can be affected by emissions from machinery and combustion of fuels – Dust generation from construction sites, material stockpiles and access roads
Noise pollution	– Increased noise quality due to vehicular traffic – Increased noise and vibration may have an impact on nearby sensitive receptors –
Sewage pollution/ sanitation hazard	Lack of proper sanitation facilities may pose health and risk hazards.
Solid waste pollution	Soil and water pollution from the improper management of wastes and excess materials from the construction sites
Landscape	– Construction activities especially earthworks will change topography and disturb the natural rainwater drainage – Change in the local landscape.
Access road facilities/ traffic congestion	Increased traffic use of narrow access road by construction vehicles will affect the movement of normal road traffics and the safety of other road-users
Liquid/ hazardous waste management	Improper storage and handling of fuels, lubricants, chemicals and hazardous materials on-site, and potential spills may pose health hazards or risks to construction workers and contaminate the environment
Construction camp management	– Lack of proper facilities , such as housing, water supply and sanitation pose health hazards and risks to construction workers and substandard living conditions for construction workers – Potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices.

Issue	Potential Environmental Impacts
Occupational health and safety	– Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases), risk factors resulting from human behavior (e.g. STD, HIV etc) and road accidents from construction traffic; – Child and pregnant labor – In case of accidents, lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims – Lack of proper facilities , such as housing, water supply and sanitation pose health hazards and risks to construction workers – Lack of water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene; – Potential risks on health and hygiene of construction workers and general public; and – Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.
Operational Stage	
Industrial Effluent	Water pollution from the liquid glucose plant
Air Pollution	Air emission from processing plants, vehicles, boilers and generators
Noise Pollution	From industrial activities and vehicle loading and unloading
Traffic Control and Safety	Increased vehicle traffic
Odor	From industrial production
Maintenance of Existing Canals	Canal water pollution
Drainage congestion:	Local drainage system may get clogged due to improper management of solid waste, and other materials.
Solid Waste Generation	– Water, air and land pollution

Issue	Potential Environmental Impacts
and Disposal	– Cause diseases to man and other lives – Public health, eyesore, odor – Disease vector proliferation, sanitary problems
Sewage waste	– Causes water- borne diseases

VI). Environmental Management Plan

A. Possible Mitigation Measure

To avoid and minimize the impacts resulting from the activities of the project, measures and management plans, which are essential to mitigate the impacts discussed above, have been proposed. These are based upon appropriate technical design, improvements or adjustments, and policy initiatives including good site operational practices etc. The overall strategy has the following aspects:

- Impact avoidance: Changing project design and construction methods to avoid impacts;
- Impact minimization: Where impacts cannot be avoided, implementing mitigation measures to reduce the impact to acceptable levels; and
- Enhancement: Measures, which, at insignificant cost to the project, give appreciable social or developmental benefits.

The environmental management plan (EMP) has been recommended to highlight the action procedures to avoid/minimize/control the impacts arising out of different project phases i.e. pre-construction, construction and operation. The EMP is elaborately described as a matrix in subsequent chapters of this report.

B. Environmental Monitoring Plan

In accordance with the EMP, an environmental monitoring plan has been developed and presented in this chapter. The contract documents will contain a listing of all required monitoring measures and a time frame for the compliance monitoring of these activities. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction and operation of the Project including the responsible agencies for implementation and supervision.

C. Institutional Arrangement and Capacity Development

List of various key institutions and their roles and responsibilities for implementation of EMP are given in this chapter for capacity building.

PRAN will construct the project and a Project Management Unit (PMU) is responsible for developing and managing the SAL project. Environmental and social consultants/external Environmental and Social Management company will act as a 3rd party to ensure the EMP implementation.

D. Environmental Monitoring Cost

The total cost for implementation of the monitoring is estimated as USD 114,200 for 2 sites during construction and operation phases of the project.

E. Analysis of Alternatives

Due to land scarcity in the country, seeking an alternative site for establishing a industry is quite difficult. Also, land acquisition is a lengthy and complex procedure under the existing Land Acquisition Law of Bangladesh. Not only that, the project conceptual development over alternative sites is quite difficult because delay in overall land acquisition process might create social conflicts and risks for the project. This site has been selected by SAL on its own land and has done all general layout planning. To avoid and minimize the impacts resulting from the activities of the project, it will be designed to adopt appropriate technological design, improvements or adjustments, policy including good site operational practices and applicable EMP etc. The overall strategy shall follow the following sequence:

Impact avoidance & minimization;

- Adequate compensation where impacts are unavoidable; and
- Enhancement Measures – Employment benefit enhancement measures proposed by consultant.

F. Public Consultation

Public consultation (such as focus group discussions, stakeholders' consultations and individual consultations) was undertaken to seek opinions and suggestions from various stakeholders that will provide inputs required to designing, construction and other implementation related issues of boththwo sites of SAL.

The consultation program has been developed including:

- Identification of key stakeholders and group of people for FGDs;
- Consultation with all key stakeholders and focus groups ; and
- Public access to the outcome of the EA process and further information about the project.

G. Conclusions

The IEE studied the environmental baseline conditions for both the sites of SAL in addition to assess potential impacts. The IEE reveals that there will be both negative impacts (mainly temporary during pre construction and construction phases) and positive impacts (during construction and operation phases) of the project. No land acquisitions (LA) are required for both the SAL sites, as the lands identified belongs to PRAN, as well as when improving access roads connecting the sites prior to starting construction.

Implementation of appropriate mitigation measures during preconstruction, construction, and operation phases will address potential negative impacts of the project. To ensure that the identified mitigation measures are implemented these measures will be included in the contracting documents of the project which will specify monitoring and supervision by SAL.

1. INTRODUCTION

'PRAN' started its operation in 1981 as a processor of fruit and vegetable in Bangladesh. Over the years, the company has not only grown in stature but also contributed significantly to the overall socio-economic development of the country."PRAN" is currently one of the most admired food & beverages brand among the millions of people of Bangladesh and other 82 countries of the world where PRAN Products are regularly being exported.

All the PRAN products are produced as per international standards maintaining highest level of quality at every stages of its production process. PRAN is currently producing more than 200 food products under 10 different categories i.e. Juices, Drinks, Mineral Water, Bakery, Carbonated beverages, Snacks, Culinary, Confectionery, Biscuits & Dairy. The company has adopted ISO 9001 as a guiding principle of its management system. The company is complaint to Hazard Analysis Critical Control Points (HACCP) of ISO and certified with HALAL which ensures only the best quality products reaches consumers table across the globe.PRAN corporate mission is stated as "Poverty & hunger are curses"while PRAN vision is "Improving Livelihood, which aim to generate employment and earn dignity& self respect for Bangladesh peoplethrough profitable enterprises.

The PRAN Agribusiness Project will be developed by Sylvan Agriculture Limited (SAL), a newly established company of PRAN. The project is proposed to have three components: (i) a liquid glucose plant (ii) a flour mill, and (iii) a frozen food processing plant. It will be located in an industrial zone in Danga, 30 km from Dhaka and also an alternative site will be in Olipur, Habihang District. The development is expected to happen in stages and will take about two years. The liquid glucose plant is expected to produce 45,000 tons of liquid glucose, 45,000 tons of starch, and 22,500 tons of husk, germ and gluten. The flour mill can produce 54,000 tons of high-grade flour and 36,000 tons of medium-grade flour. About 179,800 pieces of frozen foods will be also being produced annually. The production rate will start at 50% of capacity in the first year and raise 90% by the fifth year. About 1,800 people are expected to be directly employed by the project.

The objective this initial environmental examination is to ensure that the project compiles with ADBSafeguard Policy Statement (2009) and other social dimension requirements as well as with that of the Government of Bangladesh's, which may serve as input in the design of the Project being prepared for possible financing by the ADB.

2. ENVIRONMENTAL POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Regulatory requirements toward protection and conservation of environment and various environmental resources and also toward protection of social environment from adverse impact of projects and activities associated with them have been enunciated by the GoB as well as the co- financiers Pertinent among these requirements are summarized as under.

A. Bangladesh Environmental Policy, Regulations, and Guidelines

1.1. Government Environmental Policy, Regulations, and Guidelines

1.1.1. National Environmental Policy, 1992

The Bangladesh National Environmental Policy, approved in May 1992, sets out the basic framework for environmental action together with a set of broad sectoral action guidelines. Key elements of the Policy are:

- ¬ Maintaining ecological balance and ensuring sustainable development of the country through protection and conservation of the environment
- ¬ Protecting the country from natural disasters
- ¬ Identifying and regulating all activities that pollute and destroy the environment
- ¬ Ensuring environment-friendly development in all sectors
- ¬ Ensuring sustainable and environmentally sound management of the natural resources
- ¬ Maintaining active association, as far as possible, with all international initiatives related to environment

The Environmental Policy of 1992, which amongst other policies, seeks to ensure that transport systems, including roads and inland waterways, do not pollute the environment or degrade resources.

The Policy states that Environmental Impact Assessments (EIA) should be conducted before projects are undertaken.

1.1.2. National Environment Management Action Plan (NEMAP), 1995

The National Environmental Management Action Plan (NEMAP) is a wide-ranging and multi- faceted plan, which builds on and extends the statements, set out in the National Environmental Policy. NEMAP was developed to address issues and

management requirements during the period 1995 to 2005, and set out of the framework within which the recommendations of the National Conservation Strategy are to be implemented. NEMAP was developed based on the following broad objectives:

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

To this end, it has grouped all the relevant necessary actions under four heads: institutional, sectoral, location-specific and long-term issues. The institutional aspects reflect the need of inter- sectoral cooperation to tackle environmental problems those need new and appropriate institutional mechanisms at national and local levels. The sectoral aspects reflect the way the Ministries and agencies are organized and make it easier to identify the agency to carry out the recommended actions. The location-specific aspect focuses on particularly acute environmental problems at local levels that need to be addressed on a priority basis. The long-term issues include environmental degradation of such degree that it might become more serious and threatening than they seem to be if their cognizance is not immediately taken.

1.1.3. The Environment Conservation Act, 1995 (subsequent amendments in 2000 and 2002)

The provisions of the Act authorize the Director General (DG) of Department of Environment to undertake any activity he deems fit and necessary to conserve and enhance the quality of environment and to control, prevent and mitigate pollution. The main highlights of the act are:

- ¬ Declaration of Ecologically Critical Areas;
- ¬ Obtaining Environmental Clearance Certificate;
- ¬ Regulation with respect to vehicles emitting smoke harmful for the environment;
- ¬ Regulation of development activities from environmental perspective;
- ¬ Promulgation of standards for quality of air, water, noise, and soils for different areas and for different purposes;
- ¬ Promulgation of acceptable limits for discharging and emitting waste;
- ¬ Formulation of environmental guidelines relating to control and mitigation of environmental pollution, conservation and improvement of environment

1.1.4. Environment Conservation Rules, 1997 (subsequent amendments in 2002 and 2003)

The Environment Conservation Rules, 1997 are the first set of rules promulgated under the Environment Conservation Act, 1995. These Rules provide for, inter alia, the following:

- The national Environmental Quality Standards (EQS) for ambient air, surface water, groundwater, drinking water, industrial effluents, emissions, noise and vehicular exhaust;
- Categorization of industries, development projects and other activities on the basis of actual (for existing industries/development projects/activities) and anticipated (for proposed industries/development projects/activities) pollution load;
- Procedure for obtaining environmental clearance;
- Requirement for undertaking IEE and EIA as well as formulating EMP according to categories of industries/development projects/activities;
- Procedure for damage-claim by persons affected or likely to be affected due to polluting activities or activities causing hindrance to normal civic life.

Depending upon location, size and severity of pollution loads, projects/activities have been classified in ECR, 1997 into four categories: Green, Orange A, Orange B and Red respectively, to nil, minor, medium and severe impacts on important environmental components (IECs).

1.1.5. The EIA Guidelines for Industry, 1997

The EIA Guidelines is a handbook for procedures for preparing the EIAs and for reviewing them for the benefit of the development partners, EIA Consultants, reviewers, and academicians. While preparing these guidelines, the present environmental status as well as the need for rapid economic development of Bangladesh has been kept in view. These considerations have essentially resulted in simpler procedures to be followed for preparing the EIAs and their review.

1.2. Relevant National Polices

Exhibit 1 presents an outline of the other national legal instruments that will have relevance to development project with respect to the social and environment considerations. The IEE is prepared in compliance with these national policies.

Exhibit 1. National Legal Instruments

Act/Rule/Law/Ordinance	*Responsible Agency- Ministry/Authority*	*Key Features-Potential Applicability*
Environment Court Act, 2000 and subsequent amendments in 2002	Ministry of Environment and Forest	¬ GOB has given highest priority to environment pollution and passed 'Environment Court Act, 2000 for completing environment related legal proceedings effectively
The National Water Policy, **1999**	Ministry of Water Resources	¬ Protection, restoration and enhancement of water resources; ¬ Protection of water quality, including strengthening regulations concerning agrochemicals and industrial effluent; ¬ Sanitation and potable water; ¬ Fish and fisheries; and ¬ Participation of local communities in all water sector development.
The Brick Burning (Control) **Act, 1989** **The Brick Burning (Control)** **Amendment Act, 1992 and** **2001**	Ministry of Environment and Forest	¬ Control of brick burning ¬ Requires a license from the MoEF for operation; ¬ Restricts brick burning with fuel wood
Water Supply and Sanitation Act, 1996	Ministry of Local Government, Rural Development and Cooperatives	¬ Management and Control of water supply and sanitation in urban areas.

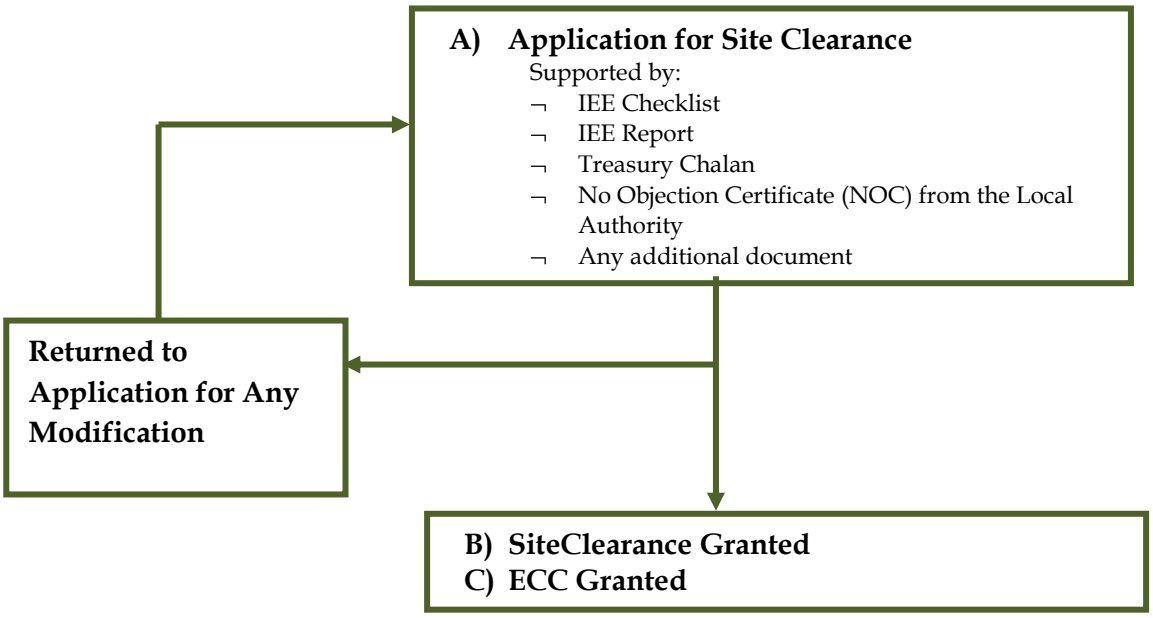
The Ground Water **Management Ordinance 1985**	Upazila Parishad	¬ Management of ground waterresources; ¬ Tube well shall not be installedin any place without the licensegranted by Upazila Parishad
The Protection and **Conservation of Fish Act 1950** **subsequent amendments in** **1982**	Ministry of Fisheries and Livestock	¬ Protection and Conservation of fishes inGovernment owned water bodies
National Fisheries Policy, **1998**	Ministry of Fisheries and Livestock	¬ Preservation, management and exploitation of fisheriesresources in inland open water; ¬ Fish cultivation and management in inland closed water; ¬ Prawn and fish cultivation in coastal areas; and ¬ Preservation, management and exploitation of sea fishery resources
The Acquisition and **Requisition of Immovable** **Property Ordinance 1982 and** **subsequent amendments in** **1994, 1995 and 2004**	Ministry of Land	¬ Current GoB Act and Guidelines, relating to acquisition and requisition of land.
The Factories Act, 1965 **Bangladesh Labour Law, 2006**	Ministry of Labor	¬ This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and

		reasonable working conditions.
National Agriculture Policy, **1999**	Ministry of Agriculture	¬ The act deals with the programs related to make the nation self-sufficient in food through increasing production of all crops, including cereals, and ensure a dependable food security system for all

1.3. Environmental Clearance

The Department of Environment (DoE), the technical arm of the Ministry of Environment and Forest (MoEF) is the regulatory body and the enforcement agency of all environmental related activities. Like all other projects, this project also needs to meet the requirement of the DOE. The project fall under Category "**Orange B**", so an Initial environmental examination (IEE) study needs to be undertaken for obtaining the environmental clearance. As per ECR 1997, steps to be followed for obtaining Environmental Clearance Certificate (ECC).

Exhibit 2. Process of Getting ECC at DoE for Orange B Category



B. Environmental and Social Requirements of the Asian DevelopmentBank

The Asian Development Bank (ADB) Safeguard Policy Statement ('the SPS') 2009 sets out the requirements for ADB's operations to undertake an environmental assessment for projects funded by the bank. The goal of the SPS is to promote the sustainability of project outcomes through protecting the environment and people from potential adverse impacts. The overall objectives of the SPS are to:

i) avoid adverse impacts of projects on the environment and affected people, where possible;
ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is impossible; and
iii) help borrowers/clients strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

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

i) Environmental Safeguards;
ii) Involuntary Resettlement Safeguards along with those vis-à-vis Land Acquisition; and
iii) Indigenous Peoples Safeguards.

ADB implements the SPS through the safeguard review procedures as outlined in Section F1/OP of its Operation Manual (OM) and the documents cited therein. However, the third area of the above three areas is beyond the scope of consideration for this particular project Sylvanas the project area does not involve any indigenous peoples.

The proposed Sylvan Agriculture Limited falls under Category Bfollowing ADB SPS (2009) and required an IEE. The IEE includes an Environmental Management Plan (EMP) that outlines specific mitigation measures, environmental monitoring requirements, and related institutional arrangements, including budget requirements. With regards socio-economic impacts, ADB screens all projects to determine whether or not they involve involuntary resettlement or have potential impacts on Indigenous Peoples. A project's involuntary resettlement category is determined by the category of its most sensitive component in terms of involuntary resettlement impacts. The Involuntary Resettlement Impacts of an ADB-supported project are considered significant if "...200 or more persons experience major impacts, which are defined as (i) being physically displaced from housing, or (ii) losing 10% or more of their productive assets (income generating)." The level of detail and comprehensiveness of the Resettlement Plan (RP) are commensurate with the significance of the potential impacts and risks.

In line with ADB's Public Communications Policy, relevant information (whether positive or negative) about social and environmental safeguard issues is to be made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the general public, so they can provide meaningful inputs into project design and implementation.

C. International Finance Corporation (IFC)' World Bank Group; Environmental, Health, and Safety Guidelines (Food and Beverage Processing)

These guidelines cover the processing of meat, vegetable, and fruit raw materials into value-added food and beverage products for human consumption. Meat and poultry slaughtering and processing activities, from reception of the animals until the carcasses are ready for sale or further processing, are covered in the EHS Guidelines for Meat Processing and the EHS Guidelines for Poultry Processing.

Environmental issues in food and beverage processing facilities primarily include the following:

I). Solid waste
II). Wastewater
III). Energy consumption
IV). Emissions to air

Exhibit 3. Effluent Standard level for food and beverage processing project

Pollutants	Units	Guideline Value	
		IFC Standard	DoE standard for (Inland Surface Water)
pH	-	6 – 9	6 – 9
BOD5	mg/l	50	150
COD	mg/l	250	200
Total nitrogen	mg/l	10	50
Total phosphorus	mg/l	2	8
Oil and grease	mg/l	10	10
Total suspended solids	mg/l	50	150
Temperature increase	°C	<3[b]	-
Total coliform bacteria	MPN[a] / 100 ml	400	-
Active Ingredients / Antibiotics	To be determined on a case specific basis		-

Notes:
a MPN = Most Probable Number
b At the edge of a scientifically established mixing zone which takes into account ambient water
Inland Surface Water means drains/ponds/tanks/water bodies/ditches, canals, rivers, springs and estuaries.

3. PROJECT DESCRIPTION

3.1 Type of the Project

The Project will develop 3 industries in two different sites with infrastructure facilities and other environmental management facilities in order to maintain the factory sites in a sustainable and hygienic manner. These facilities will include the following:

- Common amenities like playground for outdoor games, internal roads, tree plantation areas etc
- Effluent treatment plant
- Storm water drainage
- Water supply system
- Sewerage connecting toilets and waste water
- Solid waste management
- Power supply
- Gas supply
- Telecommunication
- Health and safety measures.

3.2 Category of the Project

According to ADB guidelines, the Sylvan Agricultural Project can be categorized as environment category "B" for IEE. According to the DoE, the factories can be classified as "Orange B" category. However, IEE for the industry has been prepared according to ADB and the GoB guidelines.

3.3 Location of the SAL Sites

As mentioned earlier, 2 sites are located in Narshingdi and Habiganj District .The location and details of the proposed both SAL sites are shown in the following Exhibit 4.

Exhibit 4. Location and Details of the Proposed two SAL Sites

Sites	Coordinates	Area acres	Vill./Ward	Union/Ward	Upazila/Thana (Sub-district)	District
Flour Mill & Food Processing Industry	N 23°53.952 E 90°34.410	5	Kazir Char	Danga	Palash	Narshingdi
Liquid Glucose Mill	N24° 16.263 E 91°22.962	5	Olipur	Nurpur	Habiganj Sadar	Habiganj

Source: EQMS Field survey

3.4 Description of the TwoSAL Sites

3.4.1 DangaSite (Flour Mill and Food Processing Industry)

The proposed Danga Site (Flour Mill and Food Processing Industry) site of SAL is located at about 30 km far away from the Dhaka City, 10km from Palash upazila officeat Village: Kazir-Char, Union: Danga, UZ: Palash and District: Narshingdi. The Project Location has been demarcated in Exhibit 5 (district map) and Exhibit 6 (Upazila map).

The total area of the proposed Danga Site is about 5 acres (2 hectares) which will accommodate industrial buildings and other facilities. The site is located beside the Sitalkhaya River. The land is plain with no structure and waspurchased by the SAL in 2011. No new land acquisition is required for this site.

The total land area has been acquired and purchased by the PRAN group in the name of Sylvan Agricultural Limited from the local people by the standard procedure of the government. PRAN settled the value of the land with the local people, who are the owners of the land, and compensated them accordingly.

3.4.2 Olipur Site (Liquid Glucose Industry)

The proposed Olipur Site (Liquid Glucose Industry) site of SAL is located at about 120 km from Dhaka at Village: Olipur, Union: Sayestaganj, UZ: HabiganjSadar and District: Habiganj. TheProject Location has been demarcated in Exhibit 4 (district map) and Exhibit 5 (Upazila map).

The total area of the proposed Olipur Site is about 5 acres (2 hectares which will accommodate the industrial buildings and other facilities.The site is empty with no structures. The land of the site is flat and previously agricultural.

The proposed Olipur site is located in mostlyrural area and along the national highway. The land is predominantly agricultural

The total land area has been purchased by the PRAN group in the name of Sylvan Agricultural Limited from the local people by the standard procedure of the government. PRAN settled the value of the land with the local people, who are the owners of the land, and compensated them accordingly.

Exhibit 5. Danga Location in Narshingdi District Map

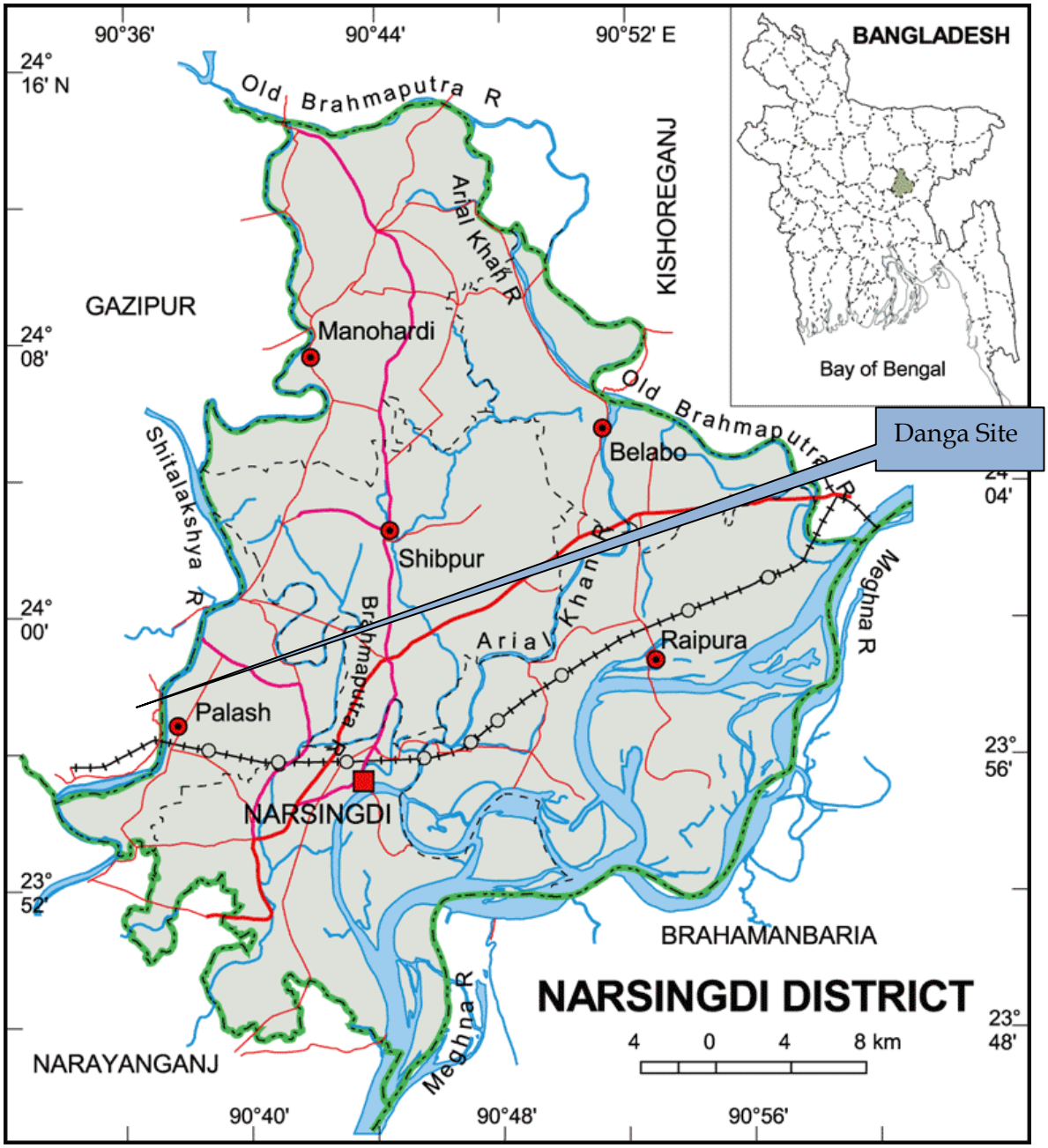


Exhibit 6. Danga Location in Palash Upazila Map

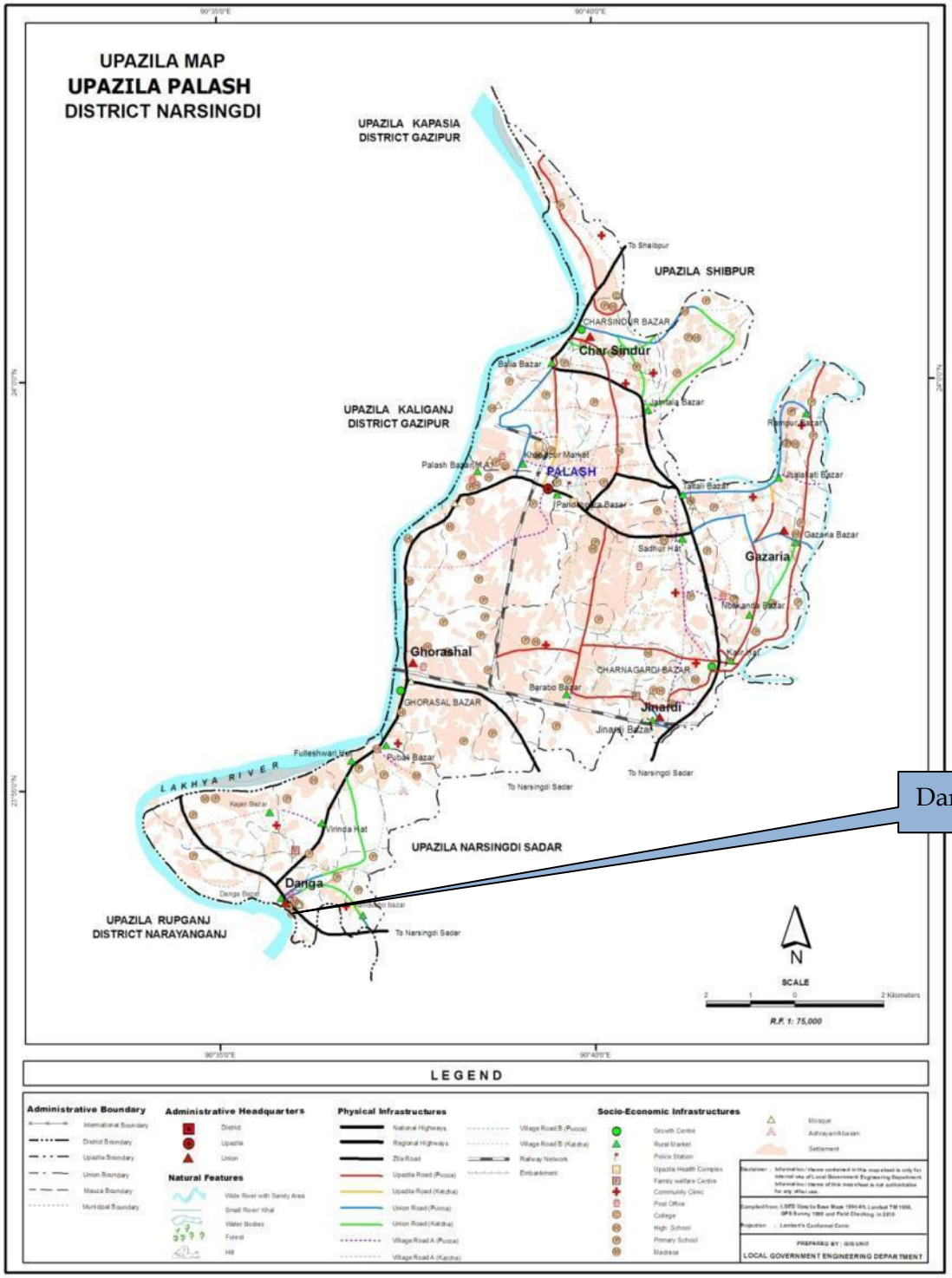


Exhibit 7. Location in Habiganj District Map

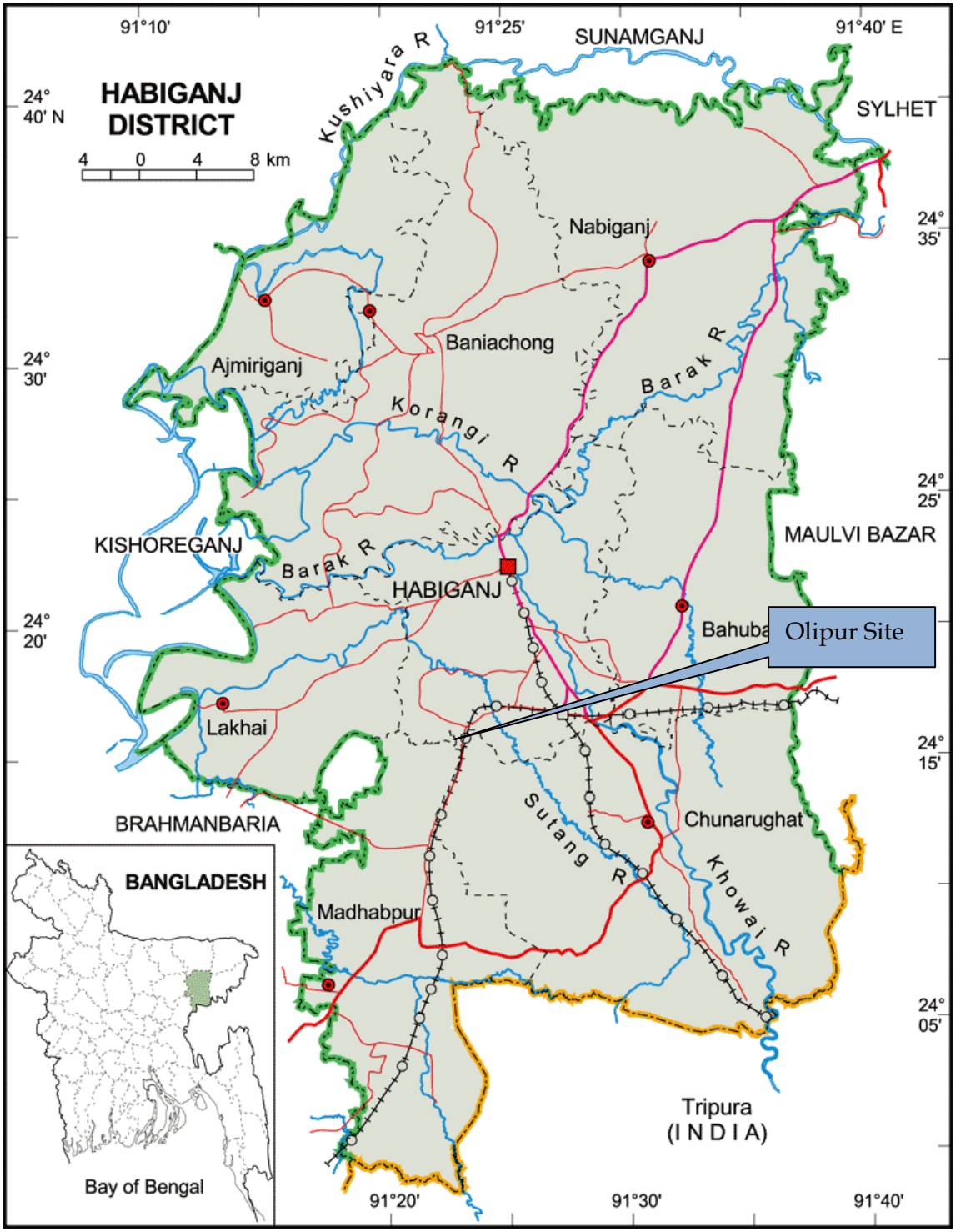
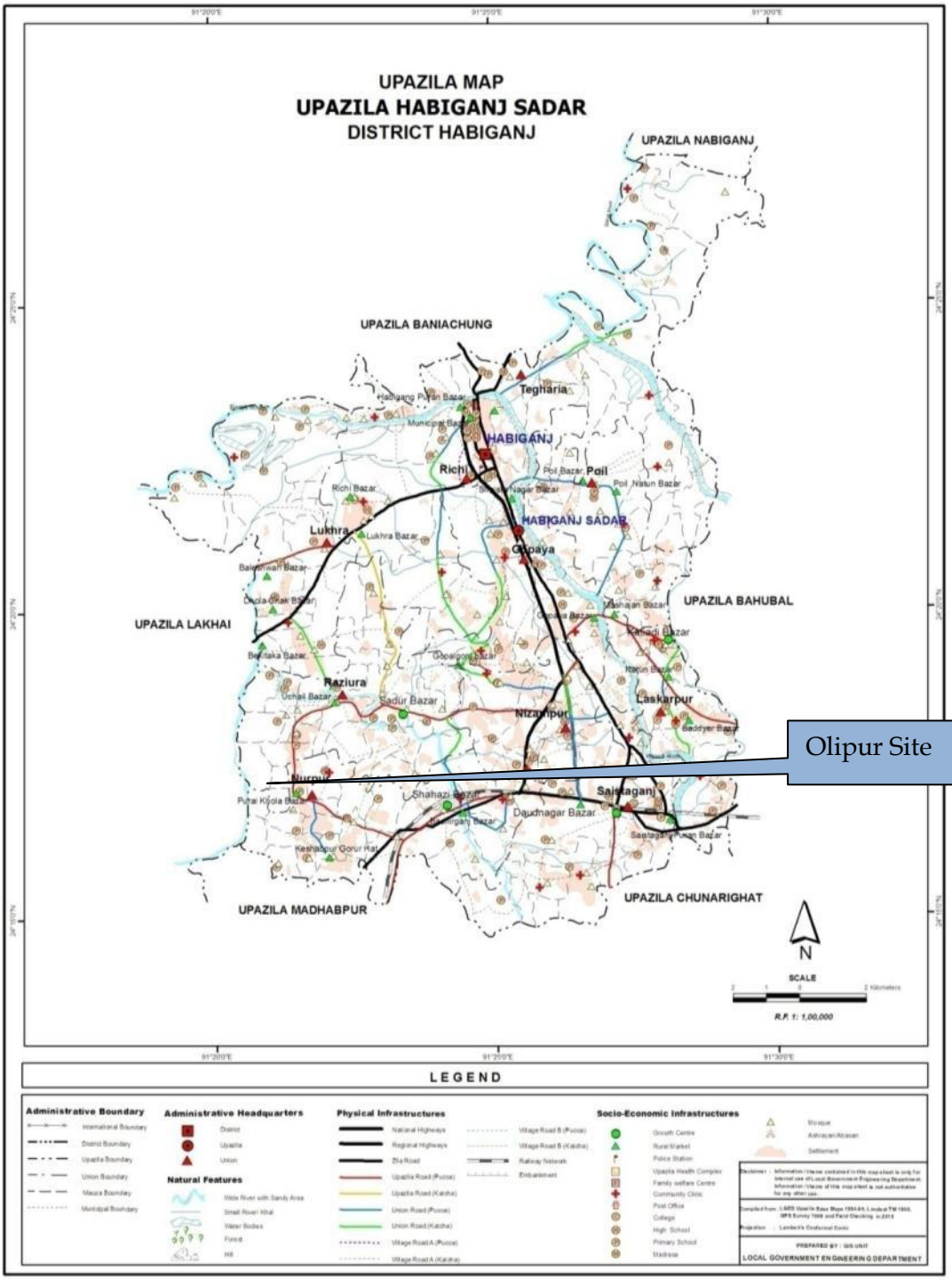


Exhibit 8. Olipur Location in Habiganj Sadar Upazila Map



3.5 Project Components

3.5.1 Danga Site

There will be two industries in Danga site: Flour Mill and Food processing industry. The details of these factories are given below:

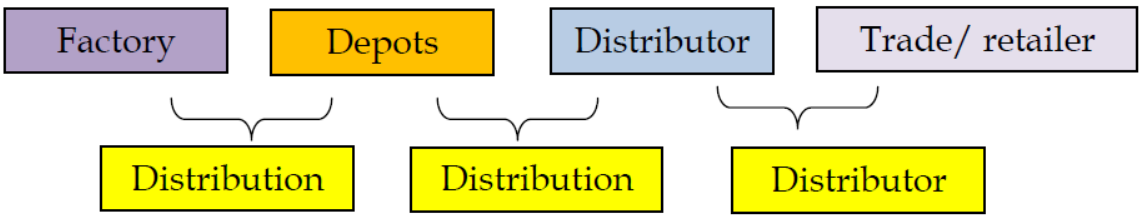
A. Flour Mill

The daily production capacity of the project is given below:

Series No.	Product Name	CAPACITY		
		Unit	Volume/day	Volume/annual
1	High Grade Flour	MT	180	54,000
2	Medium Grade Flour	MT	120	36,000

The production flow will be:

- Distribution ensures finished products from Factory to depots for further distribution to the Dealers all over Bangladesh.
- Sales admin receives the DO from dealers, collate the orders and instruct the Depots to dispatch products to respective Dealer's.
- Dealers Send DOs to Sales Admin Section at Head Office.
- This ordering and PO clearance process is managed by Oracle software.
- Distribution dept is headed by 1 GM and 3 AGMs, 2 ICs, 18 DICs and Transport Officers
- Flow of products :



The project will be operated with the following functions –

- ¬ 80% of wheat will be imported and another 20% 0f the wheat will be collected through contract farmers or direct purchase as raw materials of flour;
- ¬ Raw Materials processing for flour;
- ¬ Use approx 25% flour in own production;
- ¬ Sales of 75% flour in external market.

Usage of flour:

Internal Use:

25% of flour will be used in our own products. The main products are as under:

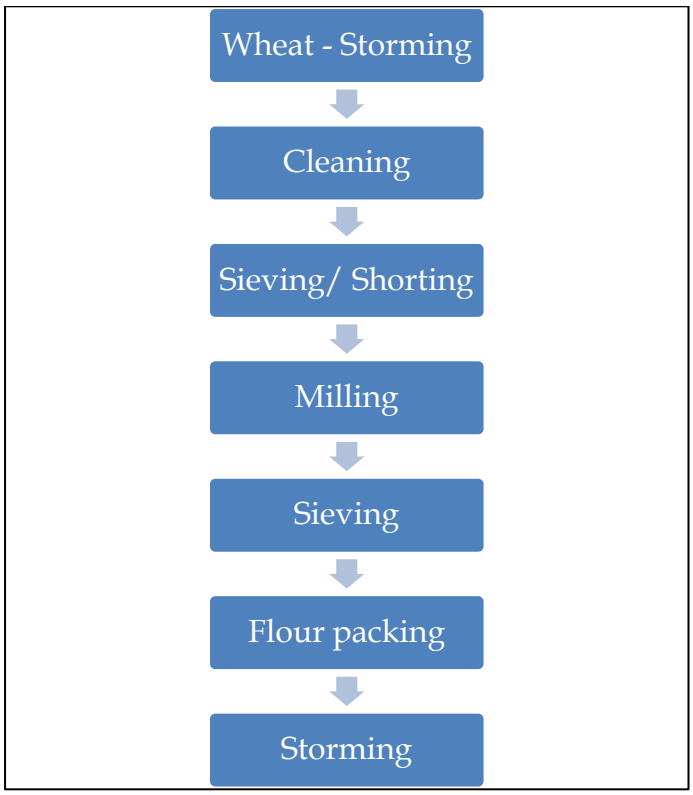
- Biscuit & Bakery
- Hot Chanachur
- Frozen Foods (Lacha Paratha, Centre Filled Ruti, Luti with Heated System)

External Use:

Approximate 75% of the total production will be sold in external market. It may be local or abroad. Flour has a huge demand in the local market. It is used for various purposes. The main Sales market of flour may be as under:

- Flour is major ingredient of biscuit, bread etc.
- Commercial Bakeries do use flour for biscuit, bread, chanachur etc.
- In hotel flour is used for making luti, poratha etc.
- It is used for preparation of consumer breakfast, pitha etc.
- It's by product; husk is used for poultry feed.
- It is used for raw materials of frozen food.

Exhibit 9. Process Flow Diagram of Flour Mill



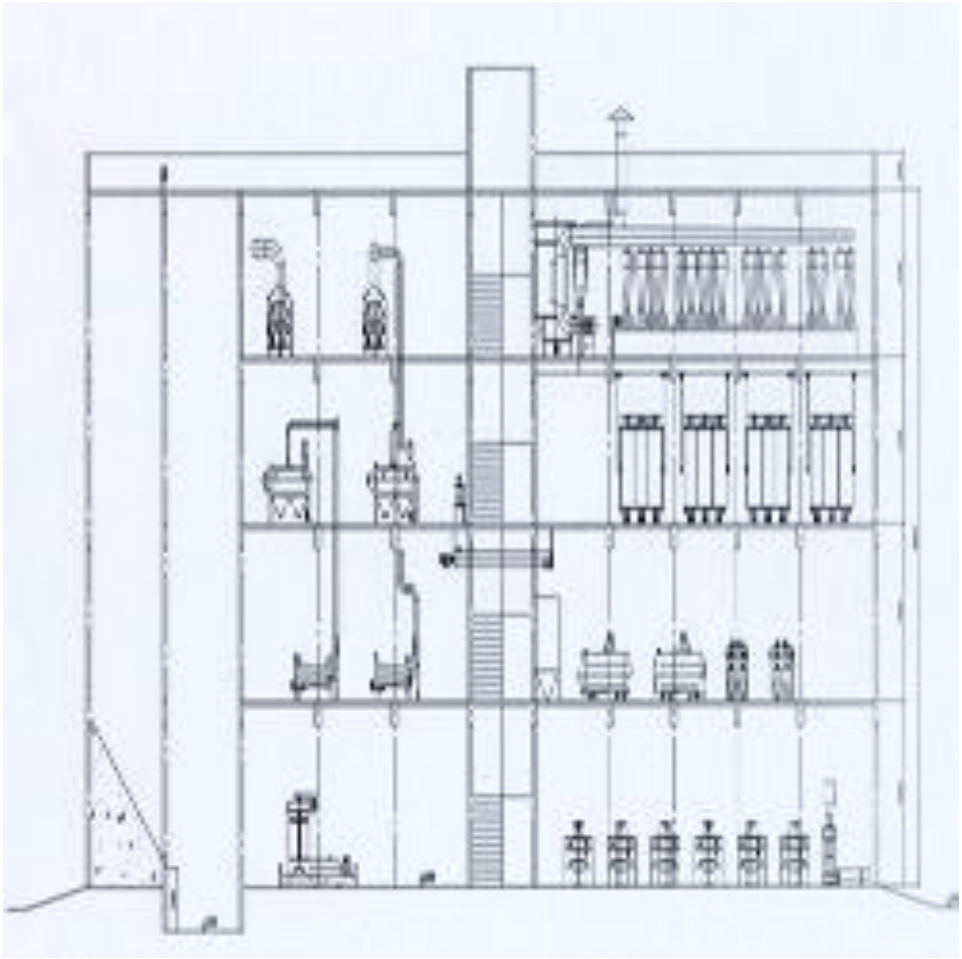


Exhibit 10. Process Flow Chart of Flour

B. Frozen Food Industry

Production and selling of lacha porata, centre filled luti, luti with heated system, and forming which has a huge demand both at home and abroad.

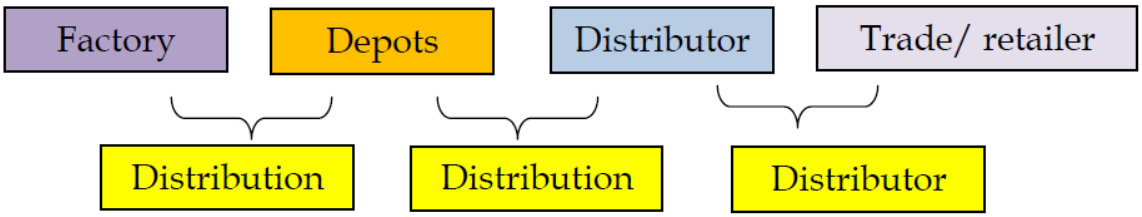
The daily production capacity of the project is given below:

Series No.	Product Name	C A P A C I T Y	
		Unit	Volume
1	Lacha/Poratha	Pcs	129,600
2	Centre Filled Luti	Pcs	162,000
3	Luti with heated system	Pcs	162,000
4	Forming	Pcs	144,000
Total		Pcs	597,600

The production flow will be:

- Distribution ensures finished products from Factory to depots for further distribution to the Dealers all over Bangladesh.

- Sales admin receives the DO from dealers, collate the orders and instruct the Depots to dispatch products to respective Dealer's.
- Dealers Send DOs to Sales Admin Section at Head Office.
- This ordering and PO clearance process is managed by Oracle software.
- Distribution dept is headed by 1 GM and 3 AGMs, 2 ICs, 18 DICs and Transport Officers
- Flow of products :



Raw Material & Consumable Sources

The major items of raw materials i.e. flour, vegetable, meat, potato, corn starch, salt etc will be procured locally. Starch (in emergency need), lentil etc will be imported from the existing suppliers.

The project will be operated with the following functions:

- ¬ Collection of vegetable, potato, meat/ chicken etc through direct purchase and collection of starch from our own source as raw materials of frozen food;
- ¬ Raw Materials processing for frozen food.
- ¬ Sales of frozen food especially in domestic market and then in abroad.

Frozen Food Market:

Frozen Food will be sold in local and international market. Primarily it will be available for following local market:

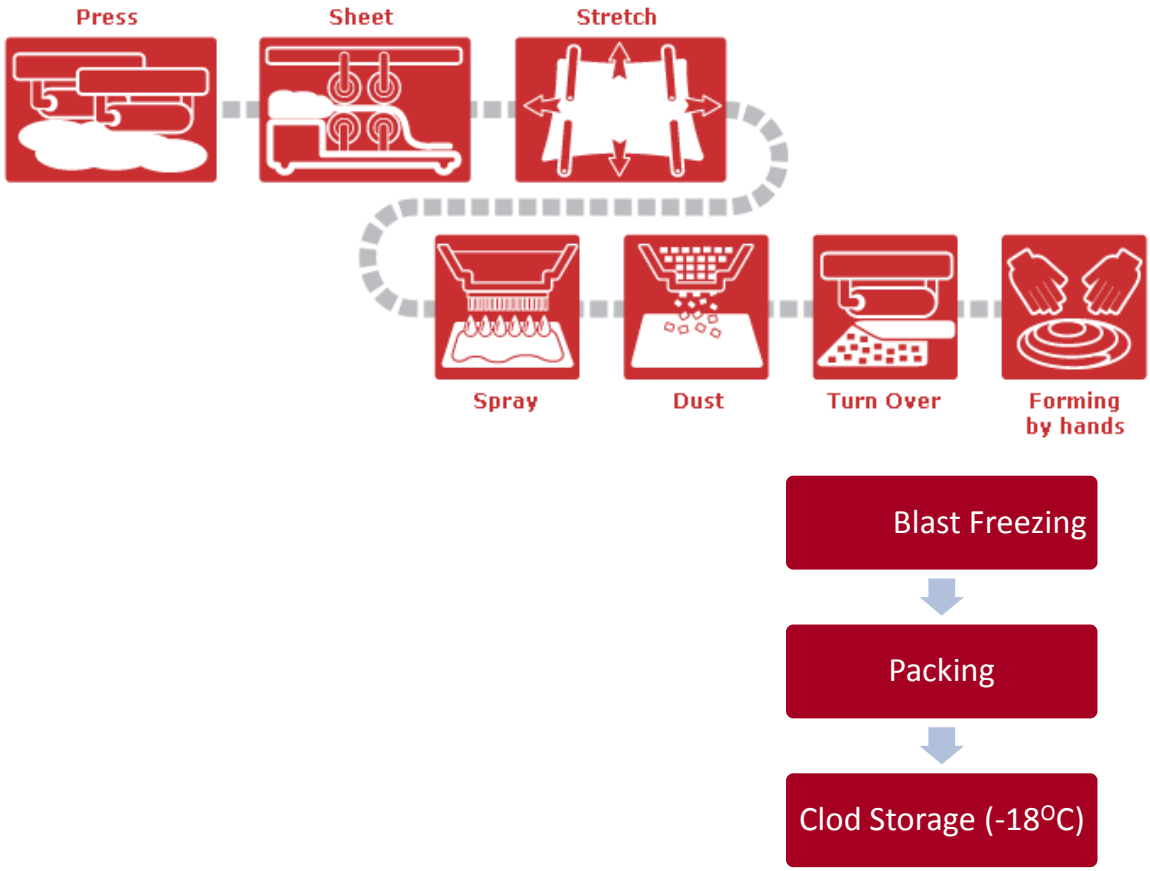
Superstores: Supermarkets will be the main market of frozen food such as luti, lacha, luti with heated system, spring roll, samosa etc

Hotels:For Lacha, parata, luti, roll, samosa etc branded hotel and restaurant may be the ideal market.

Individual: Frozen food may be the great comfort food for family.

There is a huge demand of frozen food in local and international market. Fast food shops in several places have been established based on these kinds of frozen foods.

Process Flow Chart of Lacha Paratha



3.5.2 Olipur Site

This site is for liquid glucose factory with production and selling of starch and liquid glucose having a huge demand locally and abroad.

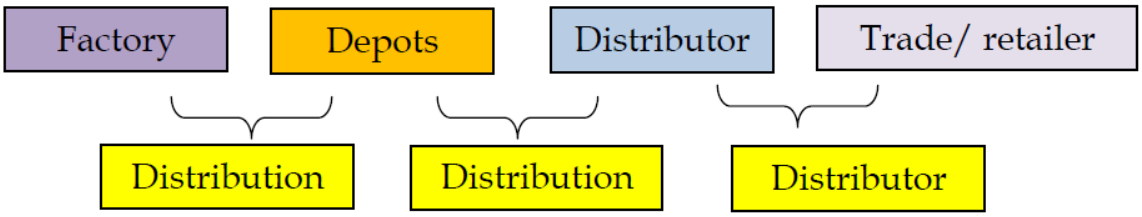
The daily production capacity of the liquid glucose factory is given below:

Series No.	Product Name	C A P A C I T Y		
		Unit	Volume/ Daily	Volume/ annually
1	Starch	MT	150	45,000
2	Liquid Glucose	MT	150	45,000

The production distribution flow will be:

- Distribution ensures finished products from Factory to depots for further distribution to the Dealers all over Bangladesh.
- Sales admin receives the DO from dealers, collate the orders and instruct the Depots to dispatch products to respective Dealer's.
- Dealers Send DOs to Sales Admin Section at Head Office.
- This ordering and PO clearance process is managed by Oracle software.

- Distribution dept is headed by 1 GM and 3 AGMs, 2 ICs, 18 DICs and Transport Officers
- Flow of products :



The major items of raw materials i.e corn/maize, cassava, etc. will be procured locally. Starch (in case of unavailablelocally), enzyme bacterial alpha amylase, activated carbon, filter, calcium chloride etc will be imported from the existing suppliers.

The project process is as follows:

- Collection of Maize, Potato, Cassava through contract farmers or direct purchase as raw materials of starch;
- Raw Materials processing for starch;
- Starch further processing for liquid glucose;
- Use approx 50% liquid glucose in own production;
- Sales of 50% liquid glucose in external market.

Usage of Liquid Glucose:

Internal Use:50% of Liquid glucose will be used the manufacture of PRAN's own products mainlyconfectionery, juices, biscuit and bakery products.

External Use: Approximate 50% of the total production will be sold in external market, local or abroad. Liquid glucose has a huge demand in the local market and used for various purposes:

Candy, Confectionery and sweet making: Major ingredient of hard boiled candies, Conjunction with sugar for flavored candies, chocolates manufacture, Glucose biscuits, Jams, jellies, chewing gums and canned fruits, Syrups for pies in bakery, Ice creams.

Extensively popular in sweet manufacturing business as it prevents crystallization, and being non-crystalline it produces homogeneous confectionery.

Bakery Industry:Used by commercial bakeries for pies, cream filling, e'clairs and candies.

Pharmaceuticals:For cough syrups and vitamin based tonics, liquid glucose is used to provide mild sweetness and body consistency. It makes principal ingredient for cough lozenges and acts as a granulating agent for tablet coating.

Flavoring:

- Flavoring and moistening agent.
- Flavoring and preservative in mouth freshening formulation.
- Substitute for Honey.

Tanning Industry:The action of glucose in tanning gives pliability and weight to the leather. In the chrome process glucose syrup is used because of its reducing action. This causes the chrome to be precipitated into the body of the leather Approx. 5% of the weight of the finished leather is introduced in the form of sugar.

Exhibit 11. Process Flow Chart of Starch

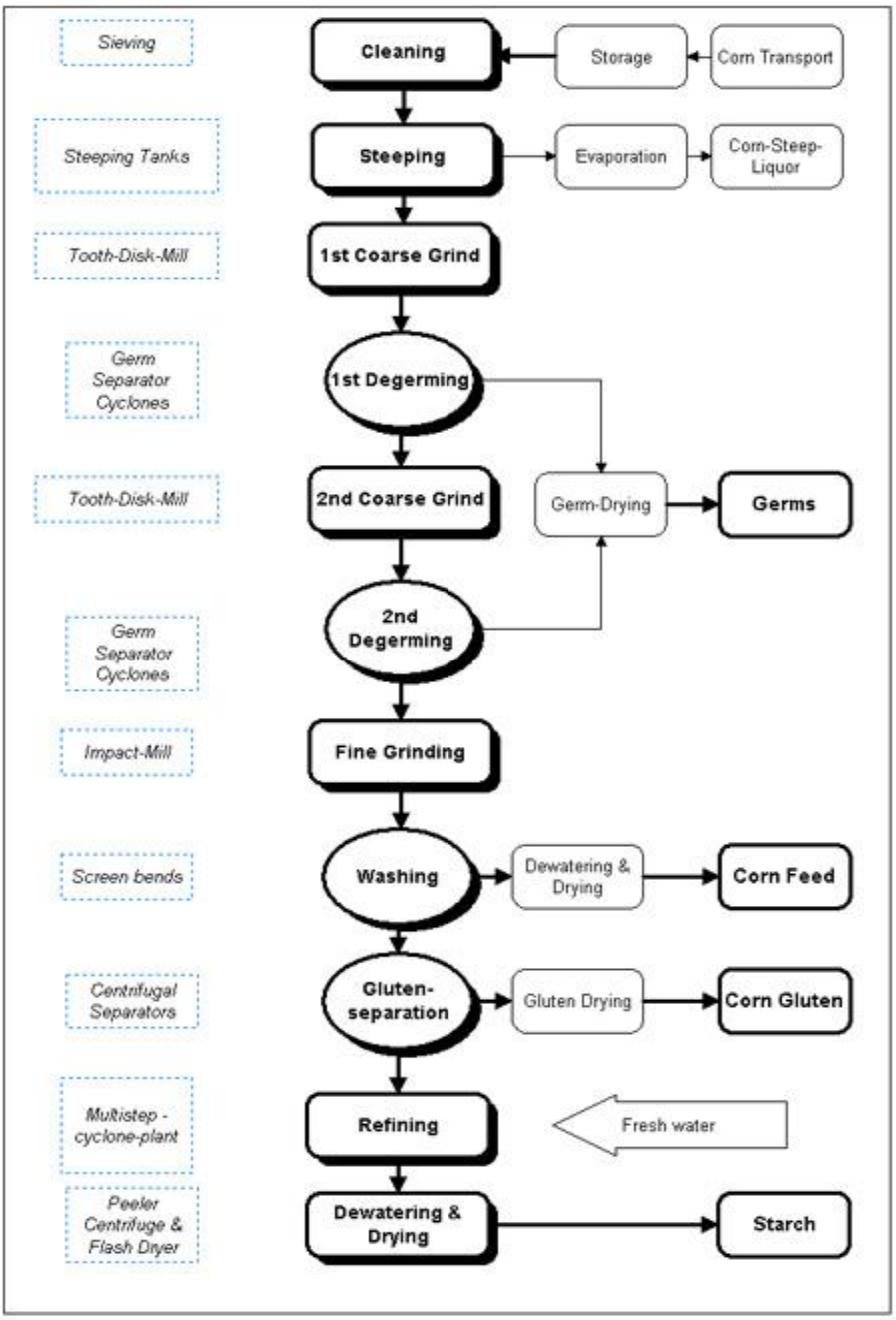
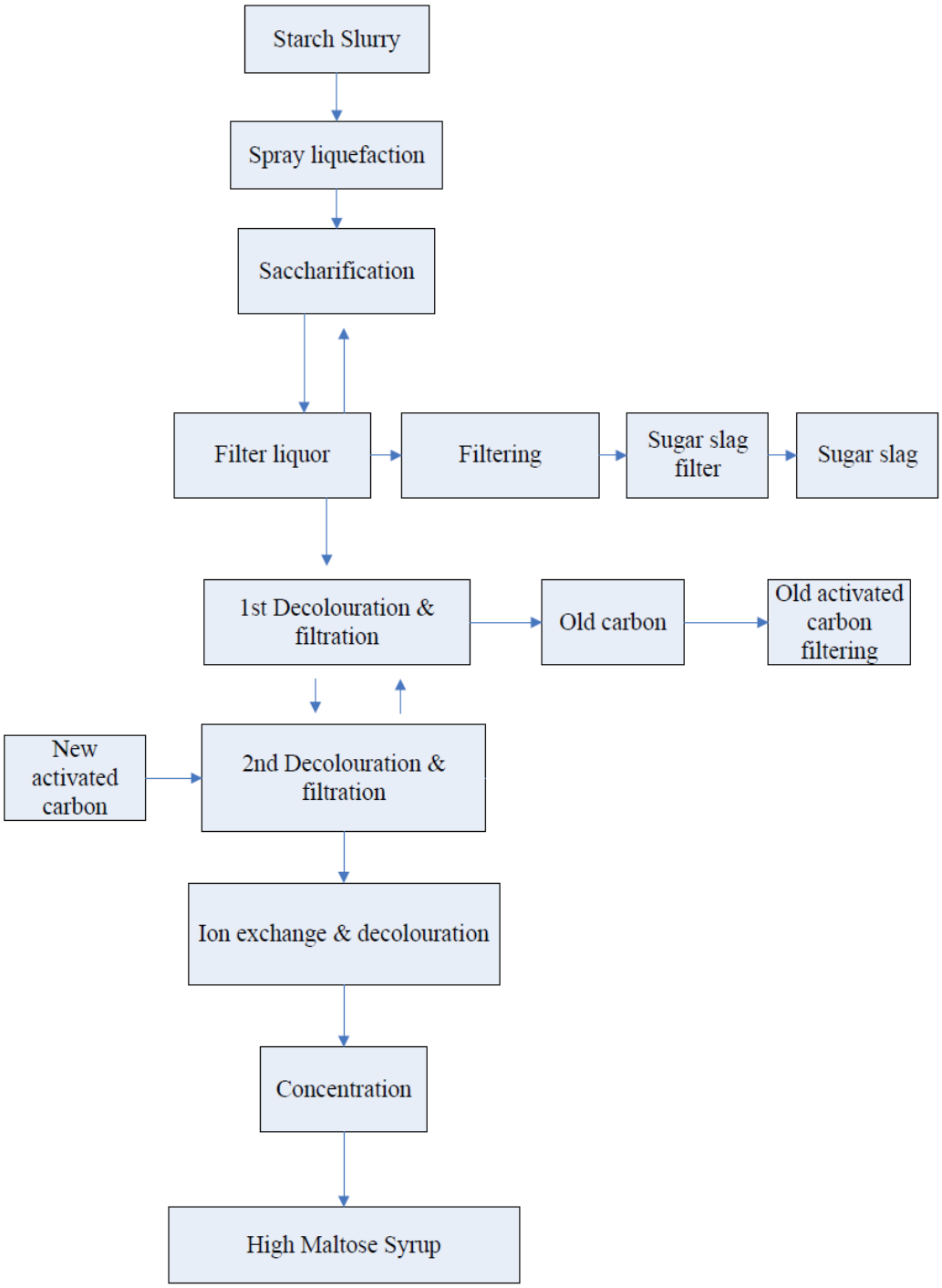


Exhibit 12. Process Flow Chart Liquid Glucose



4. BASELINE ENVIRONMENT

4.1 General

This chapter provides details of the baseline conditions of the physical, biological, and socio-economic environments existing in the project area. Data for this chapter were collected from:

- Secondary Sources: This included data from literature reviews, maps and monitoring reports;
- Primary Sources: This included gathering information from field surveys, laboratory analysis and public consultations in the project area.

4.2 Project Influence Area (PIA)

According to DoE guidelines, the project's influence area(PIA) area has to be 1 km radius of the development of the building project site. For this project, the PIA for the proposed site of Sylvan Agriculture Limited (SAL)was confined within a radius of 1 km from the center of the development site. Most of the potential impacts are likely to occur within this area. However, in case of some particular parameters, if potential impact was envisaged beyond 1 km, information was also gathered up to that distance to foresee impacts. General information of a larger area gathered from secondary sources has also been reviewed to put the project area in a comparative perspective.

Project Influence Area of this site comprises of three villages (Kazir Char, Khaisaer village and Turi village). It is a rural area.

4.3 Danga Site (Flour Mill & Food Processing Industry)

4.3.1 Surroundings

Land use in the immediate vicinity is mainly rural agriculture. The settlements near the project area are relatively rural housing and agricultural land area. The distance of surrounding important features from the site is presented in ***Exhibit 14.***

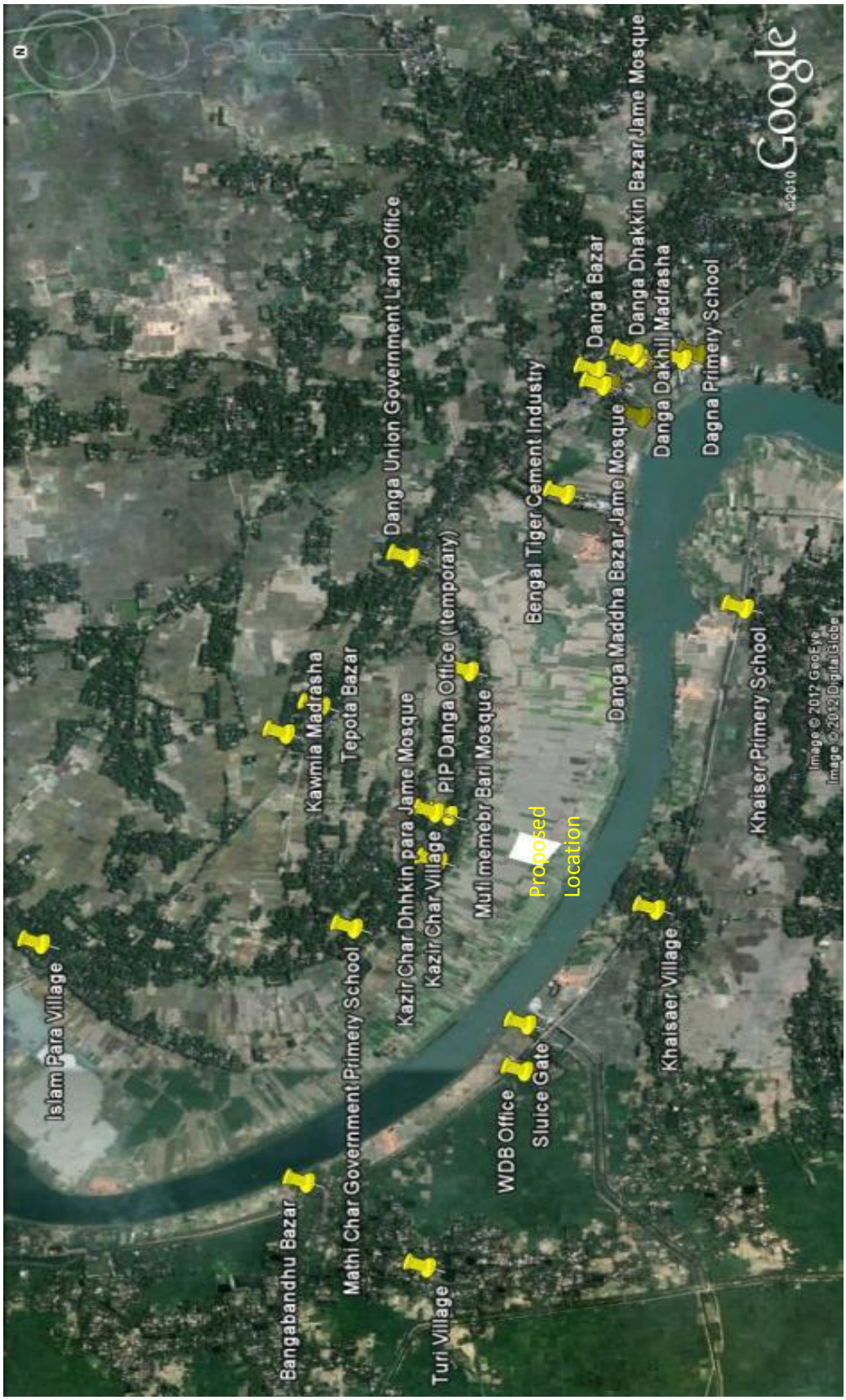


Exhibit 13. Baseline Picture of Danga Site

Exhibit 14. Important Features of the Project Influence Areain accordance with Distance (Danga Site)

SL No.	Area/ village name	Direction	Distance (Km)	Features/ Remarks
1	Kazir Char (Maddha Para Village)	North	Adjacent	Settlement SBE, EHS
2	Kazir Char Pashcim Para	West	1.0	Settlement SBE, EHS
3	Kazir Char Purba Para	East	Adjacent	Settlement SBE, EHS
4	Shitalakhya River	South	Adjacent	EHS
5	Islam para Village	North-North West	1.7	Settlement SBE, EHS
6	BangaBandhu Bazar	North West	1.6	SBE
7	Turi Village	West	1.6	Settlement SBE, EHS
8	Khaisaer Village	West	0.3	Settlement SBE, EHS
9	Danga Bazar	East	2.0	SBE
10	Tepota Bazar	Nort	0.9	SBE

Note: All directions are in reference to the CEE site
HH- Households, SBE- Small Business Enterprise, EHS- Environmental Hotspots (mosque, madrasa, school, college)

4.3.2 Physical Environment

This section describes the major features of the physical environment of the project site. Information was gathered on the existing physical environment related to climate, geology, topography, soils, hydrology and drainage, surface water and ground water quality, air quality and noise quality.

A. Topography

The overall topography of the Palash UZ is undulated. However, the Danga site area is almost flat. The land in this UZ is usually high and flood free. The main features of this site are: one time agricultural land and rural villages. The ground elevation of the project site is 15 mPWD (Graphosman. 1996).

- Geology

The site fall under the Old Meghna Estuarine Floodplain, this region occupies a large area, mainly low-lying land between the south of the Surma-Kushiyara floodplain and the northern edge of the young Meghna estuarine floodplain. Silt loam soils predominate on highlands and silty clay to clay on lowlands. Organic matter content of the soils is moderate. Topsoils are moderately acidic, but subsoils are neutral in reaction. General fertility level is medium.*Exhibit 37*.

- Soils

The soil of the Danga site is the Non-calcareous Brown Floodplain soils,which occur largely on the Old Himalayan Piedmont Plain, mostly on the ridges. They also occupy minor areas in the Tista, Karatoya-Bangali, Jamuna and Old Brahmaputra floodplains, and in some western parts of the Ganges floodplain. These soils are non-calcareous and having Cambic B-horizon which is fully or predominantly oxidized. There are two kinds of soils in this group. One class belongs to deep soils with dark colored topsoil, occurring extensively on the Old Himalayan Piedmont Plains. Another class is mainly shallow soils, lacking thick dark coloured topsoil occurring mainly outside the Old Himalayan Piedmont Plain. Most of these soils are Dystric/Eutric Gleysols or Cambisols.(*Exhibit 38.)*

B. Climate

The climate of Bangladesh is heavily influenced by Asiatic monsoon. The monsoonal influence results in three distinct seasons:

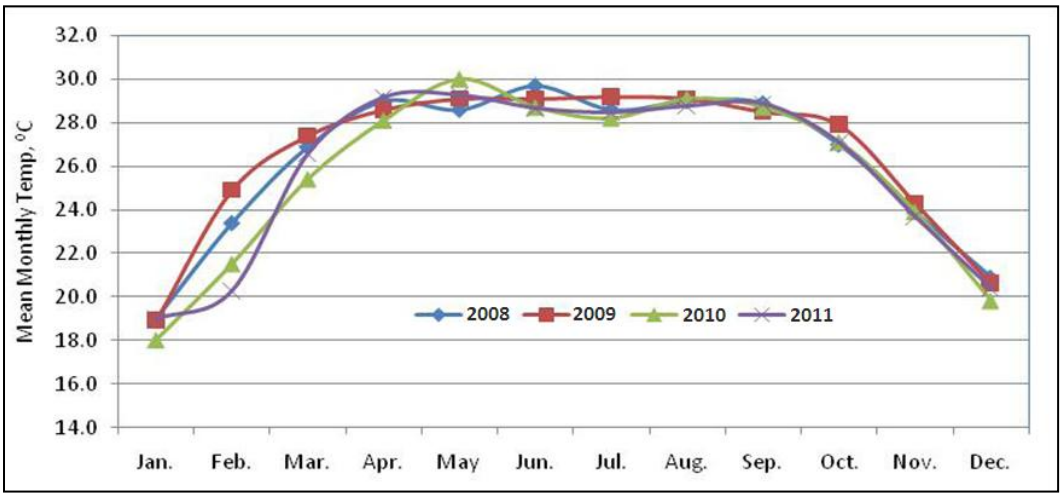
- Pre-monsoon hot season (from March to May);
- Rainy monsoon season (from June to September); and
- Cool dry winter season (from October to February).

Several climatic zones occur within Bangladesh. The project area falls under the South-central zone where rainfall is above 1,900mm and temperature range is comparatively milder (Rashid, 1977). Bangladesh Meteorological Department (BMD) climatic station is located closest to the project area. The climatic data has been collected from 2005 to 2008 for Dhaka Meteorological Station (DMS) that is approximately 15km away from project location.

- Temperature

The monthly average temperatures as recorded at the DMS are depicted in *Exhibit 16.* December and January are the coldest months with average monthly temperature of about 18°C, while April to September are the hottest months with an average monthly temperatures ranging from 28 to 30°C. The maximum average temperature in Narshingdiis 38.5°C and minimum is 9.6°C.

Exhibit 15. Mean Monthly Temperatures (oC) 2008-2011



Sources: Bangladesh Meteorological Department (BMD)

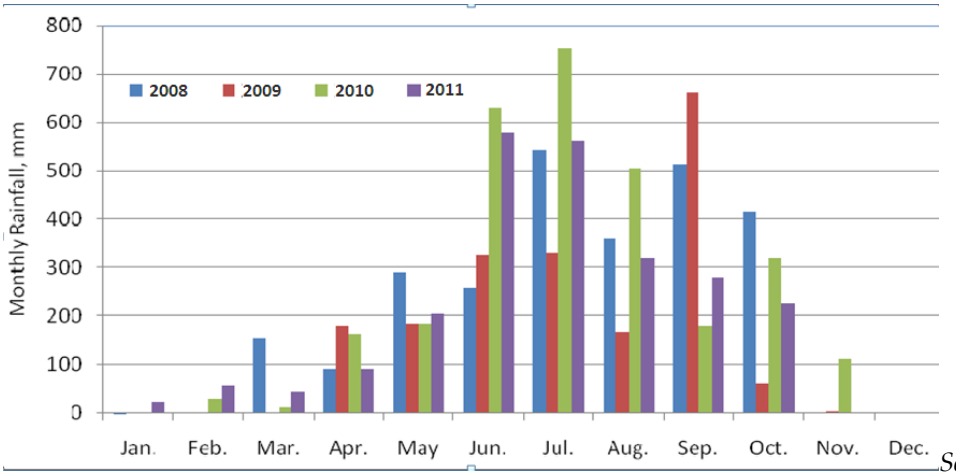
- Rainfall

The mean monthly rainfall for the rainfall station in closest proximity to the project area, Narshingdi, is shown in *Exhibit 16.* Annual rainfall of Narshingdi varies from 1,991 to 2,885 mm during the years from 2008 to 2011. Generally, June to October is the rainfall season. July is the wettest month with monthly rainfall of 331 to 753 mm in Narshingdi and December is the driest period with almost no rainfall. Maximum daily rainfall recorded is 190 mm (September 2011).

- Humidity

Annual average relative humidity in Narshingdi is 73%. Generally, all months have days with a monthly maximum humidity of more than 94%. The lowest daily humidity recorded is 6% in Narshingdi. The average maximum and minimum humidity data for the Narshingdi weather monitoring station is presented in *Exhibit 17.*

Exhibit 16. Average Monthly Rainfall (mm) 2008-2011



Sources: Bangladesh Meteorological Department (BMD)

Exhibit 17. Maximum and Minimum Monthly Humidity (%), 2008-2011

Year/ Month	2008		2009		2010		2011	
	Max	Min	Max	Min	Max	Min	Max	Min
Jan	97	28	100	21	100	20	98	25
Feb	97	17	98	15	100	23	96	13
Mar	98	18	96	6	96	14	95	28
April	94	27	96	28	95	32	94	23
May	98	44	98	40	98	33	96	37
June	98	46	99	57	98	52	98	51
July	99	57	98	55	99	55	98	61
Aug	97	55	95	52	98	50	97	57
Sept	98	52	99	51	98	42	98	53
Oct	98	34	98	38	98	31	98	32
Nov	98	32	95	26	99	35	97	29
Dec	98	24	97	29	98	28	99	33

Sources: Bangladesh Meteorological Department (BMD)

C. Air Pollution

Ambient air quality measurements are essential to provide a description of the existing conditions, to provide a baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed Danga Site construction on air quality.

The DoE in Narshingi District does not have any records on regular air quality for ambient condition or emission levels for the project area. During field survey no particular problem with air quality was noticed. Apparently good air quality is attributed to the fact that there are no large industrial installations near the project site that could serve as major sources of air pollutants. Generally air pollution sources in the project area consists of road dust, black smoke from diesel engine vehicles, construction dust, domestic heating and cooking.

The locations for air quality sampling were selected on the basis of power availability of the equipment and areas which likely to represent baseline condition. Air samples were collected from inside the project site boundary for a standard continuous 8-hour run using pre-calibrated High Volume Sampler (APM 415). (*Exhibit 19*)

Exhibit 18. Air Quality Testing Procedure

Parameters	Testing Procedures
SPM	Gravimetric method using High Volume Sampler
NOx	Absorption in dilute Sodium Arsenic Solution
SO_2	Absorption in Potassium tetrachloromercurate solution

Test results are illustrated in *Exhibit 19.* According to the ambient air quality test results, it can be summarized that the ambient air quality is quite good in the project area. The value of SPM is higher than the standard limit of ECR'97 of DoE. It could be the resultant of the surrounding environment in semi urban and the road dust is higher in the dry season but SO_2 and NOx are well within the permissible limits as compared to ECR'95 of GOB. Also the construction of the other industrial building beside the site will generate dust which may increase the SMP level of the area. The absence of major air pollution sources is responsible for the good ambient air quality in the PIA.

Exhibit 19. Air Quality Monitoring Results in the Proposed Danga Site Area

Sampling Location	Ambient air pollution concentration in micro gram/cusec meter.				
	SPM	SO_2	NOx	PM_{10}	$PM_{2.5}$
Inside the project boundary	342	43.5	67.4	59	23
Bangladesh Environmental Quality Standard ECR'97 for Residential Area[1]	200	80	80	150	65
Sampling Duration (hours	8hrs	8hrs	8hrs	24 hrs	24 hrs

Note: Air Quality tests performed by EQMS, Dhaka, April 2012.

D. Noise Pollution

Ten noise-monitoring sites were selected to undertake noise monitoring to characterize existing noise environment around the proposed project site. Noise level readings and any unusual local noise sources were recorded. Measurements were taken instantly on site using Noise level meters (LUTRON SL-4010) during the day (6am-9pm). The meter was calibrated before and after each set of readings.

The background noise level at the project area is low, due to an absence of heavy industries, large urban development or other significant noise sources.

[1] According to ECR'97 (residential and rural category area)

Exhibit 20. Noise Quality Monitoring in the Proposed Danga site

	
Photo: Noise measurement in the site	Photo: Noise measurement in the residential area near the site
	
Photo: Noise measurement infront of the mosque (the silent zone) near the site	Photo: Noise measurement infront of the market (the mixed zone) near the site

*Exhibit 22*summarizes the measured ambient noise levels at each monitoring location. The noise level found in the area is higher than the standard limit of ECR'97 (subsequent amendment in 2006). The ambient noise level is higher in mixed area, residential and silent zone around the project site. The project area falls into Industrial zone according to Bangladesh Environmental Quality Standard ECR'97 categorization. But within the project land the noise in lower than the standard value because the area is vacant and surrounding by villages.

Exhibit 21. Noise Level Parameter in and around the Proposed Danga Site

Sampling Location	Zone (according to Environmental Quality Standard 1997 and subsequent amendment in 2006)	Noise Level dB (A)	Bangladesh Environmental Quality Standard ECR'97 at day Time dB (A)		Remarks
			Day	Night	
Inside the boundary wall- North	IndustrialProject site	64.7	75	70	Low
Inside the boundary wall- South	IndustrialProject site	68.3	75	70	Low
Inside the boundary wall-West	IndustrialProject site	64.9	75	70	Low
Inside the boundary wall- east	IndustrialProject site	62.5	75	70	Low
Approach Road side (adjacent to the Site)	Mixed	72.6	60	55	High
Homestead (50m distance from site)	Residential	65.7	55	50	High
Shops (50 m distance from site)	Mixed	74.2	60	55	High
Kazi Char Dhakkin para jame Mosque	Silent	57.2	50	45	High

Note: Noise Quality tests performed by EQMS, April 2012.

E. Water Resource

- **Surface Water**

There is a river just beside the site namely Shitalakhaya River. The river is used for navigation and in some extends household washing and industrial purpose. The river water parameter was analyzed on site and 500 m downstream of the site.The results of the surface water qualityindicate water quality parameter levels are within Bangladesh limit.

Exhibit 22. Surface water collection in the Proposed Danga site

	
Photo: Surface water sampling beside the Danga site	Photo: Surface water sampling 500 m downstream of the Danga site

Exhibit 23. Surface water quality of Shitalakhay River beside the site

SL#	Parameter	Unit	Result		Bangladesh Environmental Quality Standard , ECR'97 for Water usable by various process and cooling industries
			On site	500 m Down Stream	
1.	pH	-	7.6	7.4	6.5-8.5
2.	DO	mg/L	6.2	6.4	>5
3.	BOD	mg/L	5.45	5.26	10 or less
4.	COD	mg/L	17.2	25.2	-
5.	TDS	mg/L	119	235	-
6.	Oil and Grease	mg/L	BDL	BDL	-
7.	Fe	mg/L	0.05	0.05	-

Source: EQMS, April 2012.

- **Ground Water Potential and Quality**

In 1993, Department of Public Health Engineering (DPHE) first detected arsenic in hand tube wells (HTWs) and arsenic contamination has become one of the most pressing environmental issues in Bangladesh. The World Health Organization has defined the tolerance limit of arsenic for drinking water as 0.01mg/L, while the Bangladesh standard for arsenic in drinking water is 0.05mg/L. The arsenic content of the project sites is 0.02mg/L and within the Bangladesh standards. Manually operated hand pumps and power driven tube wells extract groundwater from a depth of approx. 180 to 200 feet (55-60 meters). A study of the groundwater potential was carried out in the hydro-geological assessment.

In September 2009, Groundwater samples were collected by SMEC from shallow tube wells in the project. The samples were analysed by the Department of Environmental

Science Lab at State University of Bangladesh. The result of the groundwater field samples and the GoB standards for potable water (ECR, 1997) are shown in *Exhibit 26*. The concentration levels of pH, Alkanity, Mn, As, Fe, Ammonia Nitrate, total hardness, Chloride, Fecal Coliform and Total Coliform for tube well were found within the acceptable limit set by the DOE, GoB for potable water. According to the overall water quality data, practically good quality and quantity of ground water is available in and around the project site.

Exhibit 24. Ground water collection in the Proposed Danga site

Exhibit 25. Photo: Ground water sampling in the Mathi Char primary School

Exhibit 26. Ground Water Quality in and around Danga site

SL #	Parameter	Unit	Result		Bangladesh Environmental Quality Standard , ECR'97
			On site Deep Tube well	Mathi Char primary School	
1.	pH	-	7.2	7.3	6.5-8.5
2.	Manganese, Mn	mg/L	0	0	0.1
3.	Arsenic, As	mg/L	0.02	0.03	0.05
4.	Iron, Fe	mg/L	0.4	0.3	0.3-1
5.	Ammonia Nitrogen, NH3-N	mg/L	0.01	0.02	0.5
6.	Total Hardness	mg/L	290	267	200-500
7.	Chloride	mg/L	300	413	150-600
8.	Fecal Coliform, FC	no/100 ml	0	0	0
9.	Total Coliform, TC	no/100 ml	0	0	0

Source: EQMS, April 2012.

F. Drainage and Sewerage Facility

Like other rural areas in Bangladesh, there are no structured drainage and sewerage facilities in the study area and as a result. SAL will construct sewerage pipeline and storm water drainage facilities within the project site to run off the rain water.

G. Road and Transport Facilities

The proposed site for the SAL is located just beside the Shitalakhya River. In the northern side there is a LGED road which is mud made. It is connected to the Danga bazaar in the east side and Islam Para village at the west side. The road condition is narrow for heavy vehicle movement. SAL will use river network for transportation of all construction materials and also all product as well. For small van the LGED road can be used. The river is connected to all major places. And also the cost of the communication is cheap.

Exhibit 27. **Existing Road Network for the Proposed Danga Site**

4.3.3 Biological Environment

The biological environment generally refers to flora and fauna, their present status, description and habitats based on the nature and type of the project activities. The status of the flora and fauna of the study area was determined by specific assessment of both the terrestrial and aquatic environments, review of literature relevant to the location, and identification of species through primary (transit walk, interviews) and secondary sources. At this particular site, due to lack of any surface water bodies, only terrestrial environment was studied.

A. Terrestrial Flora and Fauna

The proposed site is located on the river side and there is no vegetation in the site. The surrounding area is also highland with mixed plants, crop and vegetation. Crops cultivated in the surrounding land mainly include rice, rabi crops (winter crops) and homestead vegetables. A sizeable number of fruit trees with economic value have been observed in the PIA area. The fruit trees include jackfruit and mangoes. Considerable number of trees and bushes in the PIA site provide habitat for birds and some other animals. The composition of plant community includes low growing grasses, herbs, shrubs and trees. The data collected from the environmental reconnaissance survey suggests that the predominant species in the area are those of cultivated vegetables and trees. A detailed list of floral species found in the project area in *Exhibit 28.*

Exhibit 28. List of Flora Species in the PIA

Scientific Name	Local Name	Family	Habit	Habitat	Status
Acacia aurculiformios	Akasia	Leguminosae	Tree	Roadside	C
Albizia procera	Shilkoroi	Leguminosae	Tree	Homestead	C
Areca catechu	Shupari	Arecaceae	Tree	Homestead	C
Artocarpus heterophyllus	Kathal	Moraceae	Tree	Homestead	LC
Averrhoa carambola	Kamranga	Averrhoaceae	Tree	Homestead	C
Axonopus compressus	Ghash	Poaceae	Herb	Road side	C
Azadirachta indica	Neem	Meliaceae	Tree	Homestead	LC
Basella alba	Puishak	Basellaceae	Herb	Homestead	CU
Benincasa hispida	Chalkumra	Cucurbitaceae	Herb	Cultivated	CU
Borassus flabellifer	Tal	Arecaceae	Tree	Roadside	LC
Capsicum annum	Kachamorich	Solanaceae	Herb	Cultivated	CU
Carica papaya	Papey	Caricaceae	Tree	Cultivated	C
Citrus aurantifolia	Lebu	Rutaceae	Shrub	Homestead	C
Cocos nucifera	Narikal	Arecaceae	Tree	Homestead	C
Cucurbita maxima	Mishti kumra	Cucurbitaceae	Herb	Cultivated	CU
Delonix regia	Krishnachura	Leguminosae	Tree	Homestead	C
Enhydra fluctuans	Helencha	Asteraceae	Herb	Wetland	C
Ixora coccinea	Rongan	Rubiaceae	Shrub	Homestead	C
Lablab purpureus	Seem	Leguminosae	Herb	Cultivated	CU
Lagenaria vulgaris	Lao	Cucurbitaceae	Herb	Cultivated	C
Lawsonia inermis	Mendi	Lythraceae	Shrub	Homestead	LC
Mangifera indica	Aam	Anacardiaceae	Tree	Homestead	C

Momordica charantia	Korolla	Cucurbitaceae	Herb	Cultivated	CU
Moringa oleifera	Shajna	Moringaceae	Tree	Homestead	LC
Musa sapientum	Kola	Musaceae	Herb	Cultivated	C
Oryza stiva	Dhan	Poaceae	Herb	Cultivated	CU
Psidium guajava	Peyara	Myrtaceae	Tree	Homestead	LC
Rottboellia protensa	Barabati	Poaceae	Herb	Fallow land	CU
Samanea saman	Rain tree	Leguminosae	Tree	Homestead	LC
Solanum melongena	Begun	Solanaceae	Herb	Homestead	CU
Syzygium cumini	Jam	Myrtaceae	Tree	Homestead	C
Tagetes patula	Ganda	Asteraceae	Herb	Homestead	CU
Tectona grandis	Shegun	Verbenaceae	Tree	Homestead	LC
Zizyphus mauritiana	Boroi	Rhamnaceae	Tree	Homestead	LC

Note: C-Common, LC-Less Common, UC- Uncommon, CU-Cultivated

Exhibit 29. **Photo: Some Floral Species in the PIA of Danga**

A number of avian species were observed also in the area. These species are typical inhabitants of urban fringes and considered as common on both at local and regional levels. In addition to the avian species, the area is habitat to a variety of reptiles, mammals and invertebrates. These include fox, rodents, snakes, etc. A detailed list of faunal species found in the project area is presented in the *Exhibit 30 and Exhibit 31*.

Exhibit 30. Locally Available Bird Species in the PIA

Local name	*Scientific name*	*Observation Status (During Field Visit)*
Bou-Katha Kao	*Cuculus micropterus*	
Paira	*Columba livia*	√
Dushor Bok	*Ardea cinera*	√
Pati kak	*Corvus splendens*	
Bhat Shalik	*Acridotheres tristis*	√
Charai	*Passer donesticus*	√
Bhadi Hans	*Cairina scutulata*	√

Source: *EQMS Field Survey*

Exhibit 31. List of Wildlife Species Found in the PIA

Group	Local name (Common Name)	Scientific name	Observation Status (During Field Visit)
Mammals			
	Ram Kutta (Dog)	*Cuon alpinus*	√
	Badur (Bat)	*Pteropus giganteus*	
	Kathbiral (Squirrell)	*Ratufa bicolor*	
	Nengti Indur (Rat)	*Mus musculus*	√
	Biral (Cat)	*Filis domesticus*	√
Reptiles			
	Tik Tiki (Lizard)	*Hemidactylus flaviviridis*	√
Amphibians			
	Kuno Bang (Frog)	*Bufo melanostictus*	√

Source: *EQMS Field Survey*

B. Aquatic Flora and Fauna

The river is quite rich in aquatic fish based on secondary sources and also fromaccounts of people in the area to get the fish status of that area. The fish species found in that area is presented in *Exhibit 32*:

Exhibit 32. List of FishSpecies Found in the PIA

Sl	Local Name	Order	Scientific Name	Past Status	Present Status	IUCN Status
1	Tara baim	Mastacembelidae	*Macrognathus aculeatus*	Wide	Less	VU
2	Khailsha	Osphronemidae	*Colisa fasciatus*	Wide	Wide	NO
3	Baicha	Osphronemidae	*Colisa labiosa*	Wide	Wide	NO
4	Koi	Anabantidae	*Anabas testudineus*	Wide	Wide	NO
5	Bele/Bailla	Eleotridae	*Glossogabius giuris*	Wide	Wide	NO

6	Roina / Bheda /Meni	Nandidae	*Nandus nandus*	Wide	Wide	NO
7	Nama Chanda	Centopomidae	*Chanda nama*	Wide	Wide	NO
8	Shol	Channidae	*Channa striatus*	Wide	Wide	NO
9	Taki, lata	Channidae	*Channa punctatus*	Wide	Wide	NO
10	Telo taki/Cheng	Channidae	*Channa orientalis*	Wide	Wide	NO
11	Kalkila	Belonidae	*Xenetlodon cancila*	Wide		VU
12	Shing	Heteropneustidae	*Heteropneustes fossilis*	Wide		NO
13	Magur	Clariidae	*Clarius batrachus*	Wide		NO
14	Bujuri-tengra /Kalo bujuri	Bagridae	*Mystus tengra*	Wide	Wide	NO
15	Gutum	Cobitidae	*Lepidocephalus guntea*	Wide	Wide	NO
16	Rui	Cyprinidae	*Labeo rohita*	Wide	Wide	NO
17	Catla	Cyprinidae	*Catla cat1a*	Wide	Wide	NO
18	Mrigel	Cyprinidae	*Cirrhinus mrigala*	Wide	Wide	NO
19	Sarputi	Cyprinidae	*Puntius sarana*	Wide	Wide	NO
20	Punti/Jat punti	Cyprinidae	*Puntius sophore*	Wide		NO
21	Tit puti	Cyprinidae	*Puntius ticto*	Wide		NO
22	Mola	Cyprinidae	*Amblypharyngodon mola*	Wide	Wide	NO
23	Dankina	Cyprinidae	*Rasbora rasbora*	Wide		EN
24	Foli	Notopteridae	*Nolopterus notopterus*	Wide	Wide	VU
25	Chapila	Clupidae	*Gudusia chapra*	Wide		NO
Exotic Species :						
26	Grass Carp	Cyprinidae	*Ctenopharyngodon idellus*	Wide	Wide	NO
27	Carpu	Cyprinidae	*Cyprinus carpio*	Wide	Wide	NO
28	Silver carp	Cyprinidae	*Hypophthalmichthys molitrix*	Wide	Wide	NO
29	Bighead carp	Cyprinidae	*Aristichthys nobilis*	Wide		NO
30	Rajputi/Thai sarputi	Cyprinidae	*Puntius gonionotus*	Wide	Wide	NO
31	Tilapia	Cichlidae	*Oreochromis mossambica*	Wide	Wide	NO
32	Nilotica	Cichlidae	*Oreochromis niloticus*	Wide	Wide	NO

Source: *EQMS Field Survey*

C. Rare and Endangered Species

There are no rare or endangered species according to the IUCN red data Book found in the project area.

D. Sensitive/ Protected Areas

There is no sensitive/protected areas found in the PIA.

4.3.4 Socio-Economic Environment

A. Administration

Palash Upazila (Narsingdi district) with an area of 94.43 sq km, is bounded by Shibpur and Kaliganj (Gazipur) on the north, Rupganj and Narsingdi SADAR upazilas on the south, Shibpur and Narsingdi Sadar upazilas on the east and Kaliganj upazila (Gazipur) and Kapasia on the west. Main River is Shitalakshya.Palash thana, now an upazila, was established in 1977. The upazila consists of 5 union parishads, 64 mouzas and 98 villages.

B. Population and Households

Following *Exhibit 33* reflects the population status of Palash Upazila and Danga Union, under which the study area is located.

Exhibit 33. Population Status of Palash Upazila

Area	Total Population	Male (%)	Female (%)
Palash Upazila	174040	53.4	46.6
Danga Union (EQMS Surveyed)	51	50.98	49.02

Source: *Population Census, 2001 and Field Survey, 2010*

C. Literacy and Educational Institutions

Average literacy 44.9%; male 56.4% and female 30.3%. Educational institutions: college 6, high school 25, madrasa 151, government primary school 47, non-government primary school 12.

D. Occupational Details

Data showed that the income group of Palash Upazilla is divided into 8 major groups while there are four major group identified by the study team in Danga Union. Following *Exhibit 34* shows the distribution of income groups. Majority of the people in Palash Upazila are into agriculture as same as inDanga Union.

Exhibit 34. Occupational Status of Palash Upazila

Groups by Occupation	Palash Upazila	Danga Union (%) (Surveyed Results)
Agriculture	27.48%,	39%
Agricultural labourer	10.67%,	2.1%

Wage labourer	3.14%	4.67%
Business	13.57%	4.3%
Service	29.28%	41%
Hanldloom	2.31%	0
Transport	1.97%	4%
and others	9.8%	5%

Source: Population Census, 2001 and EQMS Field Survey, 2010

E. Religion

In Palash Upazilla, the distribution of religious status is as Muslims 87%, Hindus 12.55%, Christians 0.08%, Buddhists 0.07% and others 0.30%. There are 218 Mosques,14 temples and 2 tomb found in Palash Upazila.

F. Utility Services

The Danga project site is in a rural area. The utility services found are given below:

i) Water Supply and Sanitation

Water supply in the Kazir Char villages is only through tube well fitted with hand pumps or electric pumps. There is no sewerage system in the village. Almost 90% households have latrines with pucca (i.e. permanent structures as pit latrine) and 10% is semi pucca.

ii) Solid Waste

There are no solid waste management facilities in the Kazir Char areas. Generally household wastes are dumped in holes made on the ground and on homestead premises.

iii) Electricity

About 100% of the houses at Kazir Char villagesare connected to electricity by the Rural Electrification Board (REB). All areas have REB electric lines along the road side.

iv) Gas Connection

The person in the area use does not have natural gas connection. They use wood, cowdung for their cooking purposes.

G. Public Health

People living around proposed Danga area gets generally affected by water borne diseases such as diarrhea, dysentery, and other diseases like influenza, malaria, etc.

Lack of adequate health facilities close to proposed site area, poor sanitation and improper hygienic practices are the major causes of these diseases.

H. Archaeological, Historical and Cultural Sites/Resources

According to the Department of Archaeology, Bangladesh, there are no places of historical and cultural important, situated within or nearby the project site.

4.3.5 Environmental Risks

A. Flood

The project area is free from flood and even in the 1988 and 1998, (heavily flooded years) the area was free from heavy flooding. But the SAL project site elevation will be increased by 12 ft (*Exhibit 57*) to address occasional flooding brought by monsoon season. There is no evidence or published document for the climate change impact and heavy/worse floods occuring in these two areas.

B. Seismic Effects

Bangladesh is situated in one of the most tectonically active regions in the world. Here three major tectonic plates (the Indian Plate, the Tibet Sub-Plate, and the Burmese Sub-Plate) collide and thrust over each other. Earthquakes occur frequently in the wider region.

Bangladesh can be divided into three seismic zones, as described by the ranges of the seismic coefficient. Zone I is the most severe area for earthquake intensity and frequency and Zone III is the least severe (GSB, 1979). The project area falls within Zone II, which is comprised of the middle regions of Bangladesh, and is the moderately seismically active region in the country. The location of the project site, relative to the seismic zones is provided in *Exhibit 58* (BNBC,1993). Attention should be given to the design and operational aspects of the structures to make them safe from earthquake hazards.

C. Cyclone and Storms

The site is cyclone and storm surges free zone. (*Exhibit 59*)

D. Erosion

The project area is free from river erosion.

4.4 Olipur Site (Liquid Glucose Industry)

4.4.1 Surroundings

The proposed Olipur Site (Liquid Glucose Industry) site of SAL is located at about 200 km far away from the Dhaka City, 20 Km from Habiganj Sadar upazila office at Village: Olipur, Union: , UZ: Habiganj Sadar and District: habiganj.

The total area of the proposed Olipur Site (Liquid Glucose Industry) site is about 5 acres which will accommodate all industrial building and other facilities.

Land use in the immediate vicinity is mainly rural agriculture. The settlements near the project area are relatively rural housing and agricultural land area. The distance of surrounding important features from the site is reflected in*Exhibit 35.*

Exhibit 35. Important Features of the Project Influence Area in accordance with Distance

SL No.	Area/ village name	Direction	Distance (Km)	Features/ Remarks
1	Shawl-jora Village	North, North West	0.5	Settlement SBE, EHS
2	Brammandora Village	West	1.0	Settlement SBE, EHS
3	Socheura Village	West	1.0	Settlement SBE, EHS
4	Sura boi Village	North-East	1.0	Settlement SBE, EHS
5	Nurpur Union Parishad	West	0.75	EHS
6	Olipue Bazar	South	0.4	SBE, EHS
7	Rubber garden	East	1.0	SBE
8	TNT Station	South-East	0.8	EHS
9	Shahjibazar Power Plant	South	2.25	EHS

Note: *All directions are in reference to the CEE site*
HH- Households, SBE- Small Business Enterprise, EHS- Environmental Hotspots (mosque, madrasa, school, college)

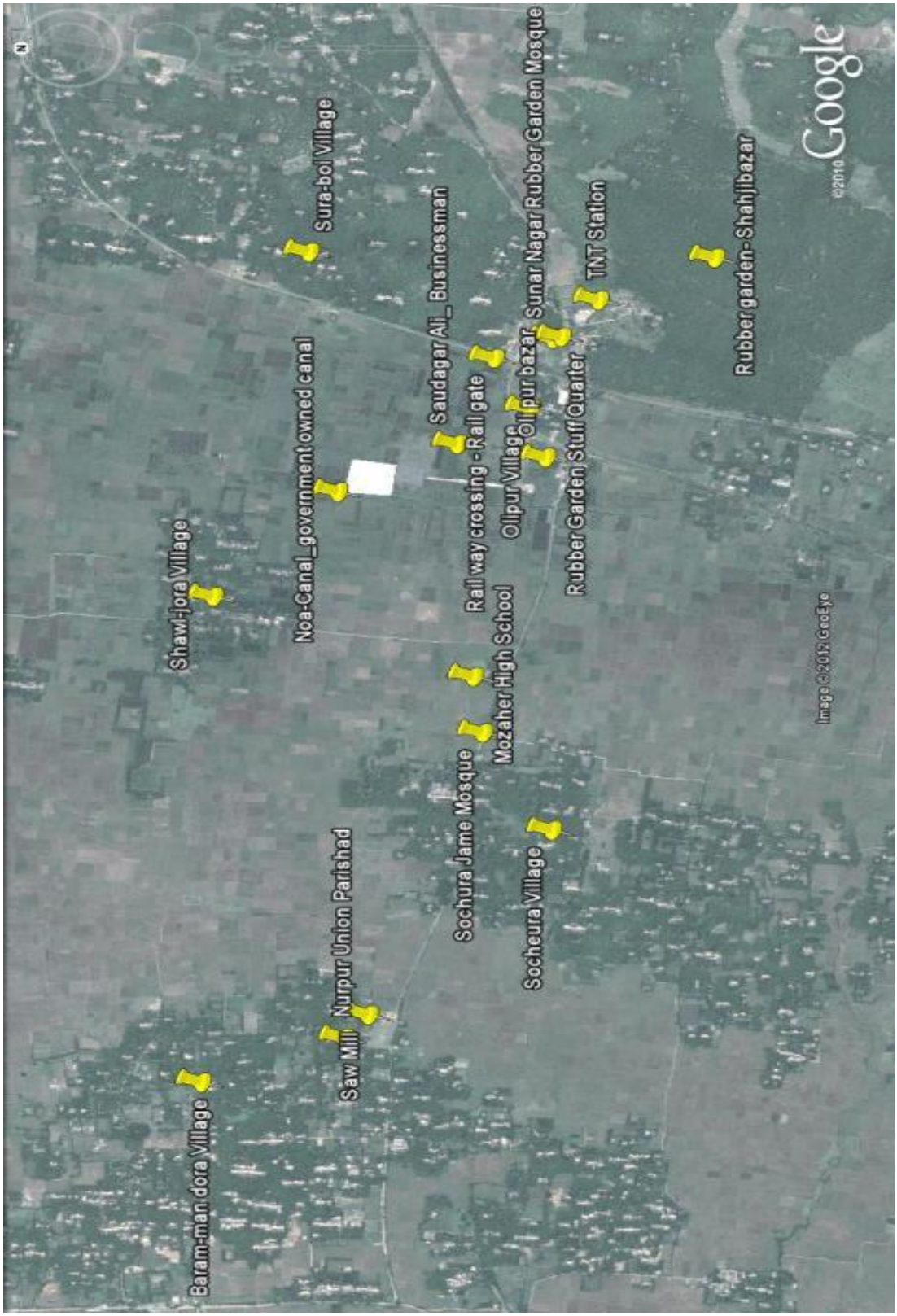


Exhibit 36. baseline Figure of the Olipur Site

4.4.2 Physical Environment

This section describes the major features of physical environment of the project site. Information was gathered on the existing physical environment related to climate, geology, topography, soils, hydrology and drainage, surface water and ground water

quality, air quality and noise quality.

A. Topography

The overall topography of the Habiganj Sadar UZ is undulated. However, the Olipur site area is almost flat. The land in this UZ is usually low and flash flood free. The ground elevation of the project site is 10 mPWD (Graphosman. 1996).

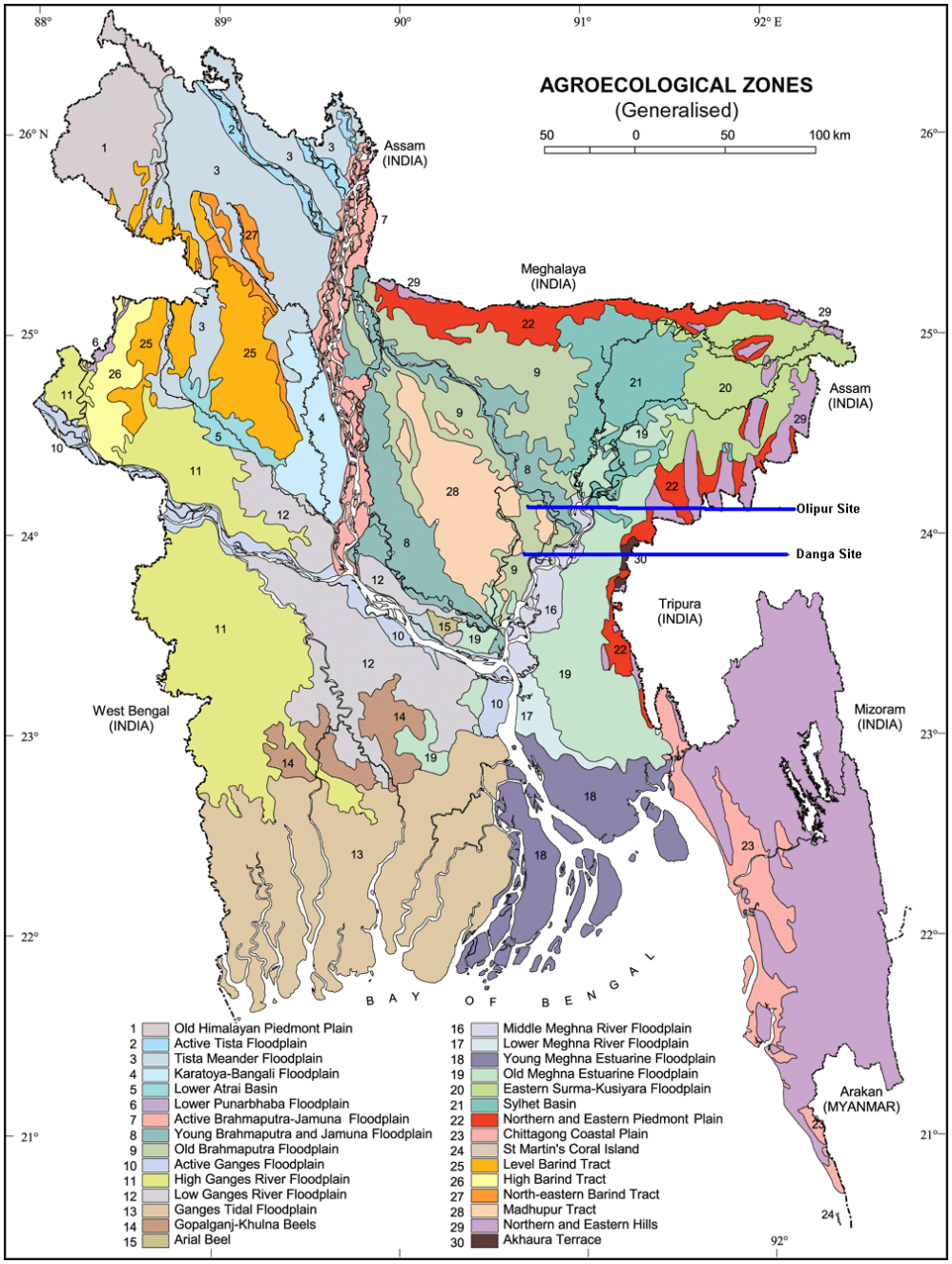
- Geology

The site fall under the Old Meghna Estuarine Floodplain occupying a large area, mainly low-lying land between the south of the Surma-Kushiyara floodplain and the northern edge of the young Meghna estuarine floodplain. Silt loam soils predominate on highlands and silty clay to clay on lowlands. Organic matter content of the soils are moderate. Topsoils are moderately acidic, but subsoils neutral in reaction. General fertility level is medium.(*Exhibit 37*)

- Soils

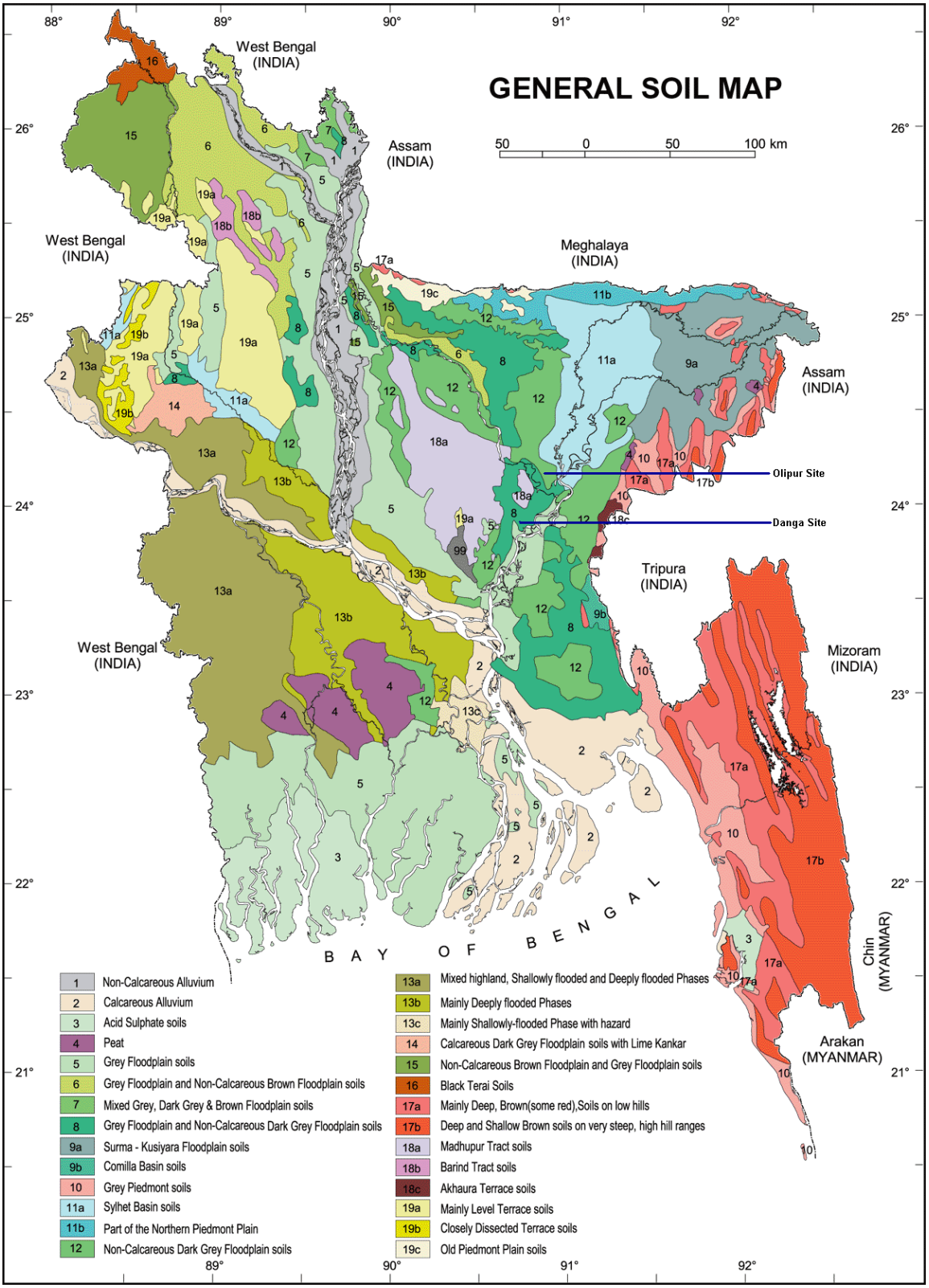
The soil of the Olipur site is the Calcareous Dark Grey Floodplain soils and cccurs extensively on the Ganges floodplain and locally on the soils that comprise cambic B-horizon and lime in part or throughout the solum and with a dark grey topsoil and/or upper subsoil. There are continuous dark grey gleans as well in the Ganges tidal floodplain. They are Calcaric Gleysols. (*Exhibit 38*)

Exhibit 37. Proposed SAL Sites of Danga and Olipur in the "Agro-ecological Zone of Bangladesh"



Source: www.banglapedia.org/httpdocs/HT/A_0079.HTM

Exhibit 38. Proposed SAL Site of Danga and Olipur in the "General Soil Map of Bangladesh"

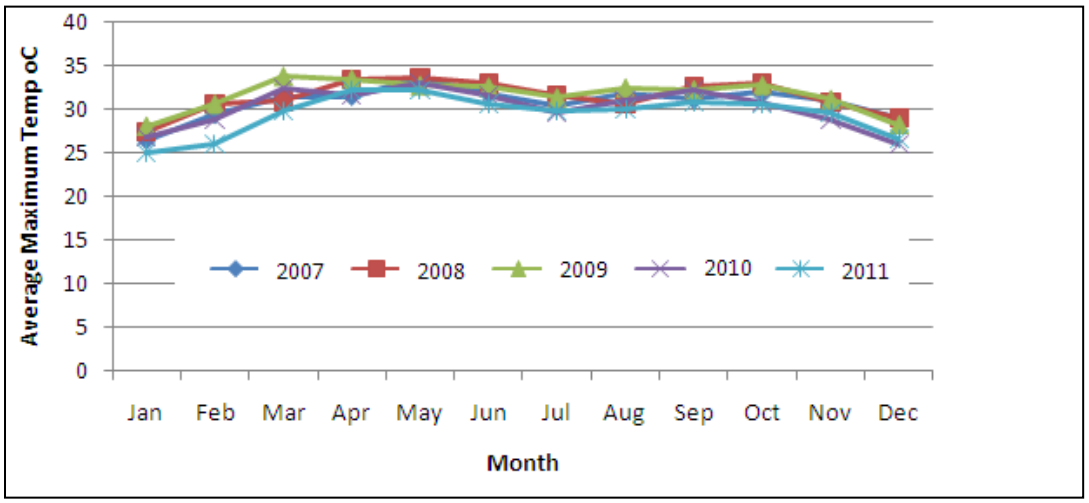


Source: http://www.banglapedia.org/httpdocs/HT/B_0251.HTM

- **Temperature**

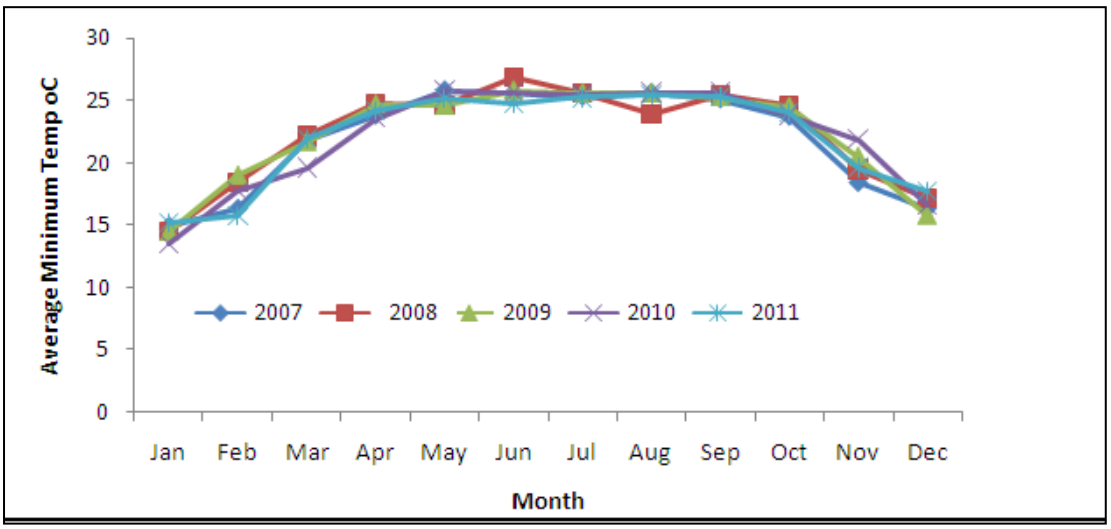
The monthly average maximum and minimum temperatures as recorded at the Sylhet weather station are depicted in *Exhibit 39*and *Exhibit 40*. The yearly average minimum temperature is 22.3° C and yearly average maximum temperature is 31.6° C based on five year monthly average temperature data.

Exhibit 39. Mean Monthly Maximum Temperatures (oC) 2007-2011



Source: Bangladesh Meteorological Department

Exhibit 40. Mean Monthly Minimum Temperatures (oC) 2007-2011



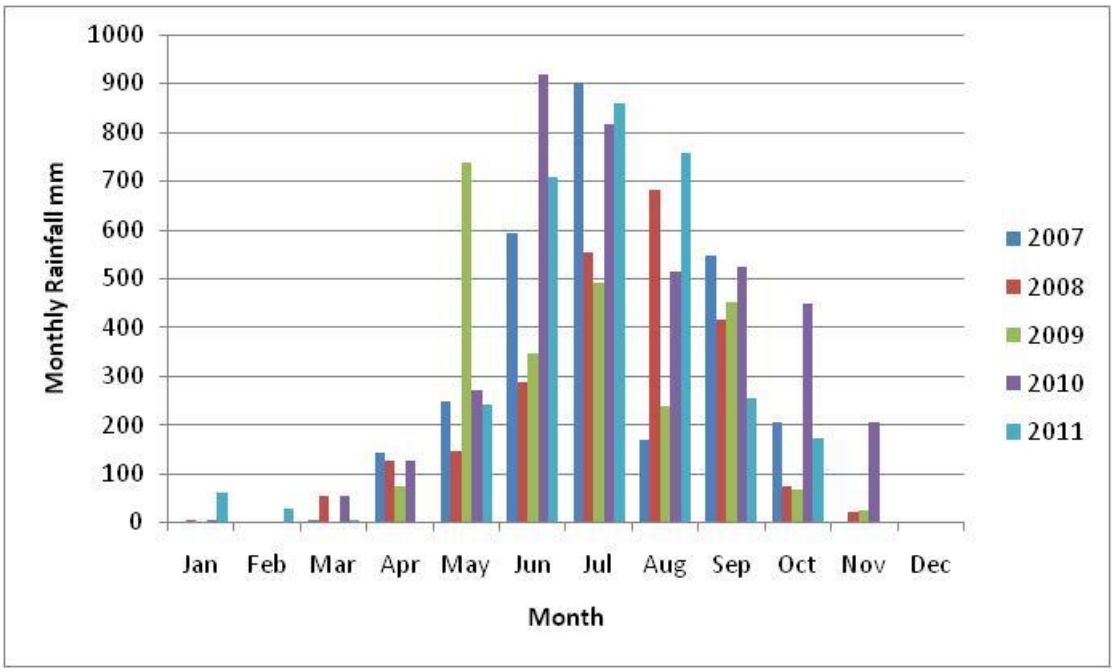
Source: Bangladesh Meteorological Department

- **Rainfall**

The mean monthly rainfall for the rainfall station in closest proximity to the project area, Chittagang weather station, is shown in *Exhibit 41*. The total yearly rainfall (mm) reading s were as 2819, 2375, 2440, 3885 and 3102 in the year of 2004, 2005, 2006, 2007

and 2008 respectively. Highest monthly rainfalls usually occur during June-September period.

Exhibit 41. Mean Monthly Rainfall (mm) 2007-2011



Source: Bangladesh Meteorological Department

- **Humidity**

Humidity levels are consistently very high during monsoons, and drop significantly for a relatively short period at the end of the dry season. *Exhibit 42* represents the monthly average relative humidity (in %) data at Chittagong in the year of 2004 to 2008. Average monthly humidity was highest in the month of July and August (87%), and the lowest in the month of February

Exhibit 42. average monthly humidity (%) data in the in the 2007-2011

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	71	58	68	72	73	79	83	81	81	75	65	62
2008	64	64	74	69	71	78	82	85	80	78	71	72
2009	72	73	63	72	78	80	82	80	82	79	73	76
2010	74	69	59	75	76	79	87	77	84	79	80	73
2011	76	65	78	68	74	82	87	87	82	79	74	79

Source: Bangladesh Meteorological Department

B. Air Pollution

Ambient air quality measurements are essential to provide a description of the existing conditions, to provide a baseline against which changes can be measured and to assist

in the determination of potential impacts of the proposed Danga Site construction on air quality.

The DoE of Sylhet Division does not have any records on regular air quality for ambient condition or emission levels for the project area. During field survey no particular problem with air quality was noticed. Apparently good air quality is attributed to the fact that there are no large industrial installations near the project site that could serve as major sources of air pollutants. Generally air pollution sources in the project area consists of road dust, black smoke from diesel engine vehicles, construction dust, domestic heating and cooking.

The locations for air quality sampling were selected on the basis of power availability of the equipment and areas which likely to represent baseline condition. (*Exhibit 43*) Air samples were collected from inside the project site boundary for a standard continuous 8-hour run using pre-calibrated High Volume Sampler (APM 415). (*Exhibit 43*)

Exhibit 43. Air Quality Testing Procedure

Parameters	Testing Procedures
SPM	Gravimetric method using High Volume Sampler
NOx	Absorption in dilute Sodium Arsenic Solution
SO_2	Absorption in Potassium tetrachloromercurate solution

Test results are illustrated in *Exhibit 44*. According to the ambient air quality test results, it can be summarized that the ambient air quality is quite good in the project area. The value of SPM, PM2.5, PM10, SO_2 and NOx are well within the permissible limits as compared to ECR'95 of GOB. Also the construction of the other industrial building beside the site will generate dust which may increase the SMP level of the area. The absence of major air pollution sources is responsible for the good ambient air quality in the PIA.

Exhibit 44. Air Quality Monitoring Results in the Proposed Danga Site Area

Sampling Location	Ambient air pollution concentration in micro gram/cusec meter.				
	SPM	SO_2	NOx	PM_{10}	$PM_{2.5}$
Inside the project boundary	107	15.5	17.5	51	25
Bangladesh Environmental Quality Standard ECR'97 for Residential Area[2]	200	80	80	150	65
Sampling Duration (hours	8hrs	8hrs	8hrs	24 hrs	24 hrs

Note: Air Quality tests performed by EQMS, Dhaka, April 2012.

C. Noise Pollution

Ten noise-monitoring sites were selected to undertake noise monitoring to characterize existing noise environment around the proposed project site. Noise level readings and any unusual local noise sources were recorded. Measurements were taken instantly on site using Noise level meters (LUTRON SL-4010) during the day (6am-9pm). The meter was calibrated before and after each set of readings.

The background noise level at the project area is low, due to an absence of heavy industries, large urban development or other significant noise sources.

Exhibit 45. Noise Quality Monitoring in the Proposed Olipur site

Photo: Noise measurement in the site office

Photo: Noise measurement in the residential area near the site

Photo: Noise measurement in the Mozaher High School (the silent zone) near the site

Photo: Noise measurement in OlipurBazar (the mixed zone) near the site

[2] According to ECR'97 (residential and rural category area)

Exhibit 46 summarizes the measured ambient noise levels at each monitoring location. The noise level found in the mixed, residential and silent zone area is higher than the standard limit of ECR'97 (subsequent amendment in 2006). The project area falls into industrial area zone according to Bangladesh Environmental Quality Standard ECR'97 categorization. The noise in lower than the standard value within the project land.

Exhibit 46. Noise Level Parameter in and around the Proposed Danga Site

Sampling Location	Zone (according to Environmental Quality Standard 1997 and subsequent amendment in 2006)	Noise Level dB (A)	Bangladesh Environmental Quality Standard ECR'97 at day Time dB (A)		Remarks
			Day	Night	
Inside the boundary wall- North	Industrial Project site	54.2	75	70	Low
Inside the boundary wall- South	Industrial Project site	58.7	75	70	Low
Inside the boundary wall-West	Industrial Project site	54.3	75	70	Low
Inside the boundary wall- east	Industrial Project site	52.9	75	70	Low
Approach Road side (adjacent to the Site)	Mixed	64.6	60	55	High
Homestead (200 m distance from site)	Residential	55.7	55	50	High
Shops (100 m distance from site)	Mixed	67.5	60	55	High
Mozaer High School	Silent	59.2	50	45	High

Note: Noise Quality tests performed by EQMS, April 2012.

D. Water Resource

- **Surface Water**

There is a canal just beside the site. The canal has less water and stagnant in the dry season but swells in the rainy season, when it passes and drains rain water. The canal water parameter was analyzed on site and 500 m downstream of the site. The result of the water quality in the canal is higher than Bangladesh limit for BOD.

Exhibit 47. Surface water quality of canal beside the site

SL#	Parameter	Unit	Result		Bangladesh Environmental Quality Standard , ECR'97 for Water usable by various process and cooling industries
			On site	500 m Down Stream	
1.	pH	-	7.7	7.8	6.5-8.5
2.	DO	mg/L	3.0	3.2	>5
3.	BOD	mg/L	35.20	38.14	10 or less
4.	COD	mg/L	55.39	52.73	-
5.	TDS	mg/L	319	235	-
6.	Oil and Grease	mg/L	BDL	BDL	-
7.	Fe	mg/L	0.03	0.02	-

Source: EQMS, April 2012.

Exhibit 48. Surface water collection in the Proposed Olipur site

Photo: Surface water sampling beside the Olipur site

Photo: Surface water sampling 500 m downstream of the Olipur site

- **Ground Water Potential and Quality**

In September 2009, Groundwater samples were collected by EQMS from shallow tube wells in the project. The samples were analysed by EQMS. The result of the groundwater field samples and the GoB standards for potable water (ECR, 1997) are shown in *Exhibit 49*. The concentration levels of pH, Alkanity, Mn, As, Fe, Ammonia Nitrate, total hardness, Chloride, Fecal Coliform and Total Coliform for tube well were found within the acceptable limit set by the DOE, GoB for potable water. According to the overall water quality data, practically good quality and quantity of ground water is available in and around the project site.

Exhibit 49. Ground Water Quality in and around Olipur site

SL #	Parameter	Unit	Result		Bangladesh Environmental Quality Standard , ECR'97
			On site Deep Tube well	Mozaer High School	
1.	pH	-	7.1	7.5	6.5-8.5
2.	Manganese, Mn	mg/L	0	0	0.1
3.	Arsenic, As	mg/L	0.01	0.02	0.05
4.	Iron, Fe	mg/L	0.9	1.2	0.3-1
5.	Ammonia Nitrogen, NH3-N	mg/L	0	0.01	0.5
6.	Total Hardness	mg/L	378	367	200-500
7.	Chlioride	mg/L	450	341	150-600
8.	Fecal Coliform, FC	no/100 ml	0	0	0
9.	Total Coliform, TC	no/100 ml	0	0	0

Source: EQMS, April 2012.

Exhibit 50. Ground water collection in the Proposed Olipur site

Photo: Ground water sampling on site

Photo: Ground water sampling in the Mozaer High School

E. Drainage and Sewerage Facility

Like other rural areas in Bangladesh, there are no structured drainage and sewerage facilities in the study area and as a result, during heavy rainfall drainage congestion and flooding is occurring in this area.

The storm water runoff process is influenced by the undulated highland characteristic of the study area. Storm water from highlands quickly accumulates in the adjoining canal.

Exhibit 51. Existing Canal

Photo: canal Condition in dry season

F. Road and Transport Facilities

The proposed site for the SAL is located just beside the Sylhet-Dhaka (N2)national highway. In the northern side there is a LGED road which is mud made.

4.4.3 Biological Environment

The biological environment generally refers to flora and fauna, their present status, description and habitats based on the nature and type of the project activities. The status of the flora and fauna of the study area was determined by specific assessment of both the terrestrial and aquatic environments, review of literature relevant to the location, and identification of species through primary (transit walk, interviews) and secondary sources. At this particular site, due to lack of any surface water bodies, only terrestrial environment was studied.

E. Terrestrial Flora and Fauna

The proposed site is located on the canal side and there is no vegetation in the site. The surrounding area is also highland with mixed plants, crop and vegetation. Crops cultivated in the surrounding land mainly include rice, rabi crops (winter crops) and homestead vegetables. A sizeable number of fruit trees with economic value have been observed in the PIA area. The fruit trees include jackfruit and mangoes. Considerable number of trees and bushes in the PIA site provide habitat for birds and some other animals. The composition of plant community includes low growing grasses, herbs, shrubs and trees. The data collected from the environmental reconnaissance survey

suggests that the predominant species in the area are those of cultivated vegetables and trees. A detailed list of floral species found in the project area in *Exhibit 52.*

Exhibit 52. List of Flora Species in the PIA

Scientific Name	Local Name	Family	Habit	Habitat	Status
Acacia aurculiformios	Akasia	Leguminosae	Tree	Roadside	C
Aegle marmelos	Bel	Rutaceae	Tree	Homestead	C
Albizia procera	Shilkoroi	Leguminosae	Tree	Homestead	C
Albizia richardiana	Gagan shirish	Leguminosae	Tree	Homestead	C
Anthocephalus chinensis	Kodam	Rubiaceae	Tree	Roadside	LC
Aponogeton crispus	Ghetu	Aponogetonaceae	Herb	Wetland	LC
Areca catechu	Shupari	Arecaceae	Tree	Homestead	C
Artocarpus heterophyllus	Kathal	Moraceae	Tree	Homestead	LC
Averrhoa carambola	Kamranga	Averrhoaceae	Tree	Homestead	C
Axonopus compressus	Ghash	Poaceae	Herb	Road side	C
Azadirachta indica	Neem	Meliaceae	Tree	Homestead	LC
Barringtonia acutangula	Hizol	Lecythidaceae	Tree	Wetland	C
Basella alba	Puishak	Basellaceae	Herb	Homestead	CU
Benincasa hispida	Chalkumra	Cucurbitaceae	Herb	Cultivated	C
Bischofia javanica	Kanjol	Euphorbiaceae	Tree	Fallow land	C
Bombax ceiba	Shimul	Bombacaceae	Herb	Homestead	LC
Borassus flabellifer	Tal	Arecaceae	Tree	Roadside	LC
Brassica oleracea var. botrytis	Phulkopi	Cruciferae	Herb	Cultivated	C
Brassica Juncea	Raisharigha	Cruciferae	Herb	Fallow land	LC
Capsicum annum	Kachamorich	Solanaceae	Herb	Cultivated	C
Carica papaya	Papey	Caricaceae	Tree	Cultivated	C
Centella asiatica	Thankuni	Ammiaceae	Herb	Fallow land	C
Ceratophyllum demersum	Jhajhi	Ceratophyllaceae	Herb	Wetland	C
Citrus aurantifolia	Lebu	Rutaceae	Shrub	Homestead	C
Citrus grandis	Jambura	Rutaceae	Tree	Homestead	C
Coccinea cordifolia	Telakucha	Cucurbitaceae	Herb	Fallow land	C
Cocos nucifera	Narikal	Arecaceae	Tree	Homestead	C
Cucurbita maxima	Mishti kumra	Cucurbitaceae	Herb	Cultivated	C
Cuscuta reflexa	Shornalata	Convolvulaceae	Herb	Epophytic	LC
Cynodon dactylon	Durba	Poaceae	Herb	Road side	C
Cyperus difformis	Behua	Cyperaceae	Herb	Fallow land	LC
Dalbergia sisoo	Sisso	Leguminosae	Tree	Road side	UC
Delonix regia	Krishnachura	Leguminosae	Tree	Homestead	C
Elaeocarpus robustus	Jolpai	Elaeocarpaceae	Tree	Homestead	LC
Enhydra fluctuans	Helencha	Asteraceae	Herb	Wetland	C
Ficus benghalensis	Bot	Moraceae	Tree	Roadside	LC
Ficus hispida	Dumur	Moraceae	Tree	Roadside	C
Ficus religiosa	Assawath	Moraceae	Tree	Roadside	LC
Ixora coccinea	Rongan	Rubiaceae	Shrub	Homestead	C
Jussiaea repens	Kesardam	Onagraceae	Herb	Wetland	C
Lablab purpureus	Sim	Leguminosae	Herb	Cultivated	C

Lagenaria vulgaris	Lao	Cucurbitaceae	Herb	Cultivated	C
Lawsonia inermis	Mendi	Lythraceae	Shrub	Homestead	LC
Leersia hexandra	Aroli	Poaceae	Herb	Fallow land	LC
Leucaena leucocephala	Ipil ipil	Leguminosae	Tree	Roadside	C
Litchi chinensis	Litchu	Sapindaceae	Tree	Homestead	LC
Luffa cylindrica	Dhundul	Cucurbitaceae	Herb	Cultivated	C
Mangifera indica	Aam	Anacardiaceae	Tree	Homestead	C
Momordica charantia	Korolla	Cucurbitaceae	Herb	Cultivated	C
Moringa oleifera	Shajna	Moringaceae	Tree	Homestead	LC
Musa pradisiaca	Kachakola	Musaceae	Herb	Cultivated	C
Musa sapientum	Kola	Musaceae	Herb	Cultivated	C
Ocimum sanctum	Tulshi	Labiatae	Herb	Fallow land	LC
Oryza stiva	Dhan	Poaceae	Herb	Cultivated	C
Psidium guajava	Peyara	Myrtaceae	Tree	Homestead	LC
Ricinus communis	Verenda	Euphorbiaceae	Shrub	Roadside	LC
Rosa centifolia	Golap	Rosaceae	Shrub	Homestead	C
Rottboellia protensa	Barajati	Poaceae	Herb	Fallow land	C
Samanea saman	Rain tree	Leguminosae	Tree	Homestead	LC
Solanum melongena	Begun	Solanaceae	Herb	Homestead	LC
Spondias pinnata	Amra	Anacardiaceae	Tree	Homestead	LC
Syzygium cumini	Jam	Myrtaceae	Tree	Homestead	C
Tagetes patula	Ganda	Asteraceae	Herb	Homestead	C
Tamarindus indica	Tetula	Leguminosae	Tree	Homestead	LC
Tectona grandis	Shegun	Verbenaceae	Tree	Homestead	LC
Terminalia arjuna	Arjun	Combretaceae	Tree	Homestead	LC
Terminalia catappa	Katbadam	Combretaceae	Tree	Homestead	C
Tilanthera philoxeroides	Helencha	Compositae	Herb	Fallow land	C
Vetiveria zizanoides	Bena	Poaceae	Herb	Fallow land	C
Zizyphus mauritiana	Boroi	Rhamnaceae	Tree	Homestead	LC

Note: *C-Common, LC-Less Common, UC- Uncommon, CU-Cultivated*

A number of avian species were observed also in the area. These species are typical inhabitants of urban fringes and considered as common on both at local and regional levels. In addition to the avian species, the area is habitat to a variety of reptiles, mammals and invertebrates. These include fox, rodents, snakes, etc. A detailed list of faunal species found in the project area is presented in the *Exhibit 53 and Exhibit 54*

Exhibit 53. Locally Available Bird Species in the PIA

SL. No	Local name	Scientific name	Observation Status (During Field Visit)
1.	Choto Machranga	*Alcedo athis*	√
2.	Tia	*Psittacula krameri*	
3.	Paira	*Columba livia*	√
4.	Jongla Ghughu	*Streptopelia tranquebarica*	
5.	Sada Bok	*Casmerodius albus*	√
6.	Pati kak	*Corvus splendens*	√
7.	Kalo Doyel	*Sanicoloides fulicafa*	√
8.	Bhat Shalik	*Acridotheres tristis*	√
9.	Charai	*Passer donesticus*	√
10.	Rashans	*Anser indicus*	√
11.	Bhubon Cheel	*Milvus migrans*	
12.	Babui	*Ploceus philippinus*	√
13.	Bhadi Hans	*Cairina scutulata*	√

Source: *EQMS Field Survey*

Exhibit 54. List of Wildlife Species Found in the PIA

SL. No	Local name	Scientific name	Observation Status (During Field Visit)
Mammals			
1.	Ram Kutta	*Cuon alpinus*	√
2.	Kathbiral	*Ratufa bicolor*	√
3.	Bara Indur	*Bandicota indica*	√
4.	Nengti Indur	*Mus musculus*	√
5.	Biral	*Filis domesticus*	√
Reptiles			
6.	Tik Tiki	*Hemidactylus flaviviridis*	√
Amphibians			
7.	Kuno Bang	*Bufo melanostictus*	√

Source: *EQMS Field Survey*

F. Rare and Endangered Species

There are no rare or endangered species according to the IUCN Red Data Book found in the project area.

G. Sensitive/ Protected Areas

There are no sensitive/protected areas found in the PIA.

4.4.4 Socio-Economic Environment

A. Administration

Palash Habiganj thana, now an upazila, was established in 1890. It consists of 2 municipalities, 18 wards, 93 mahallas, 10 unions, 202 mouzas, 259 villages.Mosque 213, temple 17, church 2, tomb 27.

B. Population and Households

Following *Exhibit 55* reflects the population status of Habiganj Sadar Upazila and Olipur Union, under which the study area is located.

Exhibit 55. Population Status of Palash Upazila and Dhamsona Union

Area	Total Population	Male (%)	Female (%)
Habiganj Sadar Upazila	225469	51.75	48.25
Olipur Union (EQMS Surveyed)	50	51.23	48.77

Source: Population Census, 2001 and Field Survey, 2010

C. Literacy and Educational Institutions

Average literacy 45.23%; male 58.2% and female 35.2%. Educational institutions: college 9, high school 35, madrasa 170, government primary school 54, non-government primary school 13.

D. Occupational Details

Data showed that the income group of Habiganj Sadar Upazilla is divided into 8 major groups while there are four major group identified by the study team in Danga Union. Following *Exhibit 56* shows the distribution of income groups. Majority of the people in Habiganj Sadar Upazila are into agriculture as same as inOlipur Union.

Exhibit 56. Occupational Status of Habiganj sadra Upazila and Olipur Union

Groups by Occupation	Habiganj Sadar Upazila	Olipur Union (%) (Surveyed Results)
Agriculture	36.02	33%
Agricultural labourer	16.84	4.1%
Wage labourer	4.61	6.67%
Business	14.74	9.3%
Service	7.07	2.3%
Fishing	2.08	4.3
Transport	3.91	5%
Construction	1.45	6%
and others	13.28	13%

Source: *Population Census, 2001 and EQMS Field Survey, 2010*

E. Religion

In Habiganj Sadar, the distribution of religious status is as Muslims 88.08%, Hindus 11.59%, Christians 0.03%, Buddhists 0.04% and others 0.26%. There are 235 Mosques,17 temples and 1 tomb found in Habiganj Sadar Upazila.

F. Utility Services

The Olipurproject site is in a rural area. The utility services found are given below:

i) Water Supply and Sanitation

Water supply in the Olipur villages is only through tube well fitted with hand pumps or electric pumps. There is no sewerage system in the village. Almost 85% households have latrines with pucca (i.e. permanent structures as pit latrine) and 15% is semi pucca.

ii) Solid Waste

There are no solid waste management facilities in the Olipur areas. Generally household wastes are dumped in holes made on the ground and on homestead premises.

iii) Electricity

About 100% of the houses at Olipur village is connected to electricity by the Rural Electrification Board (REB). All areas have REB electric lines along the road side.

iv) Gas Connection

The people in the area use haveno natural gas connection. They use wood, and cowdung for their cooking purposes.

G. Public Health

People living around proposed Olipur area gets generally affected by water borne diseases such as diarrhea, dysentery, and other diseases like influenza, malaria, etc. Lack of adequate health facilities close to proposed site area, poor sanitation and improper hygienic practices are the major causes of these diseases.

H. Archaeological, Historical and Cultural Sites/Resources

According to the Department of Archaeology, Bangladesh, there are no places of historical and cultural important, situated within or nearby the project site.

4.4.5 Environmental Risks

E. Flood

The project site is located in a generally flood prone-free area and does not experience heavy or worse flooding. However, it experiences occasional flooding during the monsoon season. Elevation of the site was increased by 12 feet to take into account this occasional flooding. (*Exhibit 57*)

F. Seismic Effects

Bangladesh is situated in one of the most tectonically active regions in the world. Here three major tectonic plates (the Indian Plate, the Tibet Sub-Plate, and the Burmese Sub-Plate) collide and thrust over each other. Earthquakes occur frequently in the wider region.

Bangladesh can be divided into three seismic zones, as described by the ranges of the seismic coefficient. Zone I is the most severe area for earthquake intensity and

frequency and Zone I is the least severe (GSB, 1979). The project area falls within Zone II, which is comprised of the middle regions of Bangladesh, and is the moderately seismically active region in the country. The location of the project site, relative to the seismic zones is provided in *Exhibit 58* (BNBC,1993). Attention should be given to the design and operational aspects of the structures to make them safe from earthquake hazards.

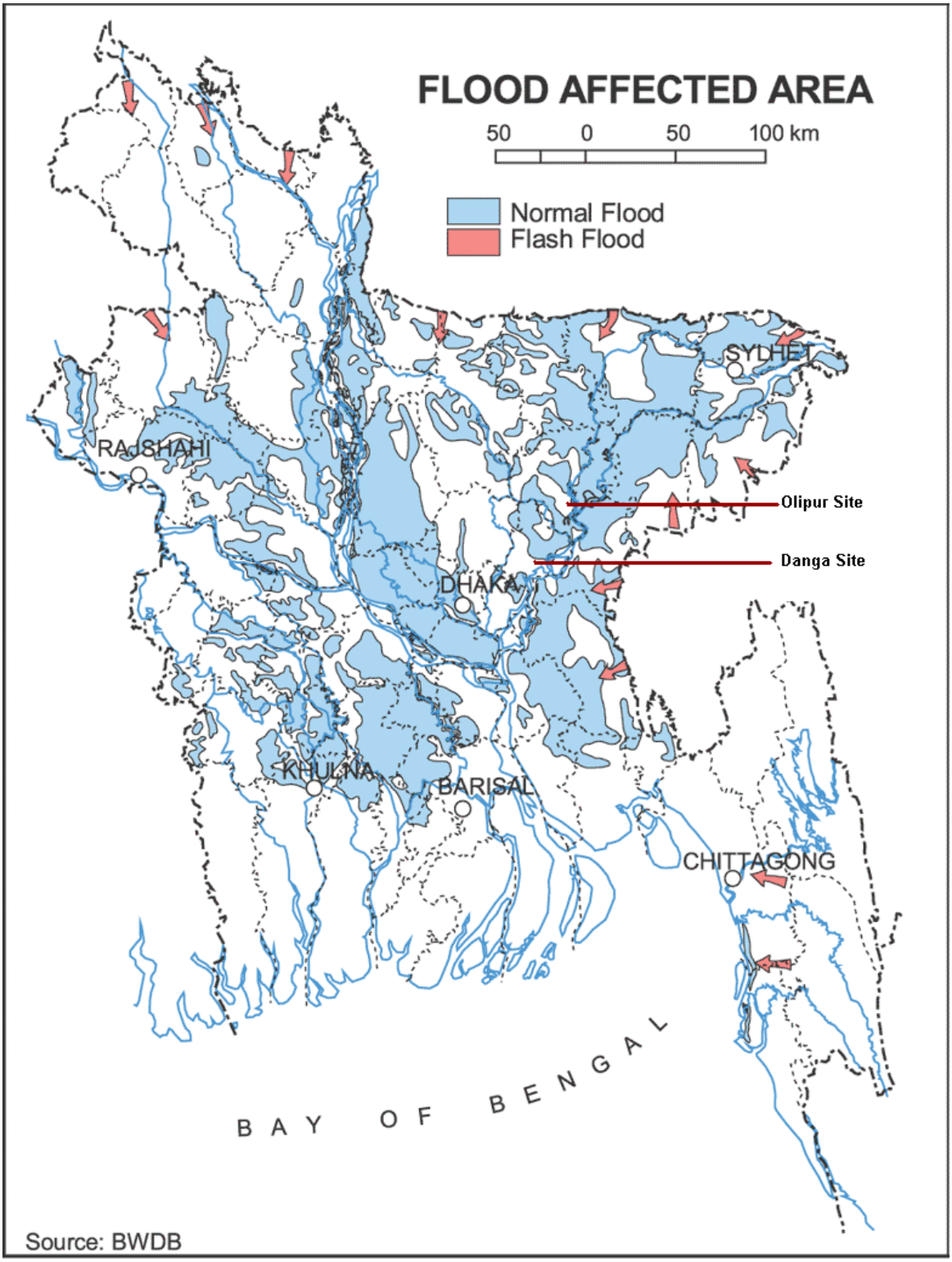
G. Cyclone and Storms

The site is cyclone and storm surges free zone. (*Exhibit 59*)

H. Erosion

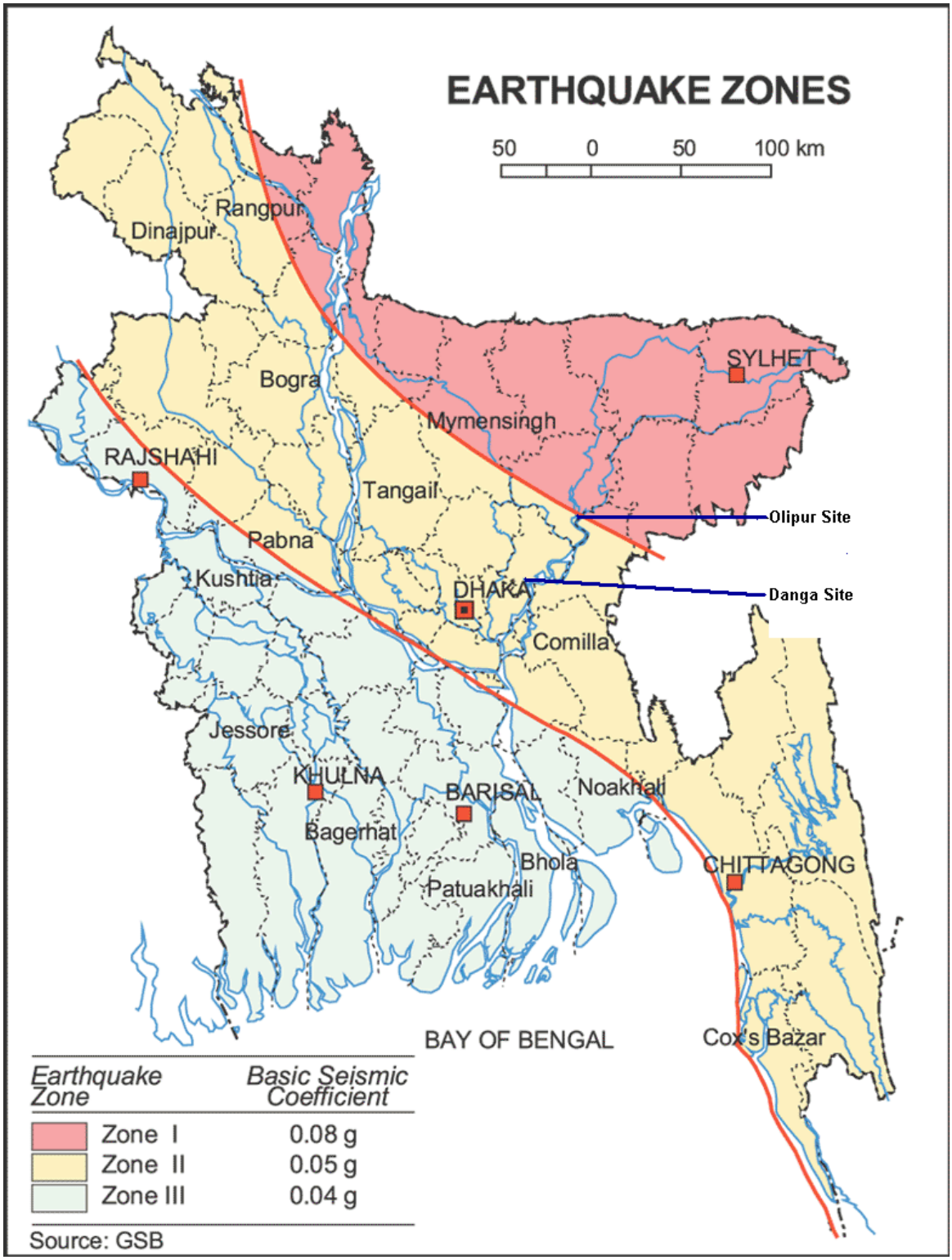
The project area is free from river erosion.

Exhibit 57. Flood prone area of Bangladesh



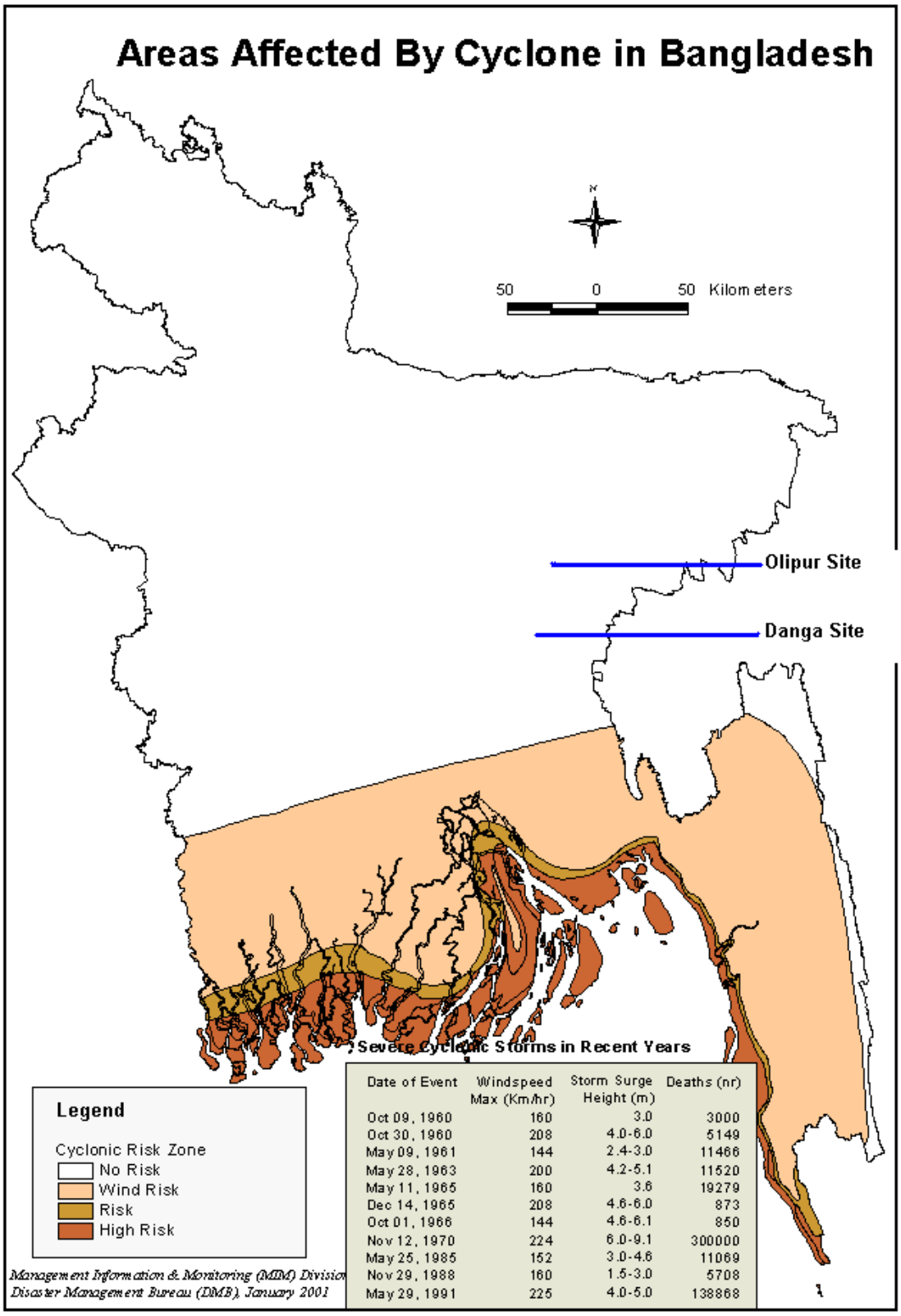
Source: Banglapedia

Exhibit 58. Seismic Zones within Bangladesh



Source: Banglapedia

Exhibit 59. Cyclone prone area of Bangladesh



Source: Banglapedia

5. IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

5.1 Identification of Potential Impacts

This chapter identifies the potential impacts related with project location, design, and construction and operation phases of the project on the physical, biological and socioeconomic domains of the environment. An environmental impact is defined as any change to an existing condition of the environment. Identification of potential impacts has been done on the basis of baseline data collected from secondary and primary sources. Identification of potential impacts due to the project site development is done by checklist methods. In the checklist, activities, which may affect the environment due to various stages of the project actions, are listed and the degrees of Significant Environmental Impacts (SEIs) are shown. The terms "none", "insignificant", "moderate" and "significant" are used in the checklist to classify the magnitude of SEIs. Environmental impacts can broadly be classified as those taking place during pre-construction, construction and operational phases of the project. Activities involved affecting environmental resources at different phases of the project implementation as well as potential /significant environmental impacts are discussed below.

5.2 Impacts during Pre-Construction

5.2.1 Landscape Change

During pre-construction phase, there will be changes in landscape due to construction of boundary walls and other initial activities.As the areas will be developed or filled, flood or drainage congestion may occur in the surrounding area.

5.2.2 Impacts During Construction

Environmental impacts of the construction phase are expected to be temporary. Construction impacts are considered to be minimal as all the construction works will be carried out within the site and will be managed via the mitigation measures defined in the EMP section.

5.2.2.1 Air Pollution

NOx and SOx except SPM value has not exceeded DOE standards based on the baseline monitoring data. During construction phase, SPM is expected to be the main pollutant associated with earthwork activities and material handling. The major earthwork activity would be excavation for basement and foundations for buildings and internal access roads. The construction equipment/vehicles, using fuel and diesel

and movements of vehicles will also contribute to air pollution. Because of this, hazardous air emissions such as NO_X, SO_2, etc. will be released into the environment. This will impact the air quality affecting the immediate vicinity of the work areas and the sparsely populated settlements surrounding the bothDanga and Olipur sites of SAL.

Another possible source of air pollution will be dust due to handling of cement, breaking of bricks/boulders, mixing of concrete ingredients and burning of bitumen for internal roads. However, due to the openness of construction sites and wind conditions, the dust and engine emissions are expected to have limited effect on the existing air quality. The anticipated air quality problem will be short lived, localized and minor lasting during the construction stage only.

5.2.2.2 Noise Pollution

According to baseline monitoring data, noise levels in the both SAL site has not been exceeded the DOE standard mainly due to adjacent access road construction that is currently going on. Noise levels in and around the construction sites could further increase as a result of operating construction machinery and during unloading and loading of construction materials during construction phase. Number of machinery and equipment will be required for the construction of the proposed project and will depend upon the construction methodology for the various types of works. However, the equipment/vehicles will broadly consist of mixture machine, concrete vibrator, brick/boulder breaking machine, dump trucks, transport vehicles, etc. which will cause noise pollution. Most of these will use diesel engines that generate noise and exhaust emissions.

5.2.2.3 Sewage Pollution

During construction phase, the proposed site shall be occupied by officials, contractor personnel and labour force (about100 persons/day). Inadequate and unhygienic sanitation facility can pollute the surrounding lands as well as diseases might be spread out among the workers and adjacent villagers. Sewage waste also might be the source of odor pollution to the local environment.

5.2.2.4 Solid Waste

The construction process will take 1-2 years and as a result the worker camps will take a semi permanent appearance. The majority of waste likely to get generated will include rubbish, ashes and residues, etc. These wastes will be generated due to construction camp, construction activities and materials used for construction. If inadequate arrangements exist for the disposal of above mentioned wastes, there will

be negative impact on the soil, aesthetic beauty of area and workers' health and safety.

Possibilities of bitumen and oil leaks, spread of contaminants brought through material transport including invasive species, etc. Also, construction debris such as removed parts of trees, soil, excess construction material, etc. which need to be disposed off site

5.2.2.5 Landscape

Landscape refers to the appearance of the land, including shape, texture, color and features. The landscape of an area can contribute to people's enjoyment of built and natural environments, attract investment, assist in development, promote biodiversity and affect drainage patterns.

Some changes to landscapes may be temporary such as the construction material, items of equipment (e.g. piling), vehicles, etc., which may be visible from the distance whilst others may be more permanent such importing material and the building up areas or the establishment of facility buildings, and chimneys/stacks.

While the existing site is currently a vacant land surrounded by settlements, the development of the Project will change the topography and landscape of the area and will become a prominent feature.

5.2.2.6 Access Road/ Traffic Congestion

The transportation and use of heavy equipment and trucks would be required during construction for the movement of construction material. Both access roads need to be used during construction period. The overall conditions of both the access roads are not good which need to be improved prior to starting the construction activities. The construction vehicles will add more traffic and road congestions. This has the potential to directly impact traffic flow of the access roads. Also due to the movement of the construction materials carrying vehicles the potential for accidents in the access roads will also increase.

5.2.2.7 Job Opportunity

At the peak of construction phase, it is likely to provide employment of nearly 100 personnel in various positions, and the contractor will be responsible for creating these employment opportunities. Priority will need to be given to the local community people for unskilled labour. This may result in an increase on household income.

5.2.2.8 Business Opportunity

At the time of construction, due to the demand of construction materials, construction

workers food and other necessaries may create a negative, as well as positive impact to the surrounding areas of both SAL site. The demand may create short-fall for the people in the area, as well as people can enhance their businesses in supplying daily needed commodities, quick medicines, fast/ dry foods and training accessories. They can also boost up their business through laundry and washing facilities.

5.2.2.9 Occupational Health & Safety

Construction workers may face sudden occupational health hazards such as, minor or major injuries due to lack of general safety requirements and precautions applicable for such sites, malfunctioning equipment, careless use of equipment and vehicles, etc. At the construction site, camps will be constructed for temporary accommodation for about 100 workers. Poorly designed sanitation facilities may pose a health threat and nuisance to the workers. Uncontrolled vending of food and drinking water on the work site may also pose a risk with respect to the transmission of contagious diseases like Typhoid, Diarrhea, Malaria, Dengue, etc. Construction workers may be required to handle hazardous materials such as cement and bitumen therefore increasing health risks.

5.2.2.10 Nearby Public Health and Safety

Improper H&S policy maintained at the site may lead to outbreak of different diseases to the surrounding people through the sick construction workers.

5.2.3 Impacts during Operation

Operational impacts continue during the life of the project after the completion of construction phase and these impacts are long lasting and in some cases permanent.

5.2.3.1 Effluent/ Waste Water

Only the liquid glucose plant is expected to generate industrial effluent. Effluent/wastewater generation is related to wet operations of the liquid glucose process. Pollutants in liquid effluent include suspended solids, mineral oils and other organic compounds. An effluent treatment plant (ETP) will be setup for the plant to treat the effluent and ensure pollutants in effluent/wastewater are within prescribed limits prior to discharge to the canal. The details of the ETP design are presented in Annex C.

Process Cooling Water: In addition to the process liquid waste, certain volumes of liquid wastes mainly comprising boiler wash water, boiler blow down, jacket water (individual cooling water) and other occasional releases are discharged from the plant. Generally, this wastewater does not contain any harmful or toxic elements and

requires no special treatment. However, a routine monitoring will be required for effluents particularly for cooling water (temperature and pH) and for boiler blow down (concentration factor and pH) before discharging into the environment.

The Danga Site's own deep tubewell capacity is estimated at 275,000 liters per day (L/Day). The flour mill's water requirement will be 200,000 L/Day mainly for wheat cleaning, floor washing, cleaning floor & machineries. The food processing plant will require about 5,000 L/D mainly for washing of floors machineries, utensils etc.

The capacity of Olipur Site's own deep tube well is only 60,000 liters per hour and the actual consumption of water is less than the capacity.Olipur Site will build another own deep tube well of 700 feet (more than 200 meters) deep and will ensure that no other deep tube well are within 1,000 feet (300 meters)radius of the site deep tube well.When two deep tube wells sink within 600 feet (or less than 200 meter)and with capacity of more than 100,000 liters per hour, then one can affect the other. Moreover, water layer of shallow tube wells is only 60 to 70 feet which is used for irrigation purpose. Therefore there will be no impact on water source of local communities.

The capacity of liquid glucose plant is 150 tons per day. Maximum volume of wastewater is estimated at 220,000 liters per day and will be treated in the dedicated ETP (250,000 liters per day capacity).

There will also be dedicated ETP for the flour and food processing plant for the washing and cleaning water.

5.2.3.2 Odor

Odor may be generated particularly during frozen food and liquid glucose processes, and from use of oils and other organic content. Odor may also be a problem in the waste disposal area and the area surrounding it. Proper mitigation measures need to be designed to minimize the impact.

5.2.3.3 Air pollution

During the manufacturing of flour, frozen food item and liquid glucose, the following air emissions might take place:

- Dust emission from manufacturing process and traffic
- VOC emission from mixing
- Exhaust emission from boiler
- Exhaust from Diesel Generator

A. Dust

Dust emissions would occur during processing and manufacturing of flour. Invisible micro dust particles of fibers escape from the factory, which deteriorate the ambient air quality in terms of Suspended Particulate Matter (SPM). The pollution of atmosphere by SPM may have the following effects:

- Increased dustiness of the area
- Retarding the growth of the vegetation
- Increased nuisance to the inhabitants
- Increased health hazards to the workers and inhabitants

However, the nature and extent of the effects depend on concentration of particulates and the length of exposure.

Drying of starch occurred in closed dryer and there is no scope to come out during drying. Packing of starch done by Filling machine and there is also no scope to expose starch powder to Filling machine workers/operators. Every hot surface must be properly insulated to avoid heat loss and at the same time to maintain ambient temperature within the limit. More over there is no temperature higher than 150 degree centigrade used in the process. Machineries used in the process are rotating not reciprocating and not make noise beyond the limits. Therefore are no potential occupational health impacts.

B. VOCS

Emissions of VOCs are related to the use of organic solvents in activities such as frozen food processing processes, liquid glucose manufacturing etc. Another source of emissions is the evaporation or thermal degradation of chemicals used. This can have a significant impact as well.

C. Exhaust Gases

Another source of air pollution is the exhaust from the boiler operation. Since the boiler will be operated by natural gas as fuel, limited air pollution is expected except some effects on the ambient air quality in terms of thermal pollution through stack effect of the boiler.

All the above impacts would be contained within the working environment within the plant area and would not affect the area outside the site, provided standard mitigation measures have been applied to control the potential environmental impacts.

Moreover, vehicular emissions will be the major source of air pollution from the SAL sites. The pollutants from vehicular emission would include SPM, SPM,

CO2, NOx and CO. However, as most of the vehicles would be using compressed natural gas (CNG), pollution from vehicular sources is expected to be low. It is recommended that the traffic within the sites to minimize traffic jams.

During the baseline survey, no apparent problem with the air quality was noticed. Satisfactory results were obtained which revealed that the ambient air quality (in terms of PM10, SPM, SO2, NOX) is within the acceptable levels as prescribed by the Department of Environment and IFC guidelines.
All the boiler of the two sites will be operated through natural gas.

5.2.3.4 Noise Pollution

Major sources of noise pollution expected are:

- Industrial processing
- Food production
- Vehicular traffic
- Generator sets during emergency

High noise level, causing inconvenience and certain health impacts related to hearing impairment and other problems for the workers, are expected if no monitoring, mitigation and enforcement measures are in place. The respective agencies responsible for such noise generation are envisaged to be monitored by the proposed environmental and social cell at the site.

5.2.3.5 Solid Waste/ industrial waste

There will be 650 persons (300 x 2 = 600 workers and about 50 other employees) staying within the both SAL project sites. It is estimated that the 325 kg (JAICA 2005) municipal solid wastes (organic and inorganic) per day (0.5kg/person/day) will be generated during the operation phase, which need to be disposed effectively and timely manner. Improper management of solid waste may lead to soil and ground water contamination through the generation of leachate. Bad odour due to non-removal of waste regularly will also cause unhealthy conditions in the both SAL site and surrounding area including attracting nuisance animals such as flies and mosquitoes. Overall, negative impacts are predicted due to solid waste during the operation phase if handling and disposal of solid wastes will not be carried out in accordance with the waste management plan.

The Flour Mill is expected to generate about 21,000 kg/day of solid waste from wheat bran, (6%) which will be used for cattle feed/ poultry feed. As for the frozen food

processing, about 3,750 kg vegetable/day will be generated which will be used to make organic fertilizer.

Inorganic Solid waste: A very small quantity of dust (clay and sand) is collected in vacuum cleaner and it is less than 0.5% that is maximum 300-350 kg per day and it can be used for land development.

5.2.3.6 Sewage Disposal

Appropriate sewage disposal system will be developed for the proposed SAL sites. Otherwise, the untreated/ unmanaged sewage will create soil and ground water pollution. It will also create bad odor which will be unhealthy and cause nuisance for nearby communities at both SAL sites. Untreated sewerage will also cause human health diseases if contaminated to ground water or soil (toxicological effect).

5.2.3.7 Dust explosion hazards

Explosions and fires within the food industry from combustible materials are a known hazard and they can have devastating and irreversible effects. Fire and explosion hazards are encountered in the food industries from dusty and powdered substances.

5.2.3.8 Transport linkage

The proposed SAL sites area is a rural area. The access road is narrow and small and light vehicles are moving around regularly. So transport facilities will be increased through the surrounding villages.

5.2.3.9 Job Opportunities

The Proposed SAL sites will create permanent job opportunity for around 650 persons in various official capacities and posts. PRAN will create 50 permanent positions for managerial activities. A Non Governmental Organization (NGO)/ Community Based Organization (CBO) will be selected for cleaning, security, food supply, cooking and other purposes. Operations management will be instructed to fulfill the vacant post by eligible local people. It will not only lead to increase in household income but also contribute towards national economic uplift.

5.2.3.10 Landscape / Tree Plantation

Landscaping would be one of the most important features of this both SAL sites. A total of 0.97 acres of land out of 5 acres is designated for greenery tree plantation (19.5% of total area). 35% green space is considered as open space. Essentially, the open spaces and greenery area within the proposed site premises are centered at the following locations:

- Entrance of the site area

- Inside along the boundary
- Around the open spaces

The tree plantation in the proposed area will not only function as landscape features resulting in harmonizing and amalgamating the physical structures of proposed buildings with surrounding environment but will also acts as pollution sink/noise barrier. It will protect soil erosion, make the ecosystem more diversified and functionally more stable, make the climate more conducive and restore balance.

5.2.3.11 Occupational Health and safety

The project will be implemented for 600 workers to receive training for 6 months simultaneously. So there could be some health and safety risks that may occur during their stay in the dormitory and training time and these are:

- Accidents due to move/ fall down from the roof/ balcony
- Movement using the stairs
- Fire hazards from loose electric lines/ cooking stoves/ careless handling of material that can generate fire
- Inadequate lighting and ventilation in and outside the industry buildings
- Poor water supply and sanitation facilities
- Poor cleanliness of the building occupants
- Lack of daily cleaning and regular maintenance of the buildings and the surrounding land.
- Exploration of dust drying

5.2.3.12 Product Contamination

Company will follow International Standard HACCP & ISO 22000: 2005 food safety standards to address potential product Communication. SAL will mitigate product Contamination Risk by practicing GMP (Current Good Manufacturing Practices)

The company management clearly separates the quality and safety assurance systems as GMP/SSOP and HACCP respectively. All the GMP and SSOPs are termed by us as Codes of Good Practices. USFDA eight sanitation key areas are the prerequisites for the implementation of HACCP & FSMS system. These issues are addressed in the processing plant is spelled out with the following heads:

- Good Plant Maintenance Practices
- Good Potable Water Control Practices
- Good Raw Material Practices
- Good Cleaning and Disinfecting Practices
- Good Hygiene Practices

- Good Pest Control Practice
- Good Manufacturing Practices
- Good Transport Practices
- Good Storage Practices
- Good Waste Disposal Practices

Protection of employee from inhaling aerosols and from lung diseases by providing and wearing of personnel protective equipment (PPE) such as mask, head gear and goggles while working in the dusty area (e.g. flour mill).

When recruiting any person for handling flour and frozen products, medical certificates will be required. Any person who, by medical examination or supervisory observation, is shown to have, or appears to have an illness, open lesion (including boils, sores or infected wounds) or any other source of microbiological contamination by which there is a reasonable possibility that frozen food contact surfaces or frozen packaging materials will become contaminated, will be excluded from any operations that may be expected to result in such contamination until the condition is corrected. Plant doctors will alsocheck employees' health in a regular basis.

5.2.4 Cumulative Impacts

There will be no cumulative impact on the both site as there are no industry surrounding the both sites.

6. ANALYSIS OF ALTERNATIVES

6.1 The No Build Scenario

From a purely physical environmental point of view, the 'do-nothing' is preferable to any project implementation, since it would avoid creation of any of the adverse impacts associated with the project. However, the potential socio-economic benefits to the nation would be foregone and industrial growth would be hampered.

It is concluded that the 'No build' alternative is unacceptable, and the potential socio-economic benefits of implementation of such project far outweigh the adverse impacts which can be controlled and minimized to an allowable level.

6.2 Consideration of Alternatives

In Bangladesh, due to land scarcity, seeking alternative site in establishing any industrial zone is quite difficult. In addition, land acquisition is a lengthy and complex procedure under the existing Land Acquisition Law of Bangladesh. Not only that, the project conceptual development over alternative sites is quite difficult because delay in overall land acquisition process might create social conflict and risk for the project.

7. ENVIRONMENTAL MANAGEMENT PLAN

7.1 Objectives

Environmental Management Plan (EMP) is prepared for all the identified environmental impacts during pre construction, construction and operational stages of the both SAL sites of Danga and Olipur site development and operation. Each potential environmental issue is addressed in the EMP through the following steps

- Issues
- Environmental Impact
- Mitigation measures
- Budget
- Implementation and supervision

The strict implementation of the EMP and project management's strict enforcement of the adequate construction practices and standards will greatly reduce the negative impacts of the Project. Environmental and social consultants if necessary will be engaged to support EMP implementation including monitoringPossible Mitigation Measures

On the basis of discussions in **Section 5.2**, the possible mitigation measures presented in the following *Exhibit 61* are recommended for the impacts.

Exhibit 60. Mitigation/Enhancement Measures during Pre- Construction, Construction and Operation Stages of SAL sites

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
Pre-Construction Stage				
Design of Project facilities	Improper design of project facilities will lead to environmental degradation	• All project facilities are to be designed in accordance with the planning and design norms as proposed in 'Chapter 3 of this EA report. • Earthquake hazard should be considered in the structural design of the buildings.	SAL	Consultant
Construction Stage				
Air Pollution	– Air quality can be affected by vehicle exhaust emissions and combustion of fuels. – Air quality can be affected by emissions from machinery and combustion of fuels. – Dust generation from construction sites, material stockpiles and access roads	• Fit vehicles with appropriate exhaust systems and emission control devices. • Maintain vehicles and construction equipment in good working condition including regular servicing. • Operate the vehicles in a fuel efficient manner • Cover haul vehicles carrying dusty materials moving outside the construction site • Impose speed limits (20 km/hr) on all vehicle movement at the worksite and through access roads to reduce dust emissions • Control the movement of construction traffic in the access road • Water spray construction materials (specially sands & boulder/brick chips) prior to loading and transport • Focus special attention on containing the emissions from generators • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites or fixed immediately prior to usage • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete mixing plant to control the particle emissions at all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		• Water spray to the material stockpiles, access roads and bare soils as and when required to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds and dry periods). Stored materials such as boulders and sand shall be covered and confined to avoid them being wind-drifted • Erect dust barriers along the boundary of the land to reduce dust movement to the surrounding areas • Minimize the extent and period of exposure of the bare surfaces • Reschedule earthwork activities when practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site • Restore disturbed areas as soon as possible by vegetation/grass-turfing • Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations		
Noise Pollution	– Increased noise levels due to vehicular traffic – Increased noise and vibration may have an impact on nearby sensitive receptors –	• Maintain all vehicles in order to keep them in good working order in accordance with manufacturers maintenance procedures • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. (@20 km/hr night time) • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site • Appropriately site all noise generating activities to avoid noise pollution to local residents • Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines, silencers) • Maintain all equipment in order to keep it in good working conditions in accordance with manufacturers' maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment.	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		• Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment • Avoid the unnecessary use of alarms, horns and sirens • Notify adjacent landholders prior any typical noise events outside of daylight hours • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions • Employ best available work practices on-site to minimize occupational noise levels • Install temporary noise control barriers where appropriate • Notify affected people if major noisy activities will be undertaken • Plan activities on site and deliveries to and from site to minimize impact • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, when working at night • Establish a grievance mechanism as part of a stakeholder engagement plan		
Sewage Pollution/ Sanitation Hazard	Lack of proper sanitation facilities will pose health hazards and risks	• Provide hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Ensure the sanitary facilities are kept clean and without any odor • Educate the workers of using the facilities	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
Solid Waste Pollution	Solid and water pollution from the improper management of waste and excess materials from construction sites.	• Dispose all wastes generated during construction in an environmentally acceptable manner. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all the wastes, wherever practical. • Prohibit burning of solid waste • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite and worker camps. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal by the Union Parishad. • Ensure proper collection and disposal of wastes within the construction camps from where Union Parishad will take by their vehicle and dispose at their dumping area. • Insist on waste separation and store by source; organic wastes in one container and inorganic wastes in another container. • Clear wastes on daily basis to waste collector. Establish waste collection, transportation and disposal at the dumping site in the adequate size of concrete chambers/boxes. • Dispose organic wastes in a designated safe place and should be kept covered so that flies, mosquitoes, dogs, cats, rats, etc. are not attracted. Encourage composting of organic waste that can be used for tree planting purposes. • All solid waste will be collected and removed from the work camps and disposed in approved waste disposal sites.		

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
Landscape	Construction activities especially earthworks, stock piling of construction materials, parking of vehicles etc. will change topography and disturb the natural rainwater drainage as well as will change the local landscape temporarily.	• Ensure the topography of the construction yard is conducive to enhance natural draining of rainwater at all times • Parking of construction vehicles and stockpiling of construction materials should be done in systematic way to avoid any drainage blockages, to enhance the aesthetics of the site. • Duration of stockpiling should be minimized as much as possible	Contractor	Project Management
Access Road/ Traffic Congestion	Increased traffic use of narrow access road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	• Ensure uninterrupted traffic movement during construction • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Bangladesh Road Traffic Regulations of BRTA. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Bangla: – Location: village name – Duration of construction period – Period of proposed detour / alternative route – Suggested detour route map – Name and contact address/telephone number of the concerned personnel – Name and contact address / telephone number of the Contractor – Inconvenience is sincerely regretted • Restrict truck deliveries to day time working hours (as common practice in	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		Bangladesh) to avoid road accidents and to reduce inconveniences to the road users. • Restrict the transport of oversize loads. • Operate construction vehicles to non-peak periods (night) to minimize traffic disruptions. • Enforce on-site and access road speed limits. • Establish a grievance mechanism as part of a stakeholder engagement plan • Alternate route in transport of some construction materials through the river (in case of Danga Site) Note: Improvement of the access road has been started by LGED . Access road should be improved fully prior to starting construction.		
Liquid/ hazardous waste	Improper storage and handling of fuels, lubricants, chemicals and hazardous liquid on-site, and potential spills from these liquid materials will pose health hazards or risks to construction workers and contaminate the environment.	• Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in enclosed areas with a covering of a sealed plastic sheet away from watercourses. • Refueling shall occur only within enclosed areas. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to handle construction materials. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall be established in higher ground if possible preferably with a slope or drain to a safe collection area in the event of a spill. • Put containers and drums in permanent storage areas on an impermeable floor.	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		• Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Ensure basic firefighting equipment are in place outside these storage areas in case of a fire		
Construction Camp Management	Improper location of construction camp and facilities (such as water supply) will put pressure on local resources used by nearby communities and will have impacts related to health, social and security matters.	• Locate the construction camps inside the proposed construction area. • Create awareness among the camp users on health and safety requirements to be maintained and code of conduct	Contractor	Project Management
	Lack of adequate facilities, such as housing, water supply and sanitation facilities will pose health risks and hazards and substandard living conditions for construction workers.	• Provide adequate housing for all workers avoiding over crowding • Provide safe and reliable water supply from deep tube wells of 300 m depth that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes	Contractor	Project Management
	Disposal of waste: Management of wastes is crucial to minimize impacts on the	• Ensure proper collection and disposal of solid wastes from the construction camps • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at sources.	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
	environment	• Store inorganic wastes in a safe place within the site and clear organic wastes on daily basis to waste collector or compost the waste. • Store and cover organic wastes so that flies, mosquitoes, dogs, cats, rats, etc. are not attracted. • All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.		
	Health and Hygiene: There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	• Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Conduct an initial health screening of the laborers coming from outside areas • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis • Establish a code of conduct for the contractor staff. Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form. • Regular mosquito repellant spraying during monsoon periods.	Contractor	Project Management
	Safety: Inadequate safety facilities to the construction camps may create security problems and fire hazards	• Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry into the camp area. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		and capable of withstanding wind storms/cyclones. • Provide appropriate type of fire fighting equipments suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.		
Worker Health and Safety	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector	• Implement suitable safety standards for all workers and site visitors which shall not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; ADB's 'Safeguard Policy Statement 2009) and contractor's own national standards or statutory regulations, in addition to complying with the national standards of the Government of Bangladesh (e.g. `The Bangladesh Labor Code, 2006') • Provide the workers a safe and healthy work environment, taking into account inherent risks of this particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job • Appoint an environment, health and safety manager to look after the health and safety of the workers • Inform the local authorities responsible for health, religious and security before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
	transmitted diseases), risk factors resulting from human behavior (e.g. STD, HIV etc) and road accidents from construction traffic;	security matters		
	Child and pregnant labor	• Not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Bangladesh Labor Code, 2006	Contractor	Project Management
	Accidents: Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	• Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work • Document and report occupational accidents, diseases, and incidents and actions taken. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazardsin a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules • Provide adequate lighting in the construction area and along the roads	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
	Construction Camps: lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	• Adequate ventilation in all facilities • Safe and reliable water supply. Water supply from deep tube wells that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Safe storage facilities for petroleum and other chemicals • Solid waste collection and disposal system • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities	Contractor	Project Management
	Water and sanitation facilities at the construction sites: lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	• Contractor shall provide safe drinking water facilities to the construction workers at all the construction sites.	Contractor	Project Management
	Other management: potential risks on health and hygiene of construction workers	To reduce health risks to the construction workers and nearby community should follow: • **Liquid Waste Mitigation Measures**	Contractor	Project Management

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
	and general public	• **Air Pollution Mitigation Measures** • **Noise Mitigation Measures** • **Road/Road Traffic Management**		
	Trainings: lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	• Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS.	Contractor	Project Management
Operational Stage				
Industrial Effluent	From the liquid glucose plant	• Effluent from will be collected and transported through concealed pipes to ETP which will discharge treated effluent • Effluent standard need to meet DoE and IFC guideline. • No treated/non treated water and solid waste generated from the ETP should be let out to land/drain/existing water sources or discharged to other areas (ETP Details are presented in ANNEX-C) • The Contractor/ Construction firm should include the main mitigation measures in the treatment process, to ensure that effluent standards are met	ESU	SAL
Air Pollution	Processing plant, vehicles, boiler, generator	• Suitable dust collectors (bag filters) will be provided at all major emission sources. Use of masks should be made compulsory for the workers. • Gas based generator will be used • Boiler/generator will be regularly inspected to ensure that they are operating efficiently and emission standards are met • For well dispersion of the hot air from boiler stack, it is recommended that the height of the stack chimney should be at least 15.0 m	ESU	SAL

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		• Installing and modifying equipment to reduce solvent use • Adopting water based methods for removing oil and grease from fabric instead of using volatile solvents • Periodical monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures will be taken. • Green belt program will be maintained. • Public awareness programs to be undertaken		
Noise Pollution	From industrial activities and vehicle load- unload	• The workers and employees working at the factory premises should use ear plugs and ear muffs for protection against the noise • Using enclosure for all generator sets • Carryout regular maintenance of the equipment to minimize the noise level • Carry out periodic monitoring of noise levels, if values exceed the standard limits, suitable mitigation measures to be taken. • Green belt will be maintained. • Public awareness programs to be undertaken. • Establish a grievance mechanism as part of a stakeholder engagement plan	ESU	SAL
Traffic Control and Safety	Vehicle traffic	• Traffic management plan will be implemented • Traffic control measures to be enforced strictly.	ESU	SAL
Odour	From industrial production	• Installing and modifying equipment to reduce use of odorous chemicals • Routing of stack emissions through boilers to reduce odour emissions • The designers should have included the main mitigation measures in the treatment process (ETP, STP, to ensure that odor standards meet national/ international standards • Establish a grievance mechanism as part of a stakeholder engagement plan	ESU	SAL
Maintenance of	Canal water pollution	• The existing canals will be periodically cleared to sustain storm water flow		

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
Existing Canals				
Drainage congestion:	Local drainage system may get clogged due to improper management of Solid waste, and other materials.	▪ Maintain drains regularly as and when required ▪ Solid wastes should not be dumped into the drain. ▪ Blocked drains should be cleaned properly and debris disposed at approved sites.	ESU	SAL
Solid Waste Generation and Disposal	▪ Water, air and land pollution ▪ Cause diseases to man and other lives ▪ Public health, eyesore, odour ▪ Disease vector proliferation, sanitary problems	▪ Setting up of separate waste collectors at different points ▪ Regular cleaning and replacing of waste collectors ▪ Waste disposal at a safe place ▪ Union Parishad to collect solid waste everyday and disposed to the landfill site ▪ Encourage waste sorting by the facility users	ESU	SAL
Sewage waste	▪ Causes water borne diseases	▪ Maintenance of Septic tanks, soak wells, pipes, etc. as and when required ▪ Provide a Sewage Treatment Plant (STP) and Soak Pit ▪ Regular monitoring of water quality	ESU	SAL
Dust Explosion	▪ Dust generated from flour mill	▪ Seal joints and leakage points around powder handling systems to prevent escape and accumulation of dust in the building and onto surrounding plant items. ▪ Maintain scrupulous cleanliness by the use of a fully earthed, centralised piped vacuum cleaning system. Avoid the use of sweeping brushes and compressed air except for non-dusty cleaning activities. ▪ Maintain slight negative pressure on storage vessels such as bins and silos by use of extraction systems.		

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		▪ Provide adequate arrangements for separating powder from its transporting air (e.g. cyclones & bag filters), when pneumatic conveyor systems are used. ▪ Fit silos or bins with explosion relief and vent to an unoccupied place of safety, preferably outside the building. ▪ Equip dust-collecting silos with appropriately designed explosion relief and a rotary valve at the base to act as an explosion choke. If the explosion relief is located above the vortex finder it is essential that the strength of the vortex finder ('thimble') is adequate to withstand an explosion within the cyclone. ▪ Totally enclose open bag (unenclosed sock) dust collecting filter units and fit with explosion relief		
Solid Waste	▪ Solid waste from industrial activities	▪ Minimize inventory storage time for raw materials to reduce losses from putrefaction; ▪ Monitor and regulate refrigeration and cooling systems during storage and processing activities to minimize product loss, optimize energy consumption, and prevent odors; ▪ Consider use of enclosure techniques to minimize damage to raw materials stored outdoors; ▪ Monitor and optimize process yields, e.g. during manual grading or cutting activities, and encourage the most productive employees to train others in efficient processing. ▪ Clean, sort, and grade raw foodstuffs at an early stage (e.g. at the farm site), in order to reduce organic waste and substandard products at the processing facility; ▪ Contain solid waste in dry form and consider disposal through composting and / or use for soil amendment; ▪ Organic and non-organic debris / soil, solid organic matter, and liquid effluents, including sludge from wastewater treatment, which remain after the		

Issue	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institution	
			Implement	Supervising
		implementation of waste prevention strategies should be recycled as a soil amendment (based on an assessment of potential impacts to soil and water resources) or other beneficial uses such as energy production; ▪ Collect and reuse rejected raw materials for manufacturing other products; ▪ Provide leak-proof containers for collected solid and liquid waste; ▪ Segregating individual by-products from each other and from waste to maximize their use and minimize waste.		

- **Occupational Health and Safety Management Plan**

An Occupational Health and Safety Management Plan (OHSMP) shall be established, operated and maintained for the project. The contents of the OHSMP manual for all project components will be based on ILO-OHS 2001 and outlined in brief in the following *Exhibit 62.*

Exhibit 61. Occupational Health Safety and Hygiene Management System Features

1.	**Occupational Health Safety and Hygiene Policy**
–	Management's supports and direction
2.	**Organizational Framework of the OHSMP (Safety Organization)**
–	Staffing of OHSMP
–	Operating procedures
–	Training program on all topics of OHSMP
–	System documentation
–	Communication
3.	**OHSMP Objectives**
–	Realistic and achievable participation of all by supervision
4.	**Risk and Hazard Prevention**
–	Prevention and control measures
–	Emergency preparedness/ awareness and response
–	Procurement (tools, equipment, services contractors, etc.)
5.	**Performance Monitoring, Investigation and Reporting**
–	Hazards and natural calamities prevention measures
–	Ambient working environment
–	Work related injuries, ill health, diseases and on-going incidents
–	On-going Medical and safety monitoring program for all workers and employees
6.	**Evaluation**
–	Feedback
–	Corrective measures
–	Action plan

1 Occupational Health Safety and Hygiene Policy :

There is a well defined IMS policy which is documented in the IMS documentation. It expresses the commitment of the top management of PRAN Group towards prevention of Ill Health and Injury, Environmental Pollution and a continual improvement of the IMS in terms of improvement of its IMS performance. It also commits to the compliance to legal requirements and any other requirement that PRAN Group has subscribed to.

2 Organizational Framework of the OHSMP (Safety Organization)

– Staffing of OHSMP

There is a clear allocation of the roles and responsibilities in the IMS manual. The process owners are identified in an organogram and the reporting lines are defined. Each departmental head is concurrently responsible for the assurance of prevention of pollution and the injury/ill health in its area of control and area of influence. At present, adequate number of qualified personnel are in place.

PRAN Group has extended this into the project where the responsibility and authorities in line with the IMS are defined and adequate number of personnel are placed in appropriate position. Mr. Rasel Kabir, the IMS co-ordinator of the Group remains the responsible person for the adherence of the IMS in the project level.

– Operating procedures

A set of OCPs are defined in the IMS Procedure manual. These are associated with those procedures that are having any possibility of significant impact. The procedures are well promulgated and practiced. They mostly evolve from a study of Aspect/Imapact/ HIRA and the applicable legal and other requirements.

– Training program on all topics of OHSMP

PRAN Group will conduct, on top of the existing programs, following training for the project personnel:

(a) Construction safety
(b) Handling of heavy equipment and manual handling.
(c) Electrical safety.
(d) Waste management.
(e) Workplace hygiene.
(f) Pollution prevention.
(g) First aid and fire training.

These training programs can be conducted by internal trainers of PRAN Group.

– System documentation

The IMS has its documentation arranged in 3 layers. Policy manual, Procedure manual and filed level WIs and Check Lists.

– Communication

The formal communication is by emails in the network. All responsible persons are connected in the PRAN Group IT system and any decision, instruction, information and communication is made by internet.

3 The IMS OHSMP Objectives

PRAN Group, in its 7 of the existing plants, have established its IMS objectives in line with reduction of waste disposal, increase of recycling, reducing number of reportable incidents, conducting training programs etc.

A set of clear objectives at the project level is still to be established. It is now imperative to formulate achievable objectives in line with the IMS policy for the 2 projects that ADB is going to fund.

4 Risk and Hazard Prevention

– Prevention and control measures

The control of impact and risk is through a chain of event which starts at Aspect/Impact/Hazard Identification exercise. In carrying out this, each department of all the units have collated the available information, history, experience, that may have an incident or probability of incident. Summarizing these information, individual aspect impact and hazards are documented. A methodology is used to assess impact and risk associated with each of the impact and risk. A set of Unacceptable Risk and Significant Impact is identified which are then used in order to set objective and operational controls.

– Emergency preparedness/ awareness and response

The identified emergencies are fire, failure of ETP, Earth Quake, Chemical Release and sudden illness. For each of these, a ERP is set. Same is practiced through mockdrills and continually being improved.

– Procurement

All the supports required for effective implementation of the IMS are procured including the PPE and pollution prevention equipment as necessary.

5 Performance Monitoring, Investigation and Reporting

– Hazards and natural calamities prevention measures

The monitoring of the hazards and impacts is part of the IMS. Both the standards ISO 14001 and OHSAS 18001 has a mandatory requirement to monitor and measure the performance, both proactive and reactive. For OH & S, adherence to the specified procedure is a pro-active measure of performance. However, monitoring the incidents and ill health, is a reactive measure of performance.

Similarly, the environmental performance is monitored by measuring the BOD, COD, DO, pH etc as mandated in the ECR 97. Noise is monitored both by day and at night.

All incidents – irrespective of severity – are taken through a process of incident investigation, root cause identification, corrective and preventive actions. A register is maintained for this.

– Ambient working environment

The overall ambient working condition is reasonably good. In some sections, noise is an issue which is addressed by the use of PPE. An internal audit program is rolled out which includes the monitoring of the ambient working environment.

– Work related injuries, ill health, diseases and on-going incidents

All injuries and ill health identified are recorded. Each of them are investigated to identify the root cause. Correction, corrective actions and preventive actions are taken.
Records of these are available as part of IMS documentation.

– On-going Medical and safety monitoring program for all workers and employees

The medical check up is on the basis of need today. This needs to be broadened and a periodic health check up for the specific health condition (audiometric test for noise prone areas, pulmonary condition for high SPM environment etc.) needs to be established to address this point.

6 Evaluation

– Feedback

An internal audit program is in place. This along with the regular interaction of the workforce with the management brings in the feedback on the performance of the IMS. The results of Internal Audit and the monitoring process are recorded and made available to all points where decisions are taken.

– Corrective measures

Corrective measures against any lapse or deviation of the system are identified and implemented. The effectiveness of the corrective actions are subsequently validated with appropriate follow-up on these.

- Action plan

Action plans are agreed in the management review process. In the management review, high level decisions are reached and recorded. These decisions are reached on the basis of consideration of a number of inputs, e.g., results of audit, communication from stake holders, status of CAPA etc.

Actions plans are integrated in the objectives target and programs where applicable.

The IMS for the existing plants are reasonably comprehensive. However, the extension of the same program into the new project s needs improvement.

- **Disaster Management Plan**

Fire and Earthquake are major disaster for the buildings occupants causing injury and even deaths due to insufficient or lack of disaster management plan. In this regard the following should be taken into consideration to protect the properties and property users such as:

- There should be automatic fire/heat detecting system in each room in each floor of SAL site buildings, as well as water sprinklers.
- There should be sufficient fire extinguishers in each floor which should be checked by the Fire Service Officials twice in a year
- The storage capacity of the fire fighting reservoir should not be less than 100 cu.m so that a rate of flow of 2250 lpm at a pressure of 3kg/sqm could be maintained which should be capable of fighting about 45 minutes in case of a fire.

- The buildings should have emergency fire exits.
- All electrical wirings should be accomplished with good quality wire to prevent electrical leakages, fires and spread of fires.
- The high risk electrical area should be clearly marked with warnings to avoid dangerous practices in the vicinity so that there would be less chance of accidents from those installations.
- The building should be designed by considering proper earthquake load of the zone.
- There should be automatic system in the lift of dormitory (future provision) of the complex so that it would reach to the nearest floor and open the door during electricity failure.
- Site should be identified for assembly during fire or any other hazard with clear marking within and outside the buildings to reach safety
- Awareness to be provided to building users on its safety precautions, code of conduct to minimize user-induced hazards and how to respond during hazardous events

- **Tree Plantation Program**

Planting for landscaping and noise attenuation is suggested for both site of SAL. Suitable tree species for both site are given below:

Exhibit 62. Suitable Tree Species for the SAL sites

Sl. No.	Fruit Trees	Timber Trees	Fuel Wood Trees	Medicine Tress
1	Amra (*Spondias pinnata*)	Jarul (*Lagerstroemia speciosa*)	Bakphul (*Sasbania grandiflora*)	Neem (*Azarlira chlaindica*)
2	Mango (*Mangifera indica*)	Mehogini (*Swietenia mahagoni*)	Debdaru (*Polyalthia longifolia*)	Arjun (*Teominalia arjunna*)
3	Black berry (*Syzygium cumini*)	Shegun (*Tectona grandis*)	Kadam (*Anthocephalus chinensis*)	Bohera (*Terminalia bellericha*)
4	Jam (Syzygium cumuin)	Akasmoni (*Acacia auricoliformis*)	Pitali (*Trewta nudiflora*)	Hortuki

Sl. No.	Fruit Trees	Timber Trees	Fuel Wood Trees	Medicine Tress
5	Tamarind (*Tamerindus indica*)	Rain tree (*Samanea saman*)	Krhisnochura Royal Poinciana (*Delonix regia*)	Amloki
6	Date palm (*Phonix sylvestries*)	-	-	-
7	*Jackfruit (Artocarpus Heterophoillus)*-	-	-	-

7.1.1 Environmental Monitoring Plan

Environmental monitoring is a very important aspect of environmental management to safeguard the protection of environment. During construction, environmental monitoring will ensure the protection of fertile top soils, potential soil erosion from embankment, drainage congestion, and degradation of environmental quality.

In accordance with the EMP, an environmental monitoring plan (MP) has been developed and presented in *Exhibit 63.* The Project Management unit supported by Environmental and Social consultants will be responsible to supervise monitoring activities of all under the Project. The Project Management unit during project implementation will:

- Supervise the environmental monitoring regularly based on the monitoring and management plan prepared in this report with the assistance of Environmental and Social Consultants if necessary. Submit quarterly reports based on the monitoring data and laboratory analysis report: main parameters to be monitored by the contractor are outlined in *Exhibit 63*
- Oversee that Project is complying with all monitoring measures and has subcontracted a recognized organization for data collection for monitoring purposes. It is recommended to use the same institutions that collected the baseline data to avoid possible calibration and methodology errors.

Ensure the environmental monitoring reports including *environmental mitigation measu*res undertaken, environmental monitoring activities undertaken, details of monitoring data collected, analysis of monitoring results, new recommended mitigation measures, environmental training conducted, and environmental regulatory violations are prepared and submitted as required by environmental authorities and annually to ADB.

Exhibit 63. Environmental Monitoring Program during Pre Construction, Construction and Operation Stages

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Cost (in USD)	Responsible Agency	
						Implemented By	Supervised By
Construction Stage							
Ground Water Quality	pH, Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC)	Laboratory analysis against the baseline established	During construction of deep tube-well	Inside the boundary	1500	Contractor through a recognized laboratory	ESU/Project Management
Portable water for the construction Camp	pH, Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC)	Laboratory analysis against the baseline established	Every month During construction period	Construction Camp	1500/ month x 6 month = 9000	Contractor through a recognized laboratory	ESU/Project Management
Surface water Quality	pH, DO, BOD_5, COD, TDS, Lead, Hg, Fe	Laboratory analysis against the baseline established	During construction	River (beside the site) and Canal	1500/ month x 6 month = 9000	Contractor through a recognized laboratory	ESU/Project Management
Air Quality	PM $_{10}$, PM 2.5, SPM, SO_2, NOx	Laboratory analysis against the baseline established	During construction (1 in 3 months)	At the construction site	2000 x 2 = 6000	Contractor through a recognized laboratory	ESU/Project Management
Noise Level	Measurement of noise	– Laboratory	During day time	Near	200 x6 =	Contractor	ESU/Project

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Cost (in USD)	Responsible Agency	
						Implemented By	Supervised By
	dB(A)	analysis against the baseline established – Visual inspection to ensure good standard equipment are in use, – Visual inspection to ensure ear plugs are in use by the construction workers – Inspection of vehicle and equipment maintenance records	and whenever any complains are received about disturbance due to construction noise Noise measurements and routine checks on maintenance records once in each month	residential area, mosque institutional area and site.	1200	through a nationally recognized laboratory	Management
Occupational health	– Check of personal protective equipment (PPE) for workers at the	Visual inspection	Weekly	Construction Site	Internal employer (salary details in	Contractor	ESU/Project Management

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Cost (in USD)	Responsible Agency	
						Implemented By	Supervised By
	sites – Check if Health, First-Aid facility, and staff trained in First Aid are available at the sites – Check if medical checkup of workers is on going				*Exhibit 67*)		
Other specified mitigation measures as per the EMP	Check if all requirements are adhered to	Visual inspection	Weekly	Construction Site, the surroundings including access roads and contractor-managed off sites	Internal employer (salary details in *Exhibit 67*)	Contractor	ESU/Project Management
Operation Stage							
Ground Water Quality	pH, Manganese(Mn), Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC)	Laboratory analysis	Quarterly	Building water supply system	1500 x 4 = 6000	ESU	SAL-Project Management Unit
Noise Level	Measurement of noise dB(A)	Laboratory analysis	Monthly (24 hours) and	Four corners of the site	200 x 12 = 2400	ESU	SAL-Project Management

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Cost (in USD)	Responsible Agency	
						Implemented By	Supervised By
			whenever any complain is received about disturbance due to noise level	boundary, at 200 m and 300 m from the following locations: (i) residential, (ii) institutional (school, mosque), (iii) silent (hospital) area			
Air Quality	PM $_{10}$, PM 2.5, SPM, SO_2, NOx	Laboratory analysis	Quarterly (8 hours continuous for two days)	Inside the project boundary	2000 x 4 = 8000	ESU	SAL/Project Management Unit
Tree plantation Program	Select healthy sapling to confirm survival rate Monitoring plantation procedure Maintenance of plants	Visual inspection to ensure plantations in green areas and other designated sites.	Monthly	As per Master Plan	2100	Contractor and ESU	SAL/Project Management Unit
Water of ETP	pH, Manganese(Mn), Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC), BOD_5	Laboratory analysis against the baseline established	Monthly	ETP treated water	1500 x 12 = 18000	ESU	SAL/Project Management Unit

7.1.2 Institutional Arrangement and Capacity Development

List of various key institutions and their roles and responsibilities for implementation of EMP are given in the following sections.

- **Profile of Key Institutions**

A. *PRAN*

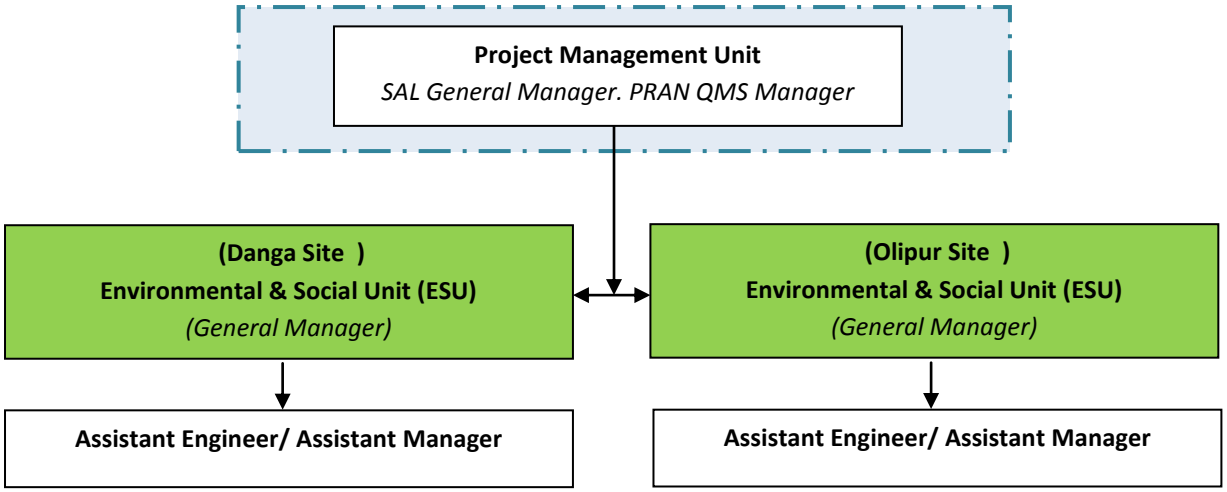
The management of SAL will be mainly responsible for overall environmental and social management of the project. PRAN Group has appointed a Quality Management System Manager who is also responsible for the environmental, health and safety processes and procedures of its factories and facilities.

B. *Project Management Unit*

A Project Management unit for the SAL Project has been established in the head office to manage the preparation (and subsequently implementation) of the proposed SAL project. The unit is in the head office will be headed by a General Manager to be supported by the Quality Management System Manager. Each site will have its own environmental and social unit (ESU) to be headed by the site General Manager. The proposed organization structure for implementation of the EMP is shown in *Exhibit 64*

Organizational structure of Project Management Unit is shown in *Exhibit 64*.

Exhibit 64. Organizational Structure for EMP Implementation



Main tasks of Project Coordination Management unit include:

- Planning and implementation of EMP

- Preparation of TOR for studies/surveys/data collection to be carried out under EMP
- Selection of consultants, NGOs for different components of EMP implementation, including environmental enhancement plans
- Supervision and monitoring of the progress of activities of the consultants and NGOs engaged for implementation of different components of EMP
- Evaluation of construction related environmental impacts and monitoring of adherence of the EMP
- Responsible for modifications of the EMP when there are adaptation/changes during implementation.
- Implementation of environmental monitoring measures (such as environmental quality monitoring, tree plantation, landscaping, wild life monitoring) during O/M stage of the Project.
- Monitoring of water supply, sanitation and health conditions at the project site
- Preparation of environmental and social monitoring reports
- Management and administration of environmental enhancement fund
- Maintain liaison with other government, semi-government and non-government organizations, universities, research institutes in the country on the matters of mutual interest related to environmental management.
- Facilitate consultations necessary with stakeholders related to environmental management

C. *Environmental and Social Consultants*

Project Management unit will hire environmental and social consultants/external environmental and social management company (if necessary) to provide support in supervision of implementation of civil works and implementation of EMP and will act as a 3rd party to ensure the EMP implementation. The consultants will also be responsible for providing support in updating EMP, if required.

Exhibit 65. Proposed Environmental and Social Consultants

Sl. No	Expertise
	Consultants
1	Environmental Specialist (1)
2	Environment, Health, and Safety Specialist

D. *Other Relevant Organizations*

The other relevant organizations involved in the implementation of EMP are those mentioned in the *Exhibit 65.* Department of Environment (DOE) oversee implementation of all development projects in the country verifying that the environmental requirements are fulfilled, government guidelines and procedures are followed and environmental quality standards are maintained properly. DOE will be consulted in case of complicated issues and if any activity requires any further environmental clearance certificates (ECC). Forest Department will help the Project Management unit with tree plantation in the proposed sites. The district administration is responsible for traffic management, law and order and resolving the social disputes that may arise during construction activities.

▪ Proposed Institutional Strengthening of Project Management

There will be institutional strengthening and capacity building programs for the Project Management and ESU units for strengthening in EMP implementation as follows:

A. *Capacity Building Programs Involving Training for the Staff*

This involves continuous and subject-oriented trainings on developing capacity of the Project Management and ESU units on:

- Social and Environmental issues of the Project
- Social and Environmental laws and regulations, norms, procedures and guidelines of GOB and co-financiers
- Environmental and Social safeguards, their importance and benefits
- Preparation of IEE such as screening and/or scoping and adequacy of impact assessment, EMP provisions, Costing, etc.
- Preparation of ToRs and other documentation
- Environmental and Social Management System and preparation of Social Monitoring Framework (SMF)
- Preparation of Environmental and Social covenants in loan agreement
- Disciplines like Environmental Management, Sustainable development, Environment Economics, Environment Auditing, etc.
- Behavioural Sciences
- Some of the senior representatives (managers) should receive environmental and social safeguard training under a recognized program (national and/or overseas).

Environmental, health and safety trainings will also be provided to staff (including contractors) in the following areas:

- Orientation program on HIV/AIDS and sexually transmitted diseases
- Orientation on how to conform with the religious sensitivity of the project area and other codes of conduct
- On the job training on EMP implementation.
- Orientation of health and safety standards requirements and health and safety measure of the site

B. *An initial model of training program will comprise of the following schedule:*

Training Module 1:

(i) Environmental issues related to SAL Project
(ii) Environment policy & legislation of Bangladesh, guidelines on SPS of ADB and IFC guidelines

Training Module 2:

(i) Environment Impact assessment of industry and related studies conducted for the purpose.
(ii) Environment baseline data of proposed site including physical, ecological and social aspects and environment quality.

Training Module 3:

(i) Environment Management and monitoring Plan of the SAL sites.
(ii) Organisational responsibilities and implementation schedules

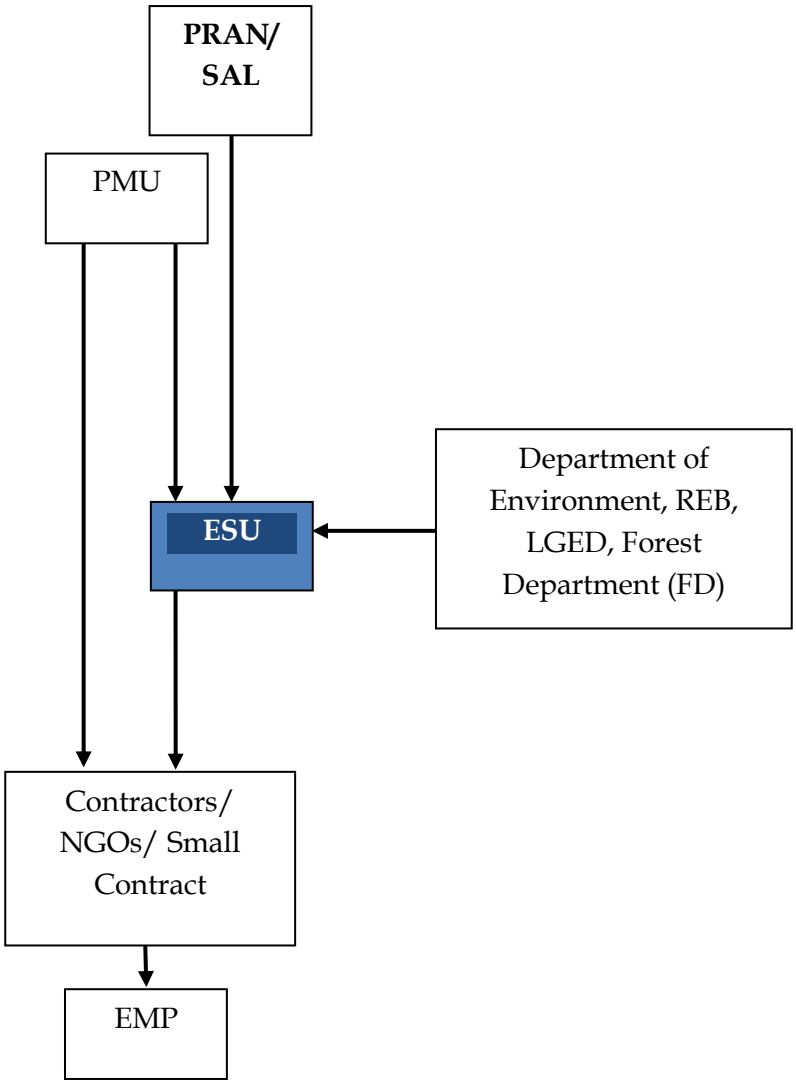
Training Module 4:

(i) Monitoring and Evaluation: analysis of environment data and its interpretation.
(ii) Reporting of environmental monitoring.

- **Institutional Framework for Implementing EMP**

Proposed Institutional Framework for Implementation of EMP is shown in *Exhibit 66*.

Exhibit 66. Proposed Institutional Framework for Implementation of EMP



7.2 Environmental Monitoring Cost

The environmental monitoring cost is given in *Exhibit 67*. The costs of the monitoring will comprise: Air. Water, noise quality monitoring through sample collection and laboratory analysis

The total cost for implementation of the monitoring is estimated as USD 41,400 during construction and Operation/yr.

Exhibit 67. Cost of Environmental Monitoring During Construction and Operation for Both Sites

No.	Activities/item	Unit	No	Rate (USD)	Amount (USD)
1	**A. Tree Plantation**	No	1	3	2100
	B. Monitoring Cost				
1.	CSC (Environmental Specialist/Engineer)	No	1	2,000 per month	12,000
2.	Transportation for Site Visits	LS			5,000
3.	Air, Water and Noise Quality Testing	No	6 months	-	26,700
4.	Contingency	LS			5,000
	Sub Total				50,800
	C. Operational Monitoring Cost/ yr				
1.	HSE Manager	Month	12	2,000	24,000
2.	Ground Water quality testing	Month	4	1500	6000
3.	Air Quality Testing	Quarterly	4	2000	8000
4.	Noise Quality Testing	Month	12	200	2400
5.	Water of ETP	Month	12	1500	18000
6.	Contingency	LS			5000
	Sub Total				63,400
	Total (A+B+C)				**114,200**

8. PUBLIC CONSULTATIONS

8.1 General Consideration

Public Consultations such as Focus Group Discussions (FGDs), individual local people and Stakeholder Consultations (SCs) have been conducted continuously during the IEE study in conformity with the ADB and DOE guidelines to achieve the following objectives:

- To enhance the sustainability of project by ensuring that interventions are relevant to the objectives of the project and will be beneficial to the people of the area.
- To determine potential environmental, social, economical, cultural impacts and develop their mitigation plans including potential negative impacts along with mitigation and positive impacts along with enhancement.

FGDs have been carried out with the group of people such as:

- Previous land owner who sell the land to SAL
- Local Government Representatives
- People living near the SAL site (Female and both female & male)
- Small businessmen
- Suppliers of the materials

Stakeholder consultations have been carried out mainly with the following organizations such as: PRAN, SAL, DoE etc.

These public consultations have been provided key inputs for the identification of the potential impacts (site specific) along with possible mitigation and enhancement measures of the project.

8.2 Focus Group Discussion

The details of FGDs are given in the following *Exhibit 68*. The findings of these of these FGDs are summarized in *Exhibit 69*. Photographs (*Exhibit 70*) of FGDs and list of participants are presented in the ANNEX-A.

Exhibit 68. Details of FGDs

Type of Group	Date	Village	Union	Upazila/ Thana	District	No. of Participants
Danag Site						
Female Villagers Surrounding Villages	22/04/2012	Kazir Char	Danga	Palash	Narshingdi	9
Potential Supplier to the SAL site/ small businessman	24/04/2012	Kazir Char	Danga	Palash	Narshingdi	5
Surrounding People, who sold land to SAL	23/4/2012	Kazir Char	Danga	Palash	Narshingdi	12
Olipur Project						
Female Villagers Surrounding Villages	21/04/2012	Sailakura	Olipur	Habiganj Sadar	Habiganj	10
Potential Supplier to the SAL site/ small businessman	21/04/2012	Nurpur	Olipur	Habiganj Sadar	Habiganj	8
Surrounding People, who sold land to SAL	20/4/2012	Nurpur	Olipur	Habiganj Sadar	Habiganj	10
Total						**53**

Exhibit 69. Summery of the FGDs

Questions to the Groups	Participants opinion, comments and suggestions	Action point/Response to proposal
Any air pollution in the area due to the project during construction and operation? If yes how to mitigate?	Yes, moderate impact may be during construction period due to carry out of sands, earthwork and breaking of bricks, boulders etc. Try to reduce air pollutions.	Construction materials carrying vehicles should be covered well. Water should be sprayed on the road to prevent dust flow in the air.
Any noise- impact of the project during construction and operation at the locality? If yes how to mitigate?	Yes, noise pollution may be occurred from movement of vehicles, piling and breaking of bricks during construction period. Try to avoid making loud noise.	Temporary wall should be made surrounding the area to stop spreading of noise.
Is the Site area inundated during flood?	The project site is not a flood prone area. This area was not flooded even in 1988 and1996 high floods.	Yes
What are the present drainage facilities? Any drainage congestion occurs? If yes how many days it remains?	There are no drainage and sewerage facilities in the proposed project site.	Drainage and sewerage facilities have to be constructed to address drainage congestion and flooding
Where do you dump household waste? Where is nearest waste dumping area? How the wastes are being carried to the dumping site?	Household and other wastes are collected by local people privately and dump on the vacant lands.	Household waste management systems have to be developed in the project area.
Are you in favour of this project? Why?	Yes, by this project unskilled and poor people can develop their skills. They will help their family by earning money as well as help to national economy.	
Any impact on trees &	Most of the participants said that there will be a little bit	More Trees should be planted in the project

wildlife (birds fox etc)? If yes how to mitigate?	impact on the existing wildlife; a few animals may be migrated during preparing of the project. Firmly try to safe the biodiversity.	area and should try to ensure safe habitat for the wildlife.

Exhibit 70. FGDs and Consultation Pictures

	
Female Villagers Surrounding Villages at Danga Site	Surrounding People, who sold land to SAL at Danga Site
	
Female Villagers Surrounding Villages at Olipur Site	Potential Supplier to the SAL site/ small businessman at Olipur Site
	
Surrounding People, who sold land to SAL at Olipur Site	Consultation with Mr. Golam Kibria Chowdhury, Chairman, Nurpur Union
	
Consultation with Mr. Syed Ahmedul Haque, Chairman and Mr. Md.	Consultation with Mr. Reaz Uddin Babor, Acting Head master, Mazaher

Abidur rahman, Vice Chairman, Habigank Sadar Upazila	Hogh School
	
Consultation with PRAN finance Director	Consultation with DoE

8.3 GRIEVANCE REDRESS MECHANISM

PRAN group has good community interaction and surrounding communities and have large participation in the workforce of the individual factories. There is also an established procedure for communication of stakeholders and responding to them accordingly. To comply with ADB requirements, PRAN will formally establish a grievance redress mechanism as part of its stakeholder's engagement.

A formal grievance management system shall be established to handle any complaints that arise during construction and operation phases for the project. The resolution of all grievances and disputes will be according to applicable legislation under national/international (in absence of national laws) requirements.

The following principles will be upheld in the grievance redress mechanism

- Openness/transparency and accessibility to all stakeholders;
- Un-biased approach in the reviewing of grievances or disputes, to promote the trust and confidence of all parties involved; and
- The maintenance of confidentiality if so requested, and to information provided by any of the parties to a complaint

The responsibility for matters relating to grievance and dispute resolution will lie with the environmental and social unit at each site (Danga and Olipur) and the Project Management unit at PRAN. A complaint register will be maintained at each site. The ESU will initially investigate the issue within 14 days of receiving the complaint and seek to resolve it in this time frame, but if the grievance remains unresolved then the complaint will be forwarded to the Project Management unit at PRAN. The Project Management unit when resolving complaints will have the following functions:

- To provide a support mechanism to affected persons;
- To record, investigate and assess grievances; and
- To resolve grievances, in accordance with PRAN's policies and applicable local legislation, and provide prompt feedback to the aggrieved parties

The Project Management unit will seek to resolve each environmental and social issue within 30 days following the forwarding of the grievance by the ESU.

The local community shall be informed about these project grievance handling procedures through its continuing stakeholders engagement and through presentations and discussions in nearby communities and villages.

9. CONCLUSIONS

The present Environmental and Social Assessment studied the environmental and social baseline conditions for the both site of SAL in addition to screened the sites to assess potential impacts. The IEE reveals that there will be both negative (mainly temporary construction related) and positive environmental impacts due to the construction activities and normal operations of the sites. The potential impacts of the SAL site development include:

During Construction:

Negative impacts:

- Air pollution
- Noise Pollution
- Sewage
- Solid waste
- Landscape
- Access road facilities/traffic congestion
- Road accident
- Occupational Health and safety
- Nearby public H&S

Positive Impacts:

- Job Opportunities
- Business opportunities

During Operation:

Negative Impacts:

- Air pollution
- Noise Pollution
- Solid waste
- Sewage
- Occupational H&S

Positive Impacts

- Tree plantation
- Transport Linkage
- Job Opportunities
- Business opportunities

No land acquisition (LA) are required for both sites, as the lands has been purchased by the SAL company with proper way.

Implementation of appropriate mitigation measures during construction, and operation phases will minimize the negative impacts of the Project to acceptable levels. To ensure that these mitigation measures are implemented and negative impacts avoided, the measures will be included in the contract document of the Project with adequate monitoring and supervision in place.

10. REFERENCES

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