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Environmental Impact Assessment Report

Shreehatta Economic Zone

Submitted to
Bangladesh Economic Zones Authority
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Bangladesh Economic Zones Authority (BEZA)

pwc

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Table of Contents

List of Figures

List of Tables

List of Annexures

Annexure I: ToR issued letter (4 pages)

Annexure II: Attendance Sheet of PCM at Villages (4 pages)

Annexure III: Map of Source of site filling from Kushiyara River

Abbreviation & Glossary

Abbreviation	
%	Percentage
°C	Degree Celsius
µg/m^3	microgram per cubic meter
AEZ	Agro Economic Zone
amsl	Above Mean Sea Level
BARC	Bangladesh Agriculture Research Council
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BEPZA	Bangladesh Economic Processing Zone Authority
BEZA	Bangladesh Economic Zone Authority
BMD	Bangladesh Meteorological Department
BNBC	Bangladesh National Building Code
BOD	Biochemical Oxygen Demand
BRRI	Bangladesh Rice Research Institute
BTCL	Bangladesh Telecom Company Limited
BUA	Built-up Area
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
$CaCO_3$	Calcium Carbonate
CCC	Criterion Continuous Concentration
CETP	Common Effluent Treatment Plant
cm	Centimeter
CMC	Criterion Maximum Concentration
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CoI	Corridor of Impact
Cr	Chromium
CSTP	Common Sewage Treatment Plant
Cum	Cubic meter
DG	Diesel Generator
DMB	Disaster Management Bureau
DO	Dissolve Oxygen
DoE	Department of Environment
DoE, B	Department of Environment, Bangladesh
DPHE	Department of Public Health and Engineering
DTA	Domestic Tariff Area
E	East
EC	Electrical Conductivity
ECA	Environment Conservation Act
ECC	Environment Clearance Certificate
ECR	Environment Conservation Rules
EIA	Environment Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EPZ	Economic Processing Zone
ETP	Effluent Treatment Plant
EZ	Economic Zone
FAR	Floor Area Ratio
FCD	Flood Control & Drainage
FDI	Foreign Direct Investment
FGDs	Focus Group Discussions
FMD	Foot & Mouth Disease
Ft.	Feet
g	Gram

GDP	Gross Domestic Product
GIS	Geo-Informatic System
gm/cc	gram per cubic centimeter
GoB	Government of Bangladesh
GSB	Geological Survey of Bangladesh
GSHAP	Global Seismic Hazard Assessment Program
Ha	Hectares
HDPE	High-Density Polyethylene
HHs	Households
HT	High Tension
HYV	High Yielding Variety
ICT	Inland Container Terminal
IEE	Initial Environment Examination
IFC	International Finance Corporation
JDI	Japan Development Institute
Kg	Kilogram
Kg/day	Kilogram Per Day
KLD	Kilo liters Per Day
Km	Kilometer
km	Kilometer
Km/h	Kilometer per Hour
KV	Kilo Volts
LCV	Low Carriage Vehicles
L_{eq}	Equivalent Noise Level
LPCD	Litre per Capita per Day
LPG	Liquefied Petroleum Gas
LT	Low Tension
LU	Land Use
M	Meter
m/s	meter / second
m/yr	meter / year
MAV	Multi-Axle Vehicles
max.	Maximum
mg/kg	microgram per kilogram
mg/l	microgram per liter
Mile/h	Mile per Hour
min.	Minimum
MLD	Million Litres Per Day
mm	Millimeter
Mm/day	Millimeter per Day
Mm/hr	Millimeter per hour
MT	Million Tonnes
MVA	Mega Volt Ampere
MVA	Mega Volts Ampere
MW	Mega Watt
N	North
NaCl	Sodium Chloride
NE	North East
NGL	Normal Ground Level
NNE	North-North-East
NOC	No Objection Certificate
Nox	Oxides of Nitrogen
NW	North West
O.P.	Operational Policy
PCC	Pretoria Portland Cement
PCMs	Public Consultation Meetings
PDMs	Public Disclosure Meetings
PF	Protected Forest

PGA	Peak Ground Acceleration
PM_{10}	Particulate Matter less than 10 micron size
$PM_{2.5}$	Particulate matter less than 2.5 micron size
PMC	Project Management Consultant
PPE	Personal protective Equipment
PPP	Public Private Partnership
PRA	Participatory Rural Appraisal
PSDSP	Private Sector Development Support Project
PUC	Pollution Under Control Certificate
R & R	Rules and Regulations
RAP	Resettlement Action Plan
RF	Reserve Forest
ROW	Right of Way
RRA	Rapid Rural Appraisal
RWH	Rain Water Harvesting
S	South
SE	Socio Economic
SE	South East
SIA	Social Impact Assessment
SMF	Social Management Framework
SO_2	Sulphur Dioxide
SPT	Standard Penetration Test
Sq Ft	Square Feet
sq.km	Square kilometer
sq.m.	Square Meter
STP	Sewage Treatment Plant
SW	South West
TCS	Typical Cross Section
ToR	Terms of Reference
TPP	Thermal Power Plant
TSS	Total Suspended Solids
UK-DFID	Department for International Development, United Kingdom
UNDP	United Nations Development Programme
US$	United States Dollars
VOCs	Volatile Organic Compounds
W	West
WARPO	Water Resources Planning organization
WP	Water Pollution
XEN	Executive Engineer
NGO	Non Government Organization
µmhos / cm	micromhos per centimetre

1. Executive Summary

1.1. Introduction

The Bangladesh Economic Zone Act, 2010, was passed by Government of Bangladesh to make provisions for the establishment of Economic Zones (EZs) in all the potential areas with an ambit to encourage rapid economic development and to instil confidence in investors and signal the Government's commitment to a stable EZ policy regime.

With an ambit of enhancement of economic development in the country, Government of Bangladesh with support from World Bank and the Department for International Development, United Kingdom (UK-DFID) has proposed to develop EZs at various potential locations in Bangladesh as Private Sector Development Support Project (PSDSP).

Bangladesh Economic Zone Authority (BEZA) is the overall agency responsible for establishments of EZs in all the potential areas including the backward and undeveloped regions. BEZA has been formed under the Bangladesh Economic Zone Act, 2010 on 9th November, 2010. BEZA has identified various locations for development of EZs. One of the potential sites is located at Sherpur Upzila and has an approximate area of 143 ha (353.53 acres)

1.2. Project Background

BEZA has planned to develop EZ to be located at Sherpur of Khalilpur Union Under Maulvibazar Sadar Upazila in Maulvibazar District. Economic zone will be developed under PPP mode. BEZA will develop the land and will also cover the off-site infrastructure at the proposed project site. Other services and infrastructure of EZ will be developed by the private developer at a later stage. The off-site development will broadly include the following:

- Site preparation & development
- Administration Building
- Boundary Wall

Taking into consideration the site location, available infrastructure, existing industries, investors interest and infrastructure & logistic requirement of the proposed industries, Shreehatta Economic Zone will be most suitable for primarily integrated textile, ceramics, pharmaceuticals, food processing & paint. Options for other industries can also be explored by the developer at the time of development of EZ depending on the investor's interest and availability of resources. At present, off-site infrastructure will be developed by BEZA for the proposed site identified for Shreehatta EZ. This EIA Report covers the environmental and social aspects related to development of EZ and off-site infrastructure for the proposed Shreehatta EZ.

BEZA has appointed M/s Price Water Coopers Pvt. Ltd. to provide transaction advisory services for development of EZs in Bangladesh which also includes Environment Impact Assessment (EIA) study of the upcoming projects. The project attracts the applicability of Environment Conservation Act, 1995 & Environmental Conservation Rules, 1997. The proposed project is classified under red category as per Environmental Conservation Rules, 1997. Thus it is required to carry out EIA study for the proposed project as per Environmental Conservation Rules, 1997 and obtain approval of DoEB before taking up any construction activity for the project. Project is being implemented with the financial support of World Bank. As per the World Bank Policy O.P.4.01 and the Environment Management Framework of PSDS project, development of the economic zone is classified as Category A project which requires a detailed environment assessment study prior development of zone to identify the

potential threats of project to environment and to frame mitigation and environment management plan to reduce the negative impact of the project.

As per the procedure, an Initial Environment Examination (IEE) Report for development of off-site facilities along with proposed Terms of Reference (ToR) was submitted to DOE on 07.04.2015. Approved ToR was granted by DoE vide Memo No. DoE/Clearance/5342/2014/202 dated 14th May, 2015. Copy of the approved ToR by DoEB is attached as Annexure I. The EIA study for the development of proposed Shreehatta EZ has been carried out as per the ToR issued by DoEB, World Bank's requirements and Environmental Management Framework of PSDSP

1.3. Project Description

Shreehatta EZ is proposed to be located in Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway. The location map of the upcoming EZ site is presented in figure 1. EZ site is divided into two parts, i.e Part A & Part B by Dhaka Sylhet highway. EZ site covers the area of 143 ha out of which 88 ha (Part A) is privately owned 55 ha (Part B) is Government land. Private land is agriculture land majorly with few scattered rural habitations and Government land is water body called Gong by locals. Private land is flat land with elevation varying from 11-13 m amsl and part B which is water body has an average depth of 15 ft. Agriculture land and water body both are irregular shaped.

Part B of EZ site/Water body receives storm water from all nearby locations. There is one more large water body to the South of the part B of the EZ site. Part B of EZ site and this large water body are connected with each other. Larger water body have been encroached by locals at various locations which has lead to accumulation of storm water in part B area of site. Part B of EZ site/Gong and larger water body are connected with Khushiyara River by a Khal at app. 5 kms upstream from Sherpur Bridge.

BEZA at present intends to develop only Part A, i.e. private land and will retain the water body or part B in its original shape. No development will be carried out in Part B of the site as per present planning.

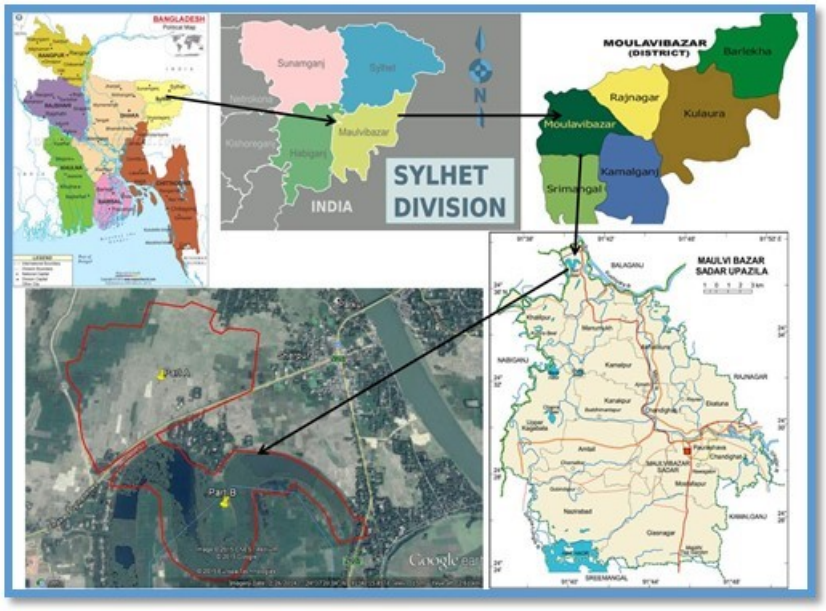


Figure 1: Location Map of Shreehatta EZ

1.4. Connectivity of the Project Site

Shreehatta EZ is connected with all the major locations of Bangladesh by road. The EZ site abuts the Dhaka – Sylhet national highway. It is spread on both sides of the 2 lane highway and is presently below the road level. Currently this highway is catering to passenger buses and trucks destined for Northern Bangladesh. A small bridge at intersection of River Kushiyara and Dhaka-Sylhet highway called Sherpur bridge bifurcates the two sides of the site. Sylhet Maulvibazar road from the Sherpur bridge runs perpendicular to site and meet part B of site at Hamarcona point. Both Sylhet Dhaka highway and Sylhet Maulvibazar roads will be access road for the site.

There are two railway stations near the EZ site – Sylhet Station (35 Km from the site) and Sreemangal Station (43 Km from site). Osmani International Airport in Sylhet is about 55 Km from the site.

1.5. Project Activities and Area Statement

Area of the site considered for development is 88 ha. At present only off-site developments will be carried out by BEZA. Details are provided below:

Boundary Wall: A compound wall all along the EZ boundary to a height of 2.1 m above NGL is proposed to be constructed and provided with 0.9 m height barbed wire fencing on top.

The total length of the compound wall is estimated to be 4000 m. Area covered by boundary wall will be 400 sq. m.

Administrative Building: Administration building will be constructed within EZ site. Building will have ground coverage of 3600 sq. m and built up area of 1680 sq. m. It will consist of 3 floors (G+2).

Site preparation and development: Site is low-lying and requires some of leveling. It is required to fill the site by 0.85 m. Total quantity of the sand required for filling is 7,16,899.14 cum. Source of the sand will be Kushiyara River Sand as identified by the BWDB. Location is app. 3.5 kms downstream the Sherpur Bridge. Identified stretch is app. 2.5 kms long.

Developer will be appointed as per the guidelines mentioned in EZ Act, 2010. Preliminary planning has been made for the economic zone on the basis of market and pre-feasibility study. As per the current planning, land use pattern of the EZ site is given in table below. Integrated textile, ceramics, pharmaceuticals, food processing & paint are planned to be proposed within EZ. After appointment of developer, developer will explore other options as per the investor's interest and there may be changes in the planning. Other developments like internal storm water drainage, power distribution, water distribution network, plotting, water treatment plant etc. will be carried out by developer. Preliminary land use planning for EZ zone is given below in table 1 below.

Table 1: Preliminary Land Use Planning for the Economic Zone

Land Use Pattern	In Hectare	In%
Saleable Area		
Industrial plots • Integrated Textiles • Ceramics • Pharmaceuticals • Paints • Food processing	**85.66** 17.30 14.85 30.98 4.76 17.77	**59.9** 12.1 10.4 21.7 3.3 12.4
Rental Factory Zone	2.19	1.5
Commercial	0.83	0.6
Total Saleable Area	**88.68**	**62.0**
Non-Saleable Area		
Control Office & Parking	0.82	0.6

Land Use Pattern	In Hectare	In%
Customs Office	0.15	0.1
Adminstrative Staff Quarters	2.58	1.8
Resettlement Zone	0.97	0.7
Security Barrack	0.36	0.3
Fire service station	0.56	0.4
Road	15.70	11.0
Dike	10.13	7.1
Green Zone	4.33	3.0
Electric Substation	0.84	0.6
Natural Gas Control Point	0.33	0.2
Mobile Tower (Existing)	0.09	0.1
Pump Sum Structure	0.00	0.0
Retention Road	1.81	1.3
Wastewater Treatment Plant	1.87	1.3
Water Treatment Plant	13.85	9.7
Total non-saleable area	**54.39**	38.0
Grand Total	**143.07**	**100.00**

1.6. Drainage System Development

Part A of EZ site is agricultural land and drains into the part B of EZ site which is a water body. Other nearby areas also drains into part B of the EZ site. Part B finally drains into the River Kushyara through Beels and Khals. Rain water harvesting system shall be developed at EZ site to harvest and store rain water. Rain water shall be used to fulfill the water requirement during construction and operation phase of the project. A peripheral drain will be constructed all along the part A of the EZ site and will be connected to part B of EZ site. This peripheral drain will cater the overflow, if any from the rain water collection and storage system. Part B, i.e. water body shall be maintained in its existing condition thereby maintaining the existing drainage pattern of the area.

Project Schedule

Table 2 presents the implementation schedule of the off-site infrastructure details at the proposed Shreehatta EZ site.

Table 2: Implementation Schedule of Off-site Infrastructural Details

S.No	Offsite infrastructure	Duration in months from start
1	Site Development	10
3	Admin building	12
4	Boundary Wall	8

Source: Mahindra

BEZA targets to start the work from January, 2016. The EZ development activities could be undertaken by the prospective developer following the off-site infrastructure development.

1.7. Resources and Utilities Demand for Off-Site Developments

Construction Materials Sourcing

Construction material like steel, cement, concrete, bricks, aggregates etc. will be required for each of the proposed off-site facility construction. The quantity of each of the raw materials is detailed in Chapter 4 of the EIA Report.

Water

Water requirement during construction phase is estimated to be app. 50 KLD, which includes Domestic water requirement of construction workers. For storing rain water during construction phase, temporary rain water harvesting ponds can be constructed at the site. Water for construction shall be sourced from rain water harvesting ponds, River Gong (Part B water body), adjacent larger water body or River Kushiyara.

The total water requirement for operational phase is estimated at about 59.011 MLD. This is peak estimated demand and is expected to reach by year 2022. Source of fresh water for EZ during operation phase will be Kushiyara River which is app. 1 km from EZ site. Water supply system will be developed by BWDB for the EZ. Water treatment plant is proposed to be provided within the EZ site to treat the river water prior usage. Rain water harvesting also can be carried out which can supplement the water supply system.

Power Requirement

Power demand during construction phase is insignificant. Power required during operation phase is estimated to be 33.04 MW. Power supply system source will be Bibiyana TPP located at 800 m from EZ site. Power supply system will be developed by Power Grid Company of Bangladesh.

Gas Requirement

Gas is available in the zone and will be taken through the pipeline from Bibiyana Gas field to Bibiyana TPP. It is estimated demand of gas for the project will be 666,312 cum/day. Gas supply system is proposed to be developed by Jalalabad Gas Company.

Street Lighting

Street lighting will be provided on the internal roads within the EZ. Solar street lights should be proposed in ratio of 1:2. Average illumination of 20 lux should be maintained on the access road.

Telecommunications

Sherpur has mobile connectivity from almost all mobile companies. There is no fixed network. It is recommended to install BTCL (Bangladesh Telecom Company Limited) network, as fixed Phone Network of BTCL is the only reliable network.

Sewage & Effluent Treatment

All industries should be responsible for treatment of the sewage and effluent generated from their unit so that all industries are zero discharge. Sewage should be treated in the STP and effluent should be treated in the ETP. Treated water should be recycled and re-used within the site. There is provision of wastewater treatment plant at the site which will cover 1.87 ha of land.

Green Belt Development

Green buffer of 10 m width will be developed all around the EZ site. Multi-layered plantation will be carried out in the buffer. Peripheral green belt will be developed by the developer. In addition to this all industries will develop green belt all around their respective plots. Native plant species consuming less water and requiring less after care and monitoring should be considered. Such species include Neem, Chambol, Sirish, Palms, Gewa, Mango, Mahagony etc. Green buffer should consist of minimum 3 rows of vegetation. First row of green buffer should be small shrubs and herbs, second row of tall shrubs and small/medium height trees and last row of medium to tall heighted trees. Total 4.33 ha of area will be covered under green.

Solid Waste Generation from Proposed EZ Project

Waste to be generated during construction phase will be left out construction material like metal piece, wood piece, unused concrete, broken bricks, glass, ceramic, demolition waste etc. Quantity of the solid waste to be generated during construction phase may vary from 30-50 kg/day. This waste should be collected and segregated at the site itself. Recyclable and Re-usable waste should be

separated and should be sent to recycler. Rejected waste should be disposed off at the designated sites by local authority.

Nature of solid waste generated during the operation phase will be highly variable due to presence of different kind of industries in the EZ. Majorly as per the feasibility study, integrated textile, ceramics, pharmaceuticals, food processing & paint may come up in the EZ. These industries are less polluting industries. Solid waste generated by industries should be managed by industries. Solid waste to be generated from EZ can be industrial non-hazardous waste, hazardous waste, bio-degradable, non-biodegradable, e-waste, construction debris, hospital and bio-medical waste. A secured scientific landfill should be developed for disposal of municipal solid waste within the EZ site. Hazardous waste from industries should be disposed off only through authorized hazardous waste handling agencies by DoEB. Else all industries should incinerate the hazardous waste generated by them taking the required air pollution control measures.

Transportation System

Road Transportation System and Traffic Survey

Shreehatta EZ is connected with all the major locations of Bangladesh by road. The EZ site lies on the Dhaka – Sylhet national highway. It is spread on both sides of the 7 meter bitumen road and is below the road level. Currently this highway is catering to passenger buses and trucks destined for Northern Bangladesh. A small bridge on the highway bifurcates the two sides of the site. It is about 20 Km to the nearest town of Maulvibazar (district headquarter) and about 25 Km from the Upzila headquarters and about 35 Km from Sylhet. Dhaka lies at a distance of about 208 Km from this point. Chittagong Port is about 435 Km from this site.

Rail & Air Transportation System for Project Site

There are two railway stations near the EZ site – Sylhet Station (35 Km from the site) and Sreemangal Station (43 Km from site). Sylhet Station is crowded and does not have adequate land for developing any new facility. Sreemangal Railway Station, on the other hand, is catering to the passenger traffic arriving mostly from Dhaka (south) and Sylhet (north).

Osmani International Airport in Sylhet is about 55 Km from the site. There are direct passenger flights from Dhaka to Sylhet operated by domestic airline companies Novo Air, Regent Airways, United Airlines and Biman Bangladesh Airlines. International flights operated by Biman Bangladesh Airlines operate between Sylhet and Abu Dhabi, Doha, Dubai, London and seasonally to Jeddah. At present, no freight services are available.

Inland Water Transportation System

The closest navigable river to Shreehatta EZ is the Kushiyara River located at about 1.5 km from the proposed EZ. River is navigable in rainy season but not throughout the year, thus for transportation of goods through IWT cannot be dependant mode of transportation.

Ashuganj River Terminal on Meghna River is about 108 Km from the proposed EZ by road. Thus material can be transported through IWT through Ashuganj River Terminal.

1.8. Cost of the Project

The total estimated cost of the proposed off-site facilities is about 1881.7 lakh taka that includes the cost of site development, boundary wall and administration building construction. Details of cost of each component are given in table 3 below.

Table 3: Cost of the Development of Proposed Off-site Facilities

S. No.	Description of work	Amount in Lakh Taka
1	Site development	706.7
2	Administration Building	560
3	Boundary Wall	615
Total		**1881.7**

Source: Mahindra

1.9. Baseline and Social Environment

The monitoring of the existing environmental conditions of the proposed project site and of its close vicinity have been collected through secondary sources with respect to physical, biological and socio-economic environment. A zone of 10 km area around the EZ site and 100 m on either side of proposed alignments for water and electrical supply is considered as project influence area.

The project area lies in the North-Eastern climate zone of the country and have tropical monsoon climate. June is the hottest month in Sherpur with it's average high temperatures at 29^0 C. The coldest month is January with average highs at 18.2^0 C. Average humidity in Sherpur region varies from 57-83%. Humidity in Maulvibazar District varies from 63.7-79%. Climate of the region is tropical monsoon and region receives high rainfall. Maximum annual rainfall received in Sherpur region is 3770 mm. During winter (e.g. January) wind prevail to S or S-E direction with maximum calms (86.4%) wind. Wind direction become reverses which prevail to N or N-W direction during pre-monsoon or monsoon with 57% calm wind. However, maximum wind behaves quite turbulence nature with lower wind speeds during post monsoon. The monthly average insolation hours in Maulvibazar varies from 13-14 hours in a day. However sunshine hours vary from 3.8 to 8.2 hours/day in a year. Monthly minimum average sunshine hours occur in month of February, i.e. 9.8 hours/day.

EZ site is divided into two parts. Part A is agricultural land and part B is water body. Average depth of water body is 15 ft. This water body receives rainfall run-off from nearby areas. This water body drains into River Kushiyara through Beels and khals. Beels have been encroached by people in downstream direction leading to water logging. Water of River Kushiyara is fresh and is used for various purposes like agriculture, industrial and domestic use. Ground water in Shallow aquifers in study area is saline whereas deep aquifers are fresh water aquifers. Fresh ground water is available at depth of 700 ft. Air quality and noise levels in the study area are within the permissible limits as per the standards prescribed in ECA, 1996 & ECR, 1997.

1.10. Environment and Social Impacts of the Proposed Project

Environmental impacts assessment was carried out considering present environmental setting of the project area, and nature and extent of the proposed activities. Proposed project involves development of EZ and off-site facilities for upcoming Shreehatta Economic Zone at Sherpur. Potential environmental impacts associated with each of the proposed off-site facility are classified as: (i) impacts during design and construction phase and ii) impacts during operation phase/Post-construction phase.Sensitive environmental and social components were identified during the site visits and qualitative and quantitative techniques have been applied for direct and indirect assessment of impacts on the identified environmental and social sensitive components. Impacts are classified as being insignificant, minor, moderate and major.

Some of the important impacts associated with the proposed off-site facilities for economic zone will be associated with land use (land acquisition), land stability (soil erosion), soil compaction and contamination, water availability, water quality of river/stream/canal, ground water contamination, waste and wastewater disposal, ambient air quality, ambient noise levels, vegetation, tree cutting (including social forestry tree), fauna (terrestrial and aquatic), drainage pattern, hydrology, climate change, socio economic, places of social/cultural importance (religious structures, community structure), construction material sourcing and occupational health and safety. Adequate mitigation measures are devised to mitigate/minimise all likely environmental impacts and the same have been presented along with the impacts.

1.10.1. Impact on Air Environment

Pre-construction Phase

Pre-construction phase will involve site clearance, leveling & filling activities and vegetation removal for development of EZ. Clearance of site will involve removal of vegetation, land leveling & filling activities. These activities will lead to dust generation. But these emissions will be limited to the EZ site only and have impact for short duration only during clearance activity. To minimize the dust generation, water should be sprinkled regularly at the site and low sulphur diesel should be used in land leveling equipments to control the SO_2 emissions.

Construction Phase

The proposed project involves construction activities like site development, civil construction, construction material handling and stocking, and construction vehicle movement will generate fugitive dust and vehicular emissions. However, these ground sourced generation will be limited to the construction site and the impact will be short duration that too during construction activities only. The likely emission from construction vehicle, machinery, and generators is likely to be insignificant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting following mitigation measures.

Mitigation Measures

- Sprinkling of water at construction site and haul roads
- Covering the scaffolding (in case of administration building) to reduce the dust emission in outside environment
- Provision of face mask to workers to minimize inhalation of dust particles
- Construction vehicles and machinery should be regularly serviced and check for pollution control
- Low sulphur diesel should be used for running construction equipment and vehicles
- Adequate parking space should be provided for the construction vehicles so as to prevent idling of the vehicles and the emissions generating from them
- Vehicles carrying construction material and debris should be covered with tarpaulin cover
- Raw materials, excavated soil and other debris should be stored under covered sheds
- Green buffer should be developed all along the EZ boundary
- Plantation should be carried out along the both side of internal roads

Operation Phase

Post development of the economic zone & setting up of industries, there could be some impacts on the air quality of the area. Industrial development will involve generation of emissions, and increased vehicular movements. These altogether may have overall negative impact on the air quality of the site and the nearby areas. The industries proposed as per the pre-feasibility study are ceramic, food processing, pharmaceuticals, paint and textile industries. These industries may generate the air emissions which have potential to pollute the environment.

Mitigation Measures

Provision shall be made for peripheral green belt all along the EZ boundary. No development zone of 10 m width & retaining wall will be developed all along the EZ zone. Green buffer will be developed in this no development zone. Green belt shall have minimum of three rows of local variety of tree with pyramidal shape. Tree species shall be selected such that first inside row is of smaller height, middle row of tree are tall and last row of tree is of medium height so that green belt formed appears like a canopy.

- Development of thick green belt (10 m) and organized greens within each industrial plot
- Power Generators should be provided with stacks of adequate height (higher than nearest building) to allow enough dispersion of emission.
- Process emission shall be control with the installation of adequate air pollution control systems
- All industries should obtain clearance from DoE, Bangladesh as applicable. Air pollution control measures shall be adopted by respective industries in line with DOE permission
- NOC from DoE shall be renewed time to time and all industries shall follow the conditions as prescribed in the NOC issued
- Air pollution prevention equipment shall be installed by the industries as per requirement to meet the emission standards prescribed by DoE.
- Air pollution monitoring should be carried out quarterly by all industries to check the air pollution level.
- Preference of usage of clean fuel like gas should be considered
- Energy conservation should be adopted by opting the alternate energy options like solar power.
- Odour should be managed at the site using odour suppressant and planting fragnant flowering trees.

1.10.2. Impact on Noise Environment

Pre-construction and Construction Phase

Pre-construction phase will involve site clearance activity for development of EZ and off-site facilities. Clearance of site will involve removal of vegetation and land leveling activities. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of rural category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

Mitigation Measures:

- Machinery to be used should comply with the noise standards prescribed by DoE.
- DG set shall be acoustic treated
- Workers shall be given PPE (ear plugs), if working in high noise area
- No noise generating activity shall be carried out in the night.
- No construction activities to be undertaken during night hours to prevent any disturbance to nearby residents and labours in labour camps.
- Acoustic enclosures should be provided with DG sets and machinery to control the noise levels at construction site.
- Temporary noise barriers should be provided near the high noise generating areas

Operation Phase

After development of economic zone, traffic in the area will increase which will increase the noise level of the area. Industrial operations may also generate the noise and increase the noise level in the area. Operating DG sets will also generate the significant noise. Following mitigation measures should be taken to prevent noise pollution during operation phase

Mitigation Measures

- Avenue plantation should be developed along both the side of internal roads which will act as noise buffer
- Green buffer of 10 m should be developed all along the project boundary. Green buffer should compose of the 2-3 rows of plants of variable height and thick canopy so as to form continuous barrier. This will help in reducing the noise level significantly.
- All industries should obtain clearance from DoEB before establishing industrial unit and should comply with all the conditions mentioned in th-e letter of environment clearance
- All industries should install the new machinery of modern make which complies with the noise standards prescribed by DoEB in ECA, 1995.
- Acoustic treatment and temporary noise barrier should be provided in area generating higher noise levels
- Job rotations should be practiced for workers in industry to prevent prolonged exposure to high noise level as it may lead to deafness, fatigue, head ache, nausea and drowsiness
- Honking should be prohibited within the economic zone

1.10.3. Impacts on Water Resources

Pre-Construction and Construction Phase

Impacts on Ground & Surface Water Resources:

Significant quantity of water will be required for various construction activities & domestic purpose. Source of water for these activities will be Kushiyara River, temporary constructed storm water ponds by contractor or ground water. Permission shall be taken from concerned authorities' prior abstraction of water. Excess withdrawal of ground water may lead to depletion of aquifers. Measures should be taken to minimize the water extraction by reducing water consumption and wastage. Mitigation measures are given below. Due to the nature of strata area has very high potential for ground water recharge. Potential recharge varies from 1001-2500 mm.

Mitigation Measures

- Best management practices for conservation of water will be required to be adopted to minimize water wastage and water loss. Best management practices to be adopted are given below:
- Temporary storm water drains and rain water harvesting ponds should be constructed so as to store rain water for construction activities.
- Water for curing can be saved by carrying out curing in early morning or late evening and covering structures with gunny bag so as the moisture can be restored for longer time.
- Regular inspections at site to monitor leakages in water storage tanks
- Creating awareness among construction workers about the importance of water conservation
- Adoption of the advance technologies and machinery which helps in minimizing water requirement for construction
- Storing the curing run-off and waste from other construction activity and using the same for sprinkling.
- Covering the water storage tanks at site to prevent evaporation losses.

Impact on Surface Water Quality

Run-off from the construction site may carry the higher quantity of sediments and oil which may pollute the surface water sources (i.e. Kushiyara River & Part B of EZ site, which is a water body) and impact the aquatic life. Thus measures are required to be taken to minimize the surface water pollution.

Mitigation Measures

- To avoid excavation activities during rains
- To prevent piling up of excavated soil, raw material and construction debris at site by proper management and disposal
- Minimize run-off by using sprays for curing
- Maintaining appropriate flow of water sprinklers at site
- Construction of storm water drains along with sedimentation tanks with sand bags as partition as barrier for direct flow of run off to river.
- Collection & Reusing of curing over flow, tyre wash water etc within the site
- Construction of adequate nos. of toilets and proper sanitation system to prevent open defecation along the river banks/water supply lines
- Construction of soak pits/septic tanks to dispose-off the domestic waste water generated from labour camps to prevent disposal of sewage in surface water bodies
- Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies
- No debris/construction material should enter the aquaculture ponds and other water body in the area

Impacts on Ground Water Quality

Ground water is saline in shallow aquifers of the study area. No significant impacts are anticipated on the ground water quality due to development of the economic zone during pre-construction & operation phase.

Mitigation Measures

- No sewage or waste water should be accumulated in any unlined structure
- Timely disposal of the construction/chemical/haz. waste so as to prevent leaching of any pollutant to ground

Impacts on Drainage Pattern & Hydrology

EZ site is divided into two parts, i.e. part A which is agricultural land and part B which is a water body. It is planned to develop part A only and part B will be retained in its existing condition. Part A is agricultural land and it drains through a storm water drain into part B of the EZ site. No activities will be carried out in part B of the EZ site. Part B receives the storm water run-off from the nearby areas and will continue to receive the run-off as it will be retained in its existing condition, thus the drainage pattern will not be affected significantly.

Mitigation Measures

- Natural drainage pattern should be maintained. Run-off assessment shall be made of catchment area and peripheral/garland drains shall be constructed around EZ site based on the assessment of catchment area (frequency, and storage area).
- Storm water drain shall have the provision of di-siltation before discharge to river.

Operation Phase

Impacts on Ground & Surface Water Resources:

Some of the industries proposed are water intensive industries like textile and paint industries. It is estimated app. 59.011 MLD of water will be required during operation phase of economic zone at Sherpur. Water will be sourced from River Kushiyara. Water supply system will be developed by BWDB. Kushiyara River is source of water for various villages for domestic and agricultural purpose. Thus extraction of water for economic zone from Kushiyara River, may impact the population dependant on the River. Water supply system shall be developed by BWDB considering the factor of

dependency of population on River and factory of water availability in the river. To reduce the fresh water demand, water conservation fixtures, water conservation measures and rain water harvesting should be undertaken at the economic zone. No ground water will be extracted during operation phase thus no impacts are anticipated on ground water resources during the operation phase.

Mitigation Measures

- Rain water harvesting system and storage should be developed to minimize ground water abstraction
- Adoption of best management practices to prevent water wastage and minimize water loss
- Usage of water conservation fixtures to minimize water consumption
- Installation of leakage detection system to minimize the water loss

Impacts on Surface Water Quality

The industries proposed in the zone are primarily integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries have potential to generate wastewater which can pollute the surface water quality, if discharged in river without treatment. Following measures shall be taken to prevent the degradation of surface water quality

Mitigation Measures

- Each industry should obtain consent of DoE Bangladesh before construction and operation and should comply to the conditions laid by them
- Each industry should treat the effluent and sewage generated by them so as to achieve zero discharge and no untreated effluent should be discharged into any water body
- Provision shall be made for Common Effluent Treatment Plant (CETP) if required.
- Common STP (in modules) should be constructed within the EZ to treat sewage from residential and commercial areas
- Proper management of waste should be done to prevent any contact between the waste and storm water
- Common waste disposal sites should also be developed within EZ site as per the standards and prior permission of DoE should be taken before development.
- Each industry should practice rain water harvesting to minimize the water consumption and reduce run-off from the site
- Storm water drains should be lined separate from effluent drains
- Storm water system should be inspected & cleaned before monsoon every year
- Peripheral drain shall also be lined and shall not be connected to internal storm water drainage system.
- The top soil shall be preserved and used for covering the sand layer at EZ site. Vegetation turffing shall be made at the side slops of the EZ areas to prevent erosion and siltation in the river.
- River water quality shall be monitored periodically.

Impacts on Ground Water Quality

Contamination of ground water with the waste and wastewater generated by industries and sewage at the EZ site may lead to ground water pollution. Following measures should be taken to minimize the ground water pollution.

Mitigation Measures

- Each industry should treat the effluents and sewage and should not discharge into ground.
- No leachate, waste water and waste material should be stored in pervious unlined area/pond.
- Ground water quality shall be monitored periodically.

1.10.4. Impacts on Land resources

Pre-construction and Construction Phase

Impact on Land Use

EZ will be developed on part A of the project site and part B will be retained in original condition. Development of EZ will change the land use from agriculture to industrial. Land cover also will be changed from soft and green area to the paved surfaces. Following measures can be taken to minimize the impacts,

Mitigation Measures

- Planning should be done in a way to minimize the tree cutting.
- If any tree cutting is undertaken then compensatory plantation should be done in minimum ratio of 1:2

Impact on Topography & Geology

Part A of the site which is to be developed into EZ is flat land. Site will be filled to height of 0.75 m and will be leveled. No significant impacts on topography are estimated due to development of EZ.

Impact on Top Soil and Soil Quality

Movement of construction vehicle and equipment will affect the soil profile of the area by compaction of the soil. Top soil of the site will be disturbed due to filling of the site to a level of 0.75 m. Storage of construction material and construction waste may contaminate the soil quality of the area. Following measures shall be taken to mitigate the impacts of the project development on top soil & soil quality.

Mitigation Measures

- No piling of raw material at site
- Raw material will be stored under covered sheds and paved surface
- Fuel storage area should be paved
- Adoption of best management practices to prevent any spillage of raw materials
- Construction debris should be stored under covered sheds and paved surface and should be disposed off regularly to designated sites
- Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the camp site. Recyclable waste should be sold to the authorized dealers and the remaining should be disposed off at designated sites through local agencies responsible for waste management in the area.

Impact on landscape and scenic beauty

Construction activities, site clearance activities, piled construction materials; machinery and camp establishment etc. on site may impact the scenic beauty and disturbs the aesthetics of the area. Nevertheless, the impact is for a short duration, and reversible as the project plan includes landscape planning, green belt development as well.

Operation Phase

Impact on Soil Quality

After development of economic zone, disposal of industrial, domestic and process waste may contaminate land and soil quality of the area. The impact can be significant and long term in case of uncontrolled discharges. Improper disposal of waste (hazardous and non-hazardous waste) may degrade soil, water, noise, air quality and ecology of the area. As per the preliminary planning, it is planned that industries like textile, ceramics, pharmaceuticals, paints and food processing will come up in the EZ zone. These industries are not heavily polluting like tanneries, distilleries etc but generate significant waste both hazardous and non-hazardous in nature, which can pollute the environment if not managed properly.

Mitigation Measures

- Provision shall be made for proper storage and disposal of industrial waste by receptive industries.
- Common waste storage areas shall be designated for industrial domestic waste.
- Waste should be segregated at source into hazardous and non hazardous waste. Further the waste should be segregated into recyclable and rejected waste. Recyclable waste should be sent to authorize vendors for recycling and rejected waste should be disposed off as per the norms specified by DoEB for the particular waste.
- Industrial waste generated should be stored on sealed surfaces and should be disposed off as per guidelines of DoE, Bangladesh.
- No chemical/hazardous raw material should be allowed to spill over the land and should be operated in covered systems
- Excessive packaging should be reduced and recyclable products such as aluminum, glass, and high-density polyethylene (HDPE) are being used where applicable.
- Organic waste should be resold to value addition industries or can be fed to live stock.
- Advanced wastewater treatment should be adopted by industries
- Use of advanced techniques to control specific portions of the manufacturing process to reduce wastes and increase productivity.
- Use of radiation to kill pathogenic microorganisms.
- Reduction or total elimination of effluent from the manufacturing process
- At present no common hazardous waste handling and disposal unit exists in Bangladesh. Industries thus have to install the incinerators in the unit to dispose hazardous waste. The incinerator further should use the clean fuel and required air quality management measures should be adopted.
- A site for disposal of hazardous waste can be identified within the EZ and it should be developed as per the norms of DoEB and upcoming Hazardous Waste Management rules of Bangladesh.

Impact on Land Use

No impact due to off-site developments is anticipated on land use of the study area during operation phase. Development of economic zone will attract more infrastructural development around the project site to facilitate industrial growth which may alter the land use of area. Some of the developments will include, construction of roads, housing facilitiy, commercial areas including hotels, hospital, restaurants, schools etc, small scale industries etc. This will help in development of the area significantly.

1.10.5. Impacts on Agriculture resources

Pre-construction and construction Phase

Part A of the EZ is agricultural land and it measures 88 ha. This land will be developed into Economic zone thus development of economic zone will lead to loss of 88 ha of the land. 88 ha of agricultural land will be converted into industrial area. Farmers losing the land shall be given the adequate compensation so as they can purchase other piece of land and can practise agriculture. Construction material, equipment, machinery etc shall not be stored or kept in agricultural fields near to the site. No raw material or debris shall be disposed off in the agricultural fields in nearby areas.

Operation phase

No impact on agriculture resources is anticipated from off-site infrastructure during operation phase. Since the EZ is surrounded by agricultural land, thus it would be recommended to install agro based industries in the zone. Farmers shall be given the advanced equipment, advanced farming traing etc at subsidized price so as to obtain maximum yield.

1.10.6. Impacts on Fisheries

Pre-construction and construction phase

Spillage or disposal of waste or wastewater in the river may significantly impact the aquatic life of the river. Thus adequate measures should be taken to prevent any impact on fisheries which are listed below.

Mitigation Measures

- Proper disposal and management of construction waste
- No waste should be dumped in water bodies during construction
- Wastewater from labour camp and construction site should not be disposed off in the water bodies
- Septic tank/soak pits should be provided to dispose off the wastewater from construction camp
- Site should be kept clean so as no pollutant from site should enter the water bodies along with run-off
- Excavation activities should not be undertaken during monsoon season
- Piling of raw material at construction site should be avoided
- Raw material, debris and fuel should be stored on paved surfaces under covered areas

Operation Phase

If any waste or wastewater is discharged into the River Kushiyara, River Gong or any other water body, it will impact the aquatic life of that water body.

Also if aquaculture based industries are installed in the EZ then the aquaculture activities in the area will boost. People should be encouraged to carry out the aquaculture activities and should be provided training for the advanced technologies to get the maximum yields.

Mitigation Measures

- Adoption of adequate wastewater and industrial effluent management technology so no untreated sewage is discharged into surface water body
- Industrial, municipal and hazardous waste should be managed such that no waste is dumped or disposed in surface water body

1.10.7. Impacts on Eco-system

Pre-construction and construction Phase

Project site is an agricultural land and involves tree cutting also. Cutting of trees will impact the ecosystem of the area. No wild fauna exist at site as no forest exists nearby. Domesticated animals like cow, goats, poultry etc. exist at the site. Various birds were also observed during the site visit at EZ site. Site will be cleared and levelled for development of economic zone thereby disturbing the habitat of these organisms and ecosystem of the area.

Run-off from construction site may get contaminated with the construction material, debris, fuel etc material stored at site. Contaminated run-off from site may affect the aquatic life of the water bodies in the study area. Following mitigation measures shall be taken to prevent the impact on eco-systems of the are given below.

Mitigation Measures:

- Twice the nos. of trees to be fell should be planted as compensatory plantation in affected areas to minimize the impact on the eco-system.

- No waste or wastewater shall be discharged in water bodies
- Construction material and debris shall be stored on paved surfaces
- No excavation shall be carried out at project site
- Pilling of raw material shall be avoided at project site
- Fuel shall be stored at paved surface only

Operation Phase

Green buffer of 10 m all around the project site will include most of the native plant species, which will significantly improve the ecology of the area. This green buffer will provide habitat for the avifauna, reptiles and small mammals and will enhance ecology of the area. Twice the number of trees fell, if any should be planted.

Post development of the economic zone & setting up of industries, there could be some impacts on the ecosystem of the area. Industrial development will involve generation of emissions, effluents and increased vehicular movements. These altogether may have overall negative impact on the eco-system of the site and the nearby areas as the air pollutant will impact the existing vegetation and avifauna in the area. But the industries proposed as per the pre-feasibility study are integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries are not heavily polluting. If appropriate measures for preventing air, water, soil and noise pollution are taken there will be no significant impact on the eco-system of the area.

Mitigation Measures:

- Green belt shall be maintained properly and survival rate of trees shall be monitored and to be maintained to minimum 70%
- Periodic monitoring shall be carried out as per the monitoring plan for air, water, noise and soil and ensure that no impact
- No waste or wastewater shall be discharged in water bodies or on land.
- Native species should only be planted in the region
- Minimum twice the no. of tree fell (if any) should be planted

1.10.8. Impacts on Socio-Economy

Pre-construction and construction Phase

Loss of Livelihood & Displacement of Families

Project development involves acquisition of land and displacement of people. 88 Ha of private agricultural land will be acquired. Large nos. of people will be displaced and will lose their livelihood. However part of EZ site which is a water body will be retained in its existing condition. Various fishermen are dependent on this water body for their livelihood. This water body is source of water for various villagers. Thus the retention of water body has prevented the impact on socio-economic environment.

Impact on Health, Aesthetics and Hygiene

Construction activities lead to generation of dust, unpleasant view, obstruction in access of public properties due to excavation etc which may impact the society significantly. Adequate waste management plan, air, soil, noise and water pollution controls are required to be adopted to prevent any impact on society. Also various health hazards are associated with construction activity which may significantly impact the workers if not taken care.

Impact on Infrastructure & Utilities

88 ha of agricultural land will be acquired for project development. This land is majorly agricultural with few katchha households, temple, mosque etc. These structures are to be removed prior to development of the project.

Impact on Demographic structure

Few HH exists at the part A of EZ site. This population will be displaced for development of project. There will be shift of population from EZ site to nearby areas. Labour is available in plenty in nearby area. Thus labour for construction will be employed from nearby areas majorly.

Generation of Employment

Employment opportunities will be ensured through three channels (i) direct employment for unskilled labour, (ii) indirect employment to the local community; and (iii) employment of women workers. Direct employment includes site clearance, excavation, loading and offloading of materials and deliveries, mason and construction works. Further, the construction labour force will be requiring food and other items, which is expected to be supplied by the local eateries, retail shops and the local community. The local community members can take advantage of these opportunities. Employment generation benefits improve the quality of life of the labourers and enhance their productivity and living standards. Employment generation, both direct and indirect, through Shreehata EZ will have a tremendous impact on human development and poverty reduction in the Sherpur area.

Mitigation measures are required to be taken to minimize the impact of projects on the society and they are given below:

Mitigation Measures

- Provision of proper training to all workers for handling the construction equipment
- Provision of cautionary and guiding signage in local and English language indicating the hazard associated with the site
- Employment should be provided preferable to local & affected people
- Entry to the fuel storage area and construction equipment rooms should be restricted and should be allowed for trained personnel
- Wastewater from the toilet should be disposed off in septic tanks and soak pits and should not be allowed to accumulate at labour camp site or construction site
- Dustbins should be provided at labour camps for collection of waste and waste should be regularly disposed off through the concerned agency
- Temporary storm water drainage system should also be provided at camp site so as to drain the storm water and prevent accumulation of storm water at site and thus breeding of mosquitoes/flies
- Arrangement of fire-fighting should be made at site and workers should be trained to use the system in case of fire
- Provision of personal protective equipment like safety jackets, helmets, gumboots, gloves, face mask, ear buds, goggles, safety shoes etc as per requirement and nature of job in which they are involved
- Job rotation should be carried out for workers exposed to high noise and dust areas
- Provision of First aid facility at the site and the labour camp
- Labour camps should be located at neat and clean location with no water logging issues
- Proper sanitation facility including toilets, bathing facility and washing facility should be provided at site and at labour camps for workers
- Clean drinking water supply should be provided to labour

- Crèche facility should be provided for kids if female workers are employed
- Regular inspection for hygiene and safety in labour camps should be done
- Compensation should be given to the people as per the policy for the planted tress
- Construction debris should not be allowed to enter into aquaculture ponds located along the road
- Entrance to any road/structure should not be blocked for construction of EZ
- A major segment of the population on the area is unemployed. Construction activity will provide employment to huge nos. of people including skilled, unskilled and non-skilled workers. This will improve the quality of life of people.

Operation Phase

Skill Enhancement of Local people

As the both skilled and un-skilled labour will be required during operation phase of the EZ, but nearby area lack the skilled labour due to low literacy rate. However unskilled labour is available in plenty. BEZA should provide the skill enhancement training to locals to carry out specific tasks and enhance the skill of local people so that they can be given employment.

Employment Generation

Furthermore, as an enhancement measure, it is recommended that equal employment opportunities should be given to women in the EZ, especially those who are now unemployed or are working in the service sector as daily wage workers. These recommendations should be included as a requirement in the contract to be prepared by BEZA for the construction works related to the proposed EZ. EZs further create an important avenue for young women to become part of the formal economy at better wages compared to agriculture and domestic services. Employment opportunities within the EZ will increase their employability and position in the household. In addition, Shreehata EZ is expected to assist women in changing their occupation pattern and accessing better job opportunities and wages. But the child labour should not be encouraged in the area. Thus BEZA should make strict rules for industries and contractor for not employing child labour and there should be imposition of heavy fine, if anybody is found guilty.

Impact on Health

Post development of the economic zone & setting up of industries, there could be some impacts on the Socio-economic conditions of the area. Industrial development will involve generation of emissions, effluents, waste and increased vehicular movements. These altogether may have overall negative impact on the health of the people and aesthetics of area. But the industries proposed as per the pre-feasibility study are integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries are not heavily polluting. If appropriate measures for preventing air, water, soil and noise pollution are taken there will be no significant impact on the society.

Poverty alleviation and diversification in livelihood

Vast employment opportunities potentially created by the EZ will reduce poverty via increased income through various livelihood options. By means of industrialization and related trades, diversification of livelihood will occur for all strata of people. Diverse livelihood options for the locals and better wages for the employees of the industrial zone will reduce poverty for many poor households and will contribute to reducing the poverty level in the locality. So, this will enormously benefit cross section of population and both gender.

The investments required in the commissioning of Shreehata EZ will directly enhance the local economy of the area by increasing cash flow which in turn will increase the purchasing power of the local population. Increased cash flow will create more employment opportunities for the local communities in Shreehata EZ.

Employment opportunities are expected to increase throughout the region during the commissioning phas. This will provide employment to high unemployed population of the area.

Education for children including Girls' Education

Due to the establishment of the EZ and better economic changes in the locality, the child education rate is likely to increase leading to a reduction in children's informal or agriculture-based labour. Due to development of area, there is high probability that new schools may come up in area and also the literacy rate, especially of females will increase in the area.

Women's empowerment

Women are mostly in household work category. Thus, employment opportunities for women created by the proposed EZ directly or indirectly are expected to provide them better socioeconomic status. Through employment women will be empowered economically by being self-reliant and may become more socially aware. This could lead to their having more decision making power in their respective families and communities. This will also encourage the parents to send their children to schools and withdraw them from wage earning activities. At the same time girl's education due to parents' better economic condition and awareness will prevent early and child marriage as girls' education will automatically retain them in school and will make social awareness and pressure of not marrying them off at early age and drop out for that.

Access to civic amenities and communication

Villages in nearby locations of proposed EZ area will access better civic amenities. However, due to the EZ construction overall traffic may be congested over the years. But industrialization will ensure better livelihood and increase ability to access better civic facilities.

Social mobility

With improved employment opportunities and higher and secured income, impoverished people will be able to move up the social ladder.

1.11. Environmental Management Plan

Environment Management Plan

The Environmental Management Plan (EMP) is the synthesis of all proposed mitigation and monitoring actions, set to a time frame with specific responsibility assigned and follow-up actions defined. EMP is a plan of actions for avoidance, mitigation and management of the negative impacts of the project. Environmental enhancement is also an important component of EMP. A detailed set of mitigation measures have been compiled in view of the likely impacts associated with the proposed Shreehatta EZ and off-site facilities at Upzila Sherpur, Maulvibazar District.

The EMP consists of a set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation (post-construction) stages of the project. The EMP has been designed keeping in view the regulatory and other requirements to ensure the following:

- Identifying the pollution causing activities at different project development stage
- Identification of source of pollution in study area through baseline study
- Identification of sensitive locations/features in the study area having potential to get impacted due to project development
- Identification of the type of impacts on environmental and social components due to various project activities at different development stage of project
- Proposing the mitigation measures for identified impacts

The detailed EMP is provided in Chapter 9.

Enhancement Plan

As enhancement plan, it is proposed that BEZA should develop a thick green belt all around the EZ site, proper storm water drainage to prevent flooding and rain water harvesting system to harvest rain

water and use it to meet daily water demand and reduce pressure on water resources. Part B (water body) of EZ site will be retained in its existing condition.

Contingency Plan

In order to be in a state of readiness to face adverse effects of accidents, a Contingency Plan is required to be prepared which includes on-site and off-site emergency plan by the individual industry and industrial estate. BEZA is committed to develop a Contingency Plan in consultation with district authorities and industry association. The Contingency Plan will have the following minimal components:

- Accidents preventions procedures/ measures
- Fire prevention planning and measures
- Fire water storage and foam system
- Accident/emergency response planning procedure
- Communication
- Emergency control centre
- Emergency information system with role & responsibility and command structure
- Recovery procedure
- Assessment of damages and rectification
- Evaluation of functioning of disaster management plan
- Accident investigation
- Clean-up and restoration

Compensation Plan

Project development involves acquisition of land. Project development involves displacement and relocation of the project. Compensation will be given to land owners. Detailed SIA, land acquisition plan and resettlement & rehabilitation plan is prepared for the project. Compensation plan is also prepared for the project and is given in the SIA report

Monitoring Plan

The objective of environmental monitoring during the construction and operation phases is to compare the monitored data against the baseline condition collected during the study period to assess the effectiveness of the mitigation measures and the protection of the ambient environment based on national standards. A monitoring schedule has been sketched based on the environmental components that may be affected during the construction and operation of the project and is given below in table 4.

Table 4: Environmental Monitoring Plan

S. No.	Aspect	Source of Impact	Monitoring Methods and Parameters	Frequency	Executing Agency	Enforcement Agency
1.0	**Construction Phase**					
1.1	Local Manpower Absorption	Construction Works	Contractor's report No. of people working in the project	Monthly	Civil Contractor	BEZA & PMC
1.2	Soil Erosion	Excavation, disposal, cut & fill and land clearing activities for site leveling and internal roads, disposal	Survey & observation; Extent and degree of erosion; Structures for controlling soil erosion	During Rainy Season	Contractor	BEZA & PMC

S. No.	Aspect	Source of Impact	Monitoring Methods and Parameters	Frequency	Executing Agency	Enforcement Agency
1.3	Greenbelt Development	-	Survival rate of species planted; Density of vegetation	Half Yearly	Contractor/BEZA	BEZA & PMC
1.4	Air Quality	Transportation of construction materials, road construction, construction of utilities	Survey & observations; Levels of PM_{10}, $PM_{2.5}$, SO_2, NOx, CO	Once in each season for twice a week for two weeks at 3 locations		BEZA & PMC
1.5	Waste Management	Restoration of disposal sites and construction areas	Status of protection measures	Quarterly	Contractors	BEZA & PMC
1.6	Noise Level	Noise levels compliance with respect to industrial standards	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations	Daily	Contractors	BEZA & PMC
1,7	Drinking Water	Contamination	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
1.8	Surface Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
1.9	Ground Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
2.0	**Operation Phase**					
2.1	Noise Levels	Noise levels compliance with respect to industrial standards	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations	Once in every month		BEZA & PMC
			Plant periphery and near noise generation sources	Monthly	Individual Industrial Units	BEZA & PMC
2.2	Biological Environment	Horticulture/ Greenbelt Development	Survival rate of plants and shrubs	Quarterly	BEZA	BEZA & PMC
			Survival rate of plants and shrubs at individual unit	Quarterly	Individual unit	BEZA & PMC
2.3	Air Quality	Industrial activities	PM_{10}, $PM_{2.5}$, SO_2, NO_x	Quarterly	Individual unit	BEZA & PMC

S. No.	Aspect	Source of Impact	Monitoring Methods and Parameters	Frequency	Executing Agency	Enforcement Agency
2.4	Surface Water Quality	Effluents and run-off from Industries and EZ site	All physio-chemical & biological parameters	Quarterly	BEZA & Individual Units	BEZA & PMC
2.5	Ground Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Quarterly	BEZA & Individual Units	BEZA & PMC
2.6	Noise Level	Noise levels compliance with respect to industrial standards	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations	Quarterly	BEZA & Individual Units	BEZA & PMC

2. Introduction

2.1. Prelude

The Bangladesh Economic Zone Act, 2010, was passed by Government of Bangladesh to make provisions for the establishment of Economic Zones (EZs) in all the potential areas with an ambit to encourage rapid economic development and to instil confidence in investors.

To meet the above objective of rapid economic development, Government of Bangladesh with support from World Bank and the Department for International Development, United Kingdom (UK-DFID) has proposed to develop EZs at various potential locations in Bangladesh as Private Sector Development Support Project (PSDSP). The PSDSP design consists of the public sector portion of investment in land, infrastructure and services for a number of pilot EZs, selected to implement new approaches to EZs in Bangladesh. EZs identified under PSDSP will be developed on Public Private Partnership (PPP basis).

Bangladesh Economic Zone Authority (BEZA) is the overall agency responsible for establishments of EZs in all the potential areas including the backward and undeveloped regions. BEZA has identified various locations for development of EZs. One of the potential sites is located at Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, Dhaka Sylhet Highway and has an approximate area of 143 ha (353.53 acres).

Taking into consideration the site location, available infrastructure, existing industries, investors interest and infrastructure & logistic requirement of the proposed industries, Shreehatta Economic Zone is planned targeting less polluting industries primarily integrated textile, ceramics, pharmaceuticals, food processing & paint.

Options for other industries can also be explored by the developer at the time of development of EZ depending on the investor's interest and availability of resources. At present, off-site infrastructure will be developed by BEZA for the proposed site identified for Shreehatta EZ. This EIA Report therefore covers in detail the environmental and social aspects of the proposed off-site infrastructure for the upcoming Shreehatta EZ. It also covers aspect of industrial area as well based on above broad industrial classification.

2.2. Project Background

BEZA shall develop the land and the following off-site infrastructure development:

- Site preparation & development
- Administration Building
- Boundary Wall

On-site facilities and Industrial area development will be planned by prospective PP developers on later stage

BEZA has appointed M/s Price Water Coopers Pvt. Ltd. to provide transaction advisory services for development of EZs in Bangladesh which also includes Environment Impact Assessment (EIA) study of the upcoming projects.

As per the procedure, an Initial Environment Examination (IEE) Report for development of off-site facilities along with proposed Terms of Reference (ToR) was submitted to DOE on 07.04.2015. Approved ToR was granted by DoE vide Memo No. DoE/Clearance/5342/2014/202 dated 14th May, 2015. Copy of the approved ToR by DoEB is attached as Annexure I. The EIA study for the

development of proposed Shreehatta EZ has been carried out as per the ToR issued by DoEB, World Bank's requirements and Environmental Management Framework of PSDSP

2.3. Project Description

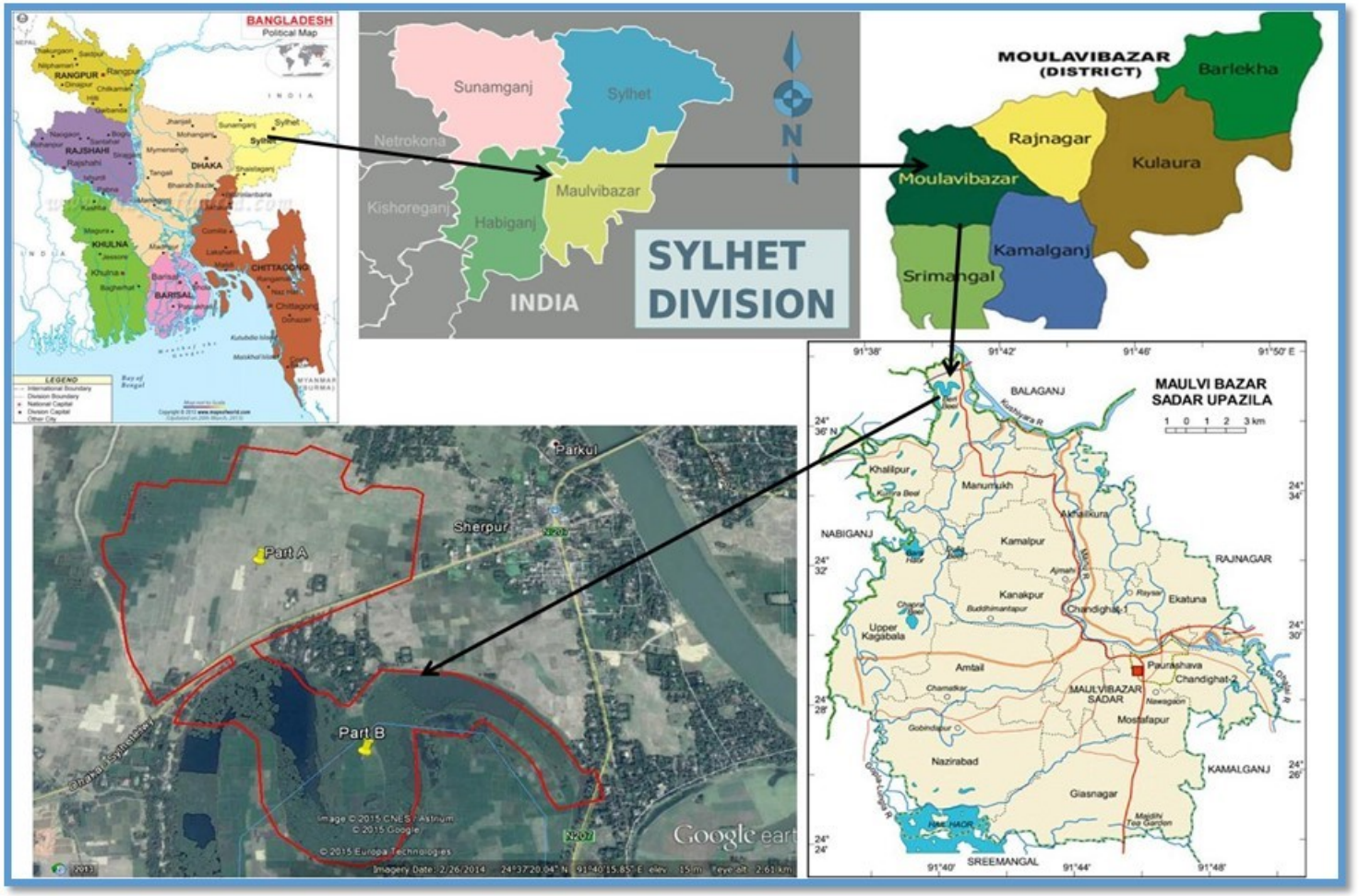
BEZA has proposed to develop Shreehatta EZ at site located in Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway. Upcoming EZ will cover the total area of 143 ha. The zone will be developed primarily for the industries like integrated textile, ceramics, pharmaceuticals, food processing & paint. At present BEZA intends to develop off-site facility for the EZ so that "ready to develop" land is available for industrialist and investors for establishing industries and developing EZ. A developer will be appointed for EZ development as per EZ Act, 2010. Developer will be responsible for developing the EZ.

2.4. Description of Project Site

Shreehatta EZ is proposed to be located in Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway. The location map of the upcoming EZ site is presented in figure 2. EZ site is divided into two parts, i.e Part A & Part B by Dhaka Sylhet highway. EZ site covers the area of 143 ha out of which 88 ha (Part A) is privately owned 55 ha (Part B) is Government land. Private land is agriculture land majorly with few scattered rural habitations and Government land is water body called Gong by locals. Private land is flat land with elevation varying from 11-13 m amsl and part B which is water body has an average depth of 15 ft. Agriculture land and water body both are irregular shaped. Geographical coordinates of the EZ site is given in table 5 below and figure 3 & 4.

Part B of EZ site/Water body receives storm water from all nearby locations. There is one more large water body to the South of the part B of the EZ site. Part B of EZ site and this large water body are connected with each other. Larger water body have been encroached by locals at various locations which has lead to accumulation of storm water in part B area of site. Part B of EZ site/Gong and larger water body are connected with Khushiyara River by a Khal at app. 5 kms upstream from Sherpur Bridge.

BEZA at present intends to develop only Part A, i.e. private land and will retain the water body or part B in its original shape. No development will be carried out in Part B of the site as per present planning.



Source: Google Earth

Figure 2: Location Map of Shreehatta EZ

Table 5: Coordinates of the EZ Site

Points	Latitude	Longitude
Part A- Private Land		
A	24°37'11.27"N	91°39'46.63"E
B	24°37'26.86"N	91°39'40.75"E
C	24°37'30.43"N	91°39'37.63"E
D	24°37'32.75"N	91°39'36.94"E
E	24°37'34.16"N	91°39'37.00"E
F	24°37'34.54"N	91°39'39.50"E
G	24°37'42.12"N	91°39'40.60"E
H	24°37'41.73"N	91°39'44.80"E
I	24°37'42.71"N	91°39'45.26"E
J	24°37'42.24"N	91°39'53.24"E
K	24°37'47.91"N	91°39'54.70"E
L	24°37'46.90"N	91°40'2.97"E
M	24°37'48.05"N	91°40'4.91"E
N	24°37'45.79"N	91°40'10.79"E
O	24°37'43.08"N	91°40'9.52"E
P	24°37'41.41"N	91°40'10.10"E
Q	24°37'40.55"N	91°40'12.14"E
R	24°37'41.78"N	91°40'13.91"E
S	24°37'41.27"N	91°40'19.91"E
T	24°37'40.53"N	91°40'21.07"E
U	24°37'28.10"N	91°40'19.27"E
V	24°37'17.37"N	91°39'55.42"E
Part B- Government Land		
AA	24°37'27.87"N	91°40'19.25"E
AB	24°37'18.83"N	91°39'58.29"E
AC	24°37'17.27"N	91°39'59.86"E
AD	24°37'15.73"N	91°40'3.66"E
AE	24°37'12.61"N	91°40'6.76"E
AF	24°37'12.60"N	91°40'8.35"E
AG	24°37'11.24"N	91°40'10.01"E
AH	24°37'11.07"N	91°40'11.14"E
AI	24°37'15.63"N	91°40'15.19"E
AJ	24°37'15.21"N	91°40'24.79"E
AK	24°37'13.26"N	91°40'29.51"E
AL	24°37'7.64"N	91°40'37.04"E

Points	Latitude	Longitude
AM	24°37'3.01"N	91°40'39.94"E
AN	24°37'3.17"N	91°40'41.55"E
AO	24°36'59.92"N	91°40'42.07"E
AP	24°36'58.86"N	91°40'36.54"E
AQ	24°37'0.59"N	91°40'35.34"E
AR	24°37'4.62"N	91°40'33.34"E
AS	24°37'9.37"N	91°40'27.88"E
AT	24°37'7.24"N	91°40'25.67"E
AU	24°37'8.06"N	91°40'19.27"E
AV	24°36'59.80"N	91°40'19.63"E
AW	24°36'53.70"N	91°40'16.70"E
AX	24°36'52.41"N	91°40'12.83"E
AY	24°36'53.21"N	91°40'7.69"E
AZ	24°36'55.92"N	91°40'3.17"E
BA	24°36'59.71"N	91°40'0.78"E
BB	24°37'6.74"N	91°39'59.96"E
BC	24°37'9.06"N	91°39'56.83"E
BD	24°37'8.69"N	91°39'54.34"E
BE	24°37'9.07"N	91°39'49.26"E
BF	24°37'11.23"N	91°39'50.09"E
BG	24°37'13.84"N	91°39'52.32"E
BH	24°37'16.33"N	91°39'56.11"E

Source: Google Earth

Figure 3: Map Showing Geographical coordinates of Part A

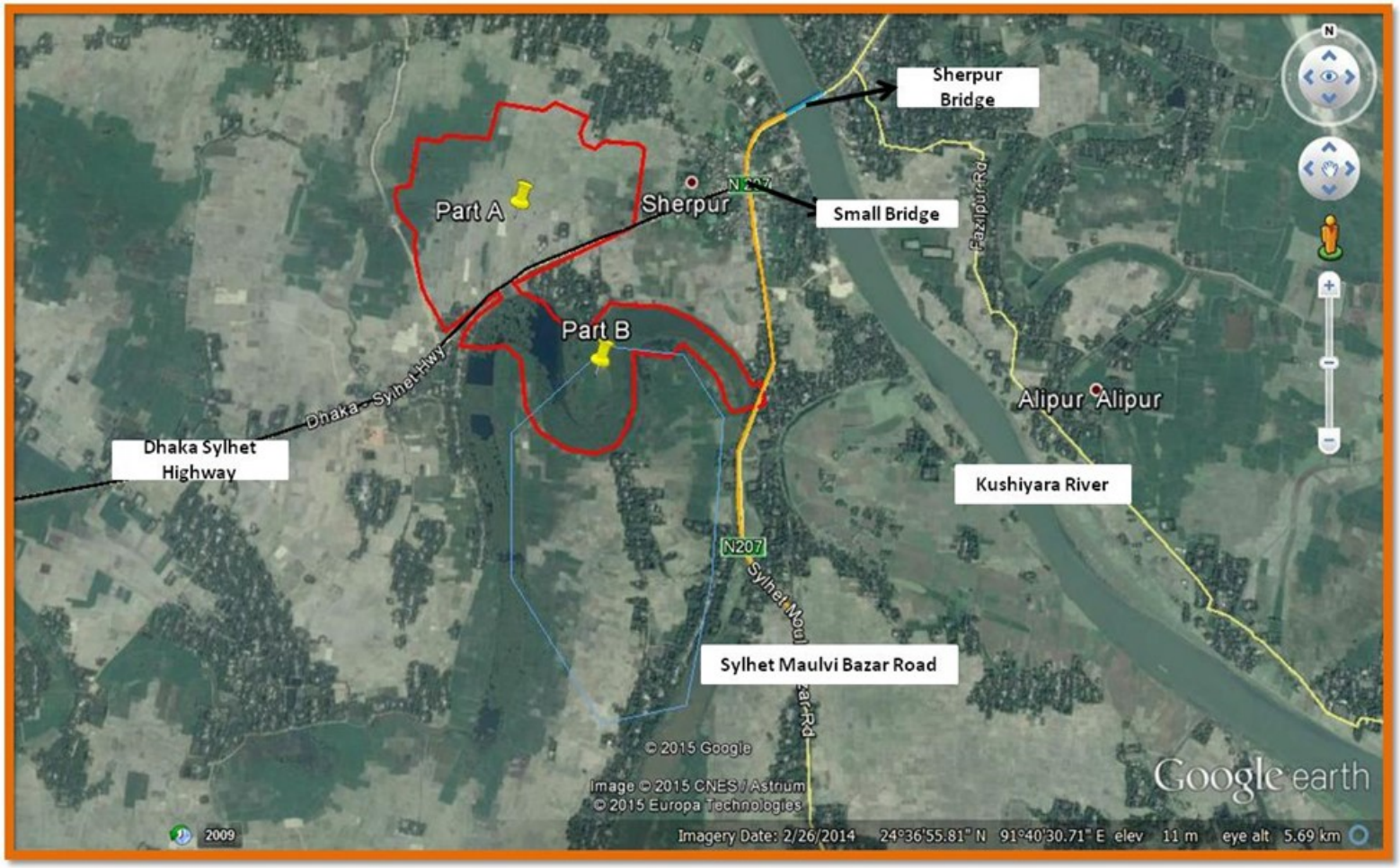
Source: Google Earth

Figure 4: Map Showing Geographical coordinates of Part B

Connectivity

Shreehatta EZ is connected with all the major locations of Bangladesh by road. The EZ site abuts the Dhaka – Sylhet national highway. It is spread on both sides of the 2 lane highway and is presently below the road level. Currently this highway is catering to passenger buses and trucks destined for Northern Bangladesh. A small bridge at intersection of River Kushiyara and Dhaka-Sylhet highway called Sherpur bridge bifurcates the two sides of the site. Sylhet Maulvibazar road from the Sherpur bridge runs perpendicular to site and meet part B of site at Hamarcona point. Both Sylhet Dhaka highway and Sylhet Maulvibazar roads will be access road for the site.

There are two railway stations near the EZ site – Sylhet Station (35 Km from the site) and Sreemangal Station (43 Km from site). Osmani International Airport in Sylhet is about 55 Km from the site. Map showing connectivity to the project site is given below in figure 5.



Source: Google Earth

Figure 5: Map Showing Connectivity of the EZ site

2.5. Need for the Proposed Project

Bangladesh is primarily an agricultural economy with close to 50% of the labour force employed in agriculture. Industry sector contribution to Gross Domestic Product (GDP) has hovered around 25-30% only for past few years. Manufacturing sector of Industry shows predominance of export led garments and textile industries and comprise of 52% share of total exports in Bangladesh making it the world's second largest garment manufacturer.

But it also reveals relatively low emphasis and export competitiveness of its other items. Therefore, the country needs to bolster exports of other indigenous products, which will happen through enhanced industrial infrastructure, capacity building, and policy initiatives. Similarly, the country may choose to substitute imports of capital goods and other items of domestic consumption, provided there is adequate investment in industrial infrastructure to enable domestic manufacturing.

The Government of Bangladesh has, in the past, successfully provided tailored infrastructure services and business environment conditions through EPZs. EPZs were used as a strategic instrument for attracting Foreign Direct Investment (FDI) and dealing with the shortcomings of the overall investment climate, business registration, licensing, etc. which were restricting investments in the Domestic Tariff Area (DTA).

To overcome the limitations of EPZ model, new EZ regime has been adopted by the Government of Bangladesh so as more spill-over can be harnessed by local firms from FDI , additional investments can be encouraged within value chains, more local produce can be procured and better linkages can be established between manufacturing firms and educational institutions.

The EZ development, a zoned industrialization, is required in Bangladesh to maximize the growth benefits of agglomeration and ease the increasing urban congestion. More importantly, the project will enable new sources of growth, where investor will show their interest.

Sherpur is one of the less developed areas of Maulvibazar district. Development of EZ in such a area will boost not only the industrial development in the area but also the infrastructural facilities like improved power supply, roads, drainage etc.. Employment generation for local people will enhance their living standard and quality of life. EZ development will lead to development of allied facilities and related developments in the nearby area. Also as per requirement for EZ development, location of Sherpur is suitable. Adequate land is available for development of EZ and no major habitation is present on the private land. Site is well connected by road as site abuts the Dhaka Sylhet Highway and Sylhet Maulvibazar Highway. Site is just at distance of 20 km from District Headquarters, 25 kms from Upzila headquarters and 35 km from Sylhet. Site lies close to Kushiyara River thus can be benefited with inland transportation of raw material and goods during navigable season. Distance of site from Chittagong port is 435 kms and Ashuganj River Terminal on Meghna River is app. 108 kms from site. All the facilities, i.e. power, gas and water are available within in nearby areas.

2.6. Need of Study

The proposed project comprises of development of land and off-site facilities for the upcoming Shreehatta EZ with an approximate area of 143 ha (35333 acres). Out of the total area, development at present will be undertaken on 88 ha which is privately owned land. Remaining land which is a water body will be retained in its original position. Off-site facilities will include development of site, i.e. filling and leveling works, construction of administration building within EZ site and boundary wall to the site.

The project attracts the applicability of Environment Conservation Act (ECA), 1995 & Environmental Conservation Rules, 1997. The proposed project component is classified under red category as per Environmental Conservation Rules, 1997. Thus it is required to carry out EIA study for the proposed project as per ECA, 1995 & Environmental Conservation Rules (ECR), 1997 and obtain approval of DoEB before taking up any construction activity at the proposed site.

Project is being implemented with the financial support of World Bank. As per the World Bank Policy O.P.4.01, development of the economic zone is classified as Category A project which requires a detailed environment assessment study prior development of zone to identify the potential threats of project to environment and to frame mitigation and environment management plan to reduce the negative impact of the project. Whereas development of the off-site facilities for economic zone will have moderate impacts and impacts will be site specific thus off-site development for EZ falls under Category B, which requires a site-specific rapid EIA study. EIA study is required to be carried out as per the ToR issued by DoE, EMF for PSDSP and World Bank Policies.

2.7. Scope and Methodology of the Study

For the purpose of environmental assessment, area within 10 km radial zone of the proposed project have been studied and classified as Study Area. Following methodology has been adopted for the EIA study:

- Collection of primary and secondary baseline information
- Analysis of project component and its activities with respect to environmental aspects
- Public consultation to identify their concern and acceptance to the project
- Analysis of Alternatives
- Impact assessment and identification of mitigation measures for elimination, or minimisation of impacts
- Assessment of institutional aspects, and development of Environmental Management and Monitoring Plan.
- Identification of sources of pollution during construction and operation phases of the project at the proposed site
- Identification of utilisation of resources obtained during construction and operation phases of the project
- Assessment of extent of pollution and resource utilisation in the proposed area
- Recommend measures to optimise resource utilisation
- Develop an environmental monitoring plan to ensure effective implementation of the environmental management plan

The board diagram for impact identification and mitigation and management is shown below in figure 6.

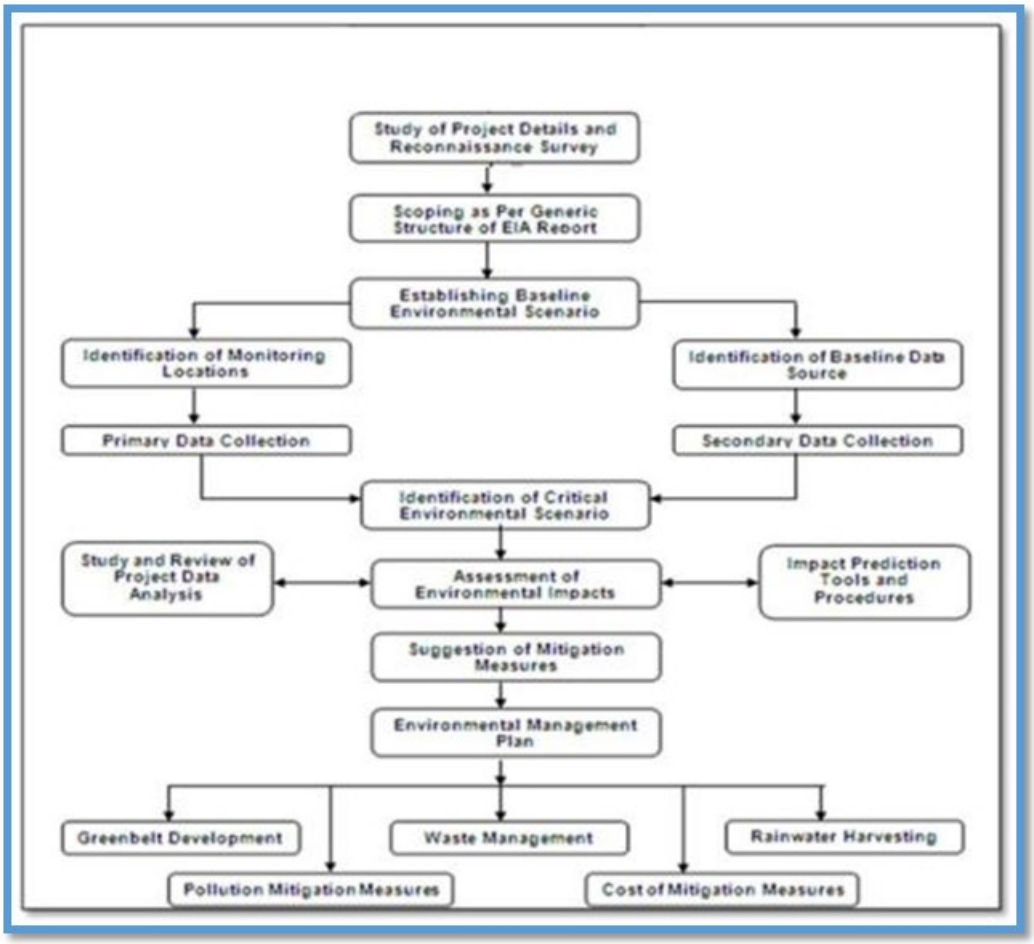


Figure 6: Methodology of EIA Study

2.8. Limitation of the Study

The present EIA Report has been prepared based on the Primary field investigations / assessment, and secondary data collected from Bangladesh Meteorological Department (BMD), Department of Environment, Bangladesh (DoEB) and others and published journals, and books, public consultation and site observations. The environmental and social assessment is based on the information collected from the various Agencies, community consultations and observations. Professional judgement and subjective interpretation of facts and observations has been applied for the preparation of the EIA Report.

Additionally other facilities like power, gas and water supply are to be developed by the concerned Government agencies. Alignment of these pipe lines and facilities are not known thus impacts due to development of these facilities cannot be assessed.

2.9. ToR Compliance Matrix

The EIA study has been conducted in accordance with the approved ToR issued by DOE (ToR letter is attached as Annexure I) and the Terms of Reference included in the EMF for the PSDSP. Table 6 presents the point-wise compliance of the issued ToR.

Table 6: Compliance of TOR Points

S. No.	ToR Point	Compliance
I	The project authority shall conduct a comprehensive Environmental Impact Assessment (EIA) study considering the overall activity of the said project in accordance with this ToR and following additional suggestions	EIA study has been carried out in line with the ToR Approved by DoE, WB guidelines & EMF of PSDSP
II	The EIA Report should be prepared in accordance with following indicative outlines:	Agreed
1	Executive Summary	Refer Chapter 1
2	Introduction: (background, brief description, rationale of the project, scope of study, methodology, limitation, EIA team, references)	Refer Chapter 2
3	Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)	Refer Chapter 3
4	Project Description	Refer Chapter 4
i.	Introduction	Section 4.1
ii.	Project objective	Section 4.2
iii.	Project options	Section 4.2
iv.	Interventions under selected options	Section 4.3
v.	Project activities: A list of the main project activities to be undertaken during site clearing, construction as well as operation	Section 4.5
vi.	Project schedule: The phase and timing for development of the project	Section 4.6
vii.	Resources and utilities demand: Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project	Section 4.7
viii.	Map and survey information Location map, cadastral map showing land plots (project and adjacent area), geological map showing geological units, fault zone, and other natural features	Section 4.8
ix.	Project plan, Design, Standard, Specification, Quantification, etc.	Section 4.5
5	Environmental and Social Baseline	Refer Chapter 5
5.1	Meteorology	Section 5.4
5.1.1	Temperature	Section 5.4.1
5.1.2	Humidity	Section 5.4.2
5.1.3	Rainfall	Section 5.4.3
5.1.4	Evaporation	Section 5.4.4
5.1.5	Wind Speed	Section 5.4.5
5.1.6	Sunshine hours	Section 5.4.6
5.2	Water Resources	Section 5.7
5.2.1	Surface Water System	Section 5.7.1 & 5.7.9
5.2.2	Tropical cyclones and Tidal Flooding	Section 5.7.2
5.2.3	Salinity	Section 5.7.4
5.2.4	Drainage Congestion and Water Logging	Section 5.7.5
5.2.5	Erosion and Sedimentation	Section 5.7.6
5.2.6	River Morphology	Section 5.7.7
5.2.7	Navigation	Section 5.7.8
5.2.8	Ground Water System	Section 5.7.10 & 5.7.11
5.3	Land Resources	Section 5.8
5.3.1	Archaeological Regions	Section 5.8.1

S. No.	ToR Point	Compliance
5.3.2	Land Types	Section 5.8.3
5.3.3	Soil Texture	Section 5.8.4
5.3.4	Land Use	Section 5.8.5
5.4	Agriculture Resources	Section 5.9
5.4.1	Farming Practice	Section 5.9.1
5.4.2	Cropping Pattern and Intensity	Section 5.9.2
5.4.3	Cropped Area	Section 5.9.3
5.4.4	Crop Production	Section 5.9.4
5.4.5	Crop Damage	Section 5.9.4
5.4.6	Main Constraints of Crop Production	Section 5.9.4
5.5	Livestock and Poultry	Section 5.10
5.5.1	Feed and Fodder Shortage	Section 5.10.1
5.5.2	Livestock/Poultry Diseases	Section 5.10.2
5.6	Fisheries	Section 5.11
5.6.1	Introduction	Section 5.11.1
5.6.2	Problem and Issues	Section 5.11.5
5.6.3	Habitat Description	Section 5.11.2
5.6.4	Fish Production and Effort	Section 5.11.3
5.6.5	Fish Migration	Section 5.11.4
5.6.6	Fish Biodiversity	Section 5.11.3
5.6.7	Fisheries Management	Section 5.11.5
5.7	Ecological Resources	Section 5.12
5.7.1	Bio-ecological Zone	Section 5.12.1
5.7.2	Common Flora and Fauna	Section 5.12.2 & 5.12.3
5.7.3	Ecosystem Services and Function	Section 5.12.4
5.8	Socio Economic Condition	Section 5.13
5.8.1	Socio Economic Condition	Section 5.13.1
5.8.2	Quality of Life Indicators	Section 5.13.4
5.8.3	Income and Poverty	Section 5.13.5
5.8.4	Gender and Women	Section 5.13.6
5.8.5	Common Property Resources	Section 5.13.8
5.8.6	Conflict of Interest and Law and Order Situation	Section 5.13.9
5.8.7	Historical, Cultural and Archaeological Sites	Section 5.13.10
6	Identification and Analysis of Key Environmental Issues (Analysis shall be presented with Scenarios, Maps, Graphics, etc. for the Case of Anticipated Impacts on Baseline)	Refer Chapter 6
6.1	Environmental Sensitivity Investigation	Section 6.1
6.2	Environmental Aspect	Section 6.2
6.1	Environmental Hot Spots	Section 6.3
6.1	Likely Beneficial Impacts	Section 6.4
6.1	Community Recommendations	Section 6.5
6.1	Alternate Analysis	Section 6.6
7	Environmental and Social Impacts	Refer Chapter 7
7.1	Introduction	Section 7.1
7.2	Impact on Water Resources	Section 7.5
7.2.1	Pre-construction Phase	Section 7.5.1
7.2.2	Construction Phase	Section 7.5.1
7.2.3	Post-construction Phase	Section 7.5.2
7.3	Impact on Land Resources	Section 7.6
7.3.1	Pre-construction Phase	Section 7.6.1
7.3.2	Construction Phase	Section 7.6.1
7.3.3	Post-construction Phase	Section 7.6.2
7.4	Impact on Agriculture Resources	Section 7.7
7.4.1	Pre-construction Phase	Section 7.7.1
7.4.2	Construction Phase	Section 7.7.1
7.4.3	Post-construction Phase	Section 7.7.2

S. No.	ToR Point	Compliance
7.5	Impact on Fisheries	Section 7.8
7.5.1	Pre-construction Phase	Section 7.8.1
7.5.2	Construction Phase	Section 7.8.1
7.5.3	Post-construction Phase	Section 7.8.2
7.6	Impact on Ecosystem	Section 7.9
7.6.1	Pre-construction Phase	Section 7.9.1
7.6.2	Construction Phase	Section 7.9.1
7.6.3	Post-construction Phase	Section 7.9.2
7.7	Socio Economic Impact	Section 7.10
7.7.1	Pre-construction Phase	Section 7.10.1
7.7.2	Construction Phase	Section 7.10.1
7.7.3	Post-construction Phase	Section 7.10.2
8.	Public Consultation and Disclosure	Refer Chapter 8
8.1	Introduction	Section 8.1
8.2	Objectives of Public Consultation and Disclosure Meeting	Section 8.1
8.3	Approach and Methodology of Public Consultation and Disclosure Meeting	Section 8.2
8.4	Public Consultation Meetings (PCMs)	Section 8.4
8.5	Public Disclosure Meetings (PDMs)	Section 8.4
9.	Environmental Management Plan and Monitoring Indicators	Refer Chapter 9
9.1	Introduction	Section 9.1
9.2	Mitigation Plan	Section 9.3
9.3	Enhancement Plan	Section 9.4
9.4	Contingency Plan	Section 9.5
9.5	Compensation Plan	Section 9.6
9.6	Monitoring Plan	Section 9.7
9.7	Monitoring Indicators	Section 9.8
10	Cost Estimation for Environmental Mitigation Measures and Monitoring	Refer Chapter 10
11.	Conclusions and Recommendations	Refer Chapter 11
III	Without obtaining approval of EIA report by the Department of Environment, the Project authority shall not be allowed to conduct earth filling or any kind of physical intervention in the proposed project site and also not be able to start the physical activity of the project.	Agreed
IV	This approval of the Terms of Reference (ToR) would not mean any acceptance or site clearance of the Project.	Agreed
V	The proposed EIA study would not establish any claim, right in favour of the proponent for getting site clearance or environmental clearance.	Agreed
VI.	Without obtaining Environmental Clearance, the project authority shall not be able to start the operation of the project.	Agreed
VII.	The project authority shall submit the EIA along with the No Objection Certificate (NOC) from the local authority, NOC from Forest Department (if it is required in case of cutting any forested plant, private or public) and NOC from other relevant agencies for operational activity etc. to the Sylhet Division Office of DOE in Sylhet with a copy to the Head Office of DOE in Dhaka.	Agreed

2.10. Structure of the Report

This EIA report has been prepared strictly following the report structure desired by DOE as per TOR. The EIA report contains project features, baseline environmental conditions, assessment of environmental impacts, and formulation of mitigation measures along with environmental management and monitoring plan.

The report includes the following chapters:

Chapter 1: Executive Summary

The executive summary gives the synopsis of the EIA Report.

Chapter 2: Introduction

This chapter provides background information of the project proponent, need for the EIA study as per prevailing legislation, Location and brief description of the project, methodology adopted for EIA study and structure of the report.

Chapter 3: Legislative, regulation and policy consideration

This chapter deals with the details of the potential legal, administrative, planning and policy framework which have been used in the preparation of the EIA Report.

Chapter 4: Project Description

This chapter deals with the details of the proposed EZ such as location, connectivity, project requirements, Infrastructure development, environmental consideration, project cost, implementation schedule, etc.

Chapter 5: Environmental and Social Baseline

This Chapter describes the baseline environmental conditions around the project site for various environmental attributes, viz. physical, biological and socio-economic, within the 10 km radial zone, which is termed as the study area. Topography, soil, water, meteorology, air, noise, and land constitute the physical environment, whereas flora and fauna constitute the biological environment. Demographic details and occupational pattern in the study area constitute socio-economic environment. Baseline environmental conditions are based on the information collected from the various agencies and the secondary data collected from published sources.

Chapter 6: Identification and Analysis of Key Environmental Issues

This chapter details the analysis of the key environmental issues.

Chapter 7: Environmental and Social Impacts

This chapter details the inferences drawn from the environmental impact assessment of the proposed project. It describes the overall impacts of the project activities and underscores the areas of concern, which need mitigation measures.

Chapter 8: Public Consultation and Disclosure Meeting

This Chapter provides an insight into the process & methodology followed for carrying out the public consultation meetings in study area and proceedings of pubic consultations

Chapter 9: Environmental Management Plan and Monitoring Indicators

This Chapter provides mitigation and control measures to attenuate and/or eliminate environmental impacts, which are likely to be caused by the proposed project. An Environmental Management Plan (EMP) has been developed to mitigate the potential adverse impacts and to strengthen the beneficial impacts. This chapter also provides the environmental monitoring plan proposed for the project.

Chapter 10: Cost Estimation for Environmental Mitigation Measures and Monitoring

This chapter concludes on the findings that emerged from the environmental assessment study and summarizes the key points to be addressed to ensure the environmental sustainability of the project during the construction and operation phases.

Chapter 11: Conclusions and Recommendations

This chapter concludes on the findings that emerged from the environmental assessment study and summarizes the key points to be addressed to ensure the environmental sustainability of the project during the construction and operation phases.

2.11. EIA Team

A multidisciplinary team of professionals having experience of conducting Environment & Social Impact Assessment Studies for Industrial Parks, Industrial Areas, Special Economic Zones, DTA, Economic Zones, Area development, Industrial Corridors etc was involved in carrying out EIA study for this project. Details of the professionals are given in the table 7 below:

Table 7: EIA Team

Name of Professional	Area of Expertise	Position Assigned
Sanjay Kumar Jain	Environment Impact Assessment, Environmental Management Plan and Environmental & Social management framework	Team Leader & Sr. Env. & EIA Specialist
Nisha Rani Singhal	Environment Impact Assessment & Environment Management Plan	Support Environmentalist
Ratnesh Kotiyal	Aquatic Ecology	Aquatic ecologist
Anil Kumar	Land Use Land cover & Remote Sensing	GIS & Land Use Specialist
Manoj Sharma	Soil Resources & Quality Assessment, Agricultural Resource Assessment	Soil Expert
K. Manivanan	Architecture & planning	Urban Planner

2.12. References

List of secondary data used for carrying out EIA study and preparation of EIA report is given at the table 8 below.

Table 8: Reference Used for EIA Study

S. No.	Reference
	Government Departments
1.	Bangladesh Agriculture Research Council (BARC)
2.	Bangladesh Economic Zone Authority
3.	Bangladesh Water Development Board
4.	Department of Environment
5.	Bangladesh Meteorological Department
6.	Bangladesh Forest Department
7.	Bangladesh Bureau of Statistics
8.	Bangladesh Food & Agriculture Department (FAO, Bangladesh)
9.	Geological survey of Bangladesh
10.	Disaster Management Bureau (DMB)
11.	Department of Disaster Management (DDM)
12.	Department of Agriculture Extension
13.	Bangladesh Rice Research Institute
14.	Department of Fisheries
15.	Power Grid Company of Bangladesh
16.	Land & Revenue Department, Sherpur

S. No.	Reference
Journals, Books & Existing Studies	
1.	Geological Settings Of The Areas Of Arsenic Safe Aquifers, Md. Munir Hussain And SKM Abdullah, Ground Water Task Force, October, 2001
2.	Misbah UDDIN, Mithun DEB, Dabojani DAS "Remote Sensing Based Analysis of Critical Bends of Kushiyara River in Bangladesh"
3.	Annual Flood Report, 2014, Flood Forecasting and Warning Centre, Bangladesh Water Development Board
4.	EIA Report of Bibiyana 300-450 MW Gas based Combined Cycle Power Plant at Nabiganj, Habiganj, 2013
5.	Md. Misbah Uddin, Assessment Of Morphological Aspects Of Kushiyara-Monu River System, Department Of Water Resources Engineering Bangladesh University Of Engineering And Technology, Dhaka, Bangladesh, June, 2010
6.	Anwar Zahid and Syed Reaz Uddin Ahmed "Groundwater Resources Development in Bangladesh: Contribution to Irrigation for Food Security and Constraints to Sustainability", Ground Water Hydrology Division, Bangladesh Water Development Board, Dhaka, Bangladesh"
7.	Maminul Haque Sarker, Shampa, R.M. Nair, Syed Monowar Hossain, Jakia Akter, "Inland Navigation and Integrated Water Resources Management", IUCN, 2014
8.	Community Report, Maulvibazar Zila, June, 2012, Population and Housing Census, 2011, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning
9.	District Statistics, 2011, Maulvibazar, December, 2013, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning
10.	Community Report, Sherpur Zila, June, 2012, Population and Housing Census, 2011, Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning
11.	Environment Impact Assessment Report "Bibiyana I and II Gas Power Project", Bangladesh Centre for Advanced Studies for Summit Bibiyana I Power Company Limited and Summit Bibiyana II Power Company Limited, June, 2011
12.	Preliminary Environmental and Social Audit (Construction Phase) Report of Summit Bibiyana II Power Company Limited Project, Parkul, Nabigonj, Habigonj, Bangladesh by Summit Bibiyana II Power Company Limited
13.	Social Impact Assessment Report-Shreehatta Economic Zone, Sherpur
Website	
1.	Wikipedia
2.	Google maps
3.	http://www.bangladeshtourismdirectory.com/bangladesh-archaeological-sites-list.html
4.	Google earth imageries
5.	http://www.saarc-sadkn.org/countries/bangladesh/disaster_mgt.aspx (Bangladesh Disaster Knowledge Network)
6.	http://www.livingwiththejamuna.com/essayintroduction.html
7.	http://www.fao.org/docrep/field/003/AC360E/AC360E03.htm#anxA
Others	
1.	Site visits
2.	Pre-feasibility reports & Soil Analysis report from BEZA, PWC, JDI and Mahindra

3. Legislative, Regulation and Policy Consideration

3.1. Regulatory Requirements for the Proposed Project

The Government of Bangladesh has framed various laws and regulation for protection and conservation of natural environment. These legislations with applicability to this project are summarized below in the table 9 below.

Table 9: Applicability of Key Environmental Legislation at a Glance

Name	Key Requirement	Applicability	Remarks
Acts/Rules			
Bangladesh Environmental Conservation Act, 1995 (ECA, 1995) and Environment Conservation Rules 1997 (ECR, 1997) ECA & ECR amendment 2000 ECA & ECR amendment 2002	Mandatory requirement of prior environment clearance for certain category of project for conservation and improvement of environment and control and mitigation of pollution of the environment. Standards are described under ECR, 1997 To ascertain responsibility for compensation in case of damage to ecosystem Restriction on polluting automobiles, sale and production of environmental harmful items.	Applicable. Project classified under red category. EIA study required to be undertaken	Site approval certificate is to be obtained from DoE prior carrying out EIA study. EIA study is carried out on basis of ToR approved by DoE.
Environment Court Act, 2000 and subsequent amendments in 2002	To give high priority to environment pollution prevention	Applicable, for all projects have potential of environmental threat	All the developments to be carried out as per ECA, 1995 & ECR, 1997 and amendments. Regulatory authority is Judiciary and Ministry of Environment & Forest
Bangladesh Wildlife Preservation Act, 1974 and Revision 2008 (Draft)	No person shall damage or destroy any vegetation in any wild life sanctuary & the wild Animals shall not be hunted or captured. For preservation of Wildlife Sanctuaries, parks, reserves.	Not Applicable. Project site is not located within any wildlife sanctuary/national park or any other protected area under this act.	Development activity will not have any interface with wildlife or wild habitat at any stage. Regulatory authority is Ministry of Environment and Forest Bangladesh Wild Life Advisory Board
The Forest Act 1927,Amendment 2000 (Protected, village Forests and Social Forestry)	Declare any forests land or waste land as protected forests. May stop public or private way or watercourse in the interest of preservation of the forest	Not Applicable. No forest land diversion is involved.	No forest land will required to be diverted

Name	Key Requirement	Applicability	Remarks
	Declare a reserved forest area as Village Forests Declare an area as Social forests or launch a social forestry programme in Govt. land or private land with permission		
The Private Forests Ordinance Act, 1959	Conservation of private forests and for the afforestation on wastelands.	Not applicable	Tree cutting will be minimized. Compensatory plantation to be carried out for the tree to be fell. Also owners should be given adequate compensation for each tree fell.
The Penal Code	Chapter XIV of the Penal Code provides offences affective public health, safety, convenience, decency and morals; Section 277: Falling Water or Public Spring or Reservoir; Section 278: Making Atmosphere Noxious to Health; Section 284: Negligent Conduct with Respect to Poisonous Substance; Section 285: Negligent Conduct with Respect to Fire or Combustible Matter; Section 286: Negligent Conduct with Respect to Explosive Substance. Section 277: whoever voluntarily corrupts or fouls the water of any public spring or reservoir, to render it less fit for the purpose for which it is ordinarily used will be punished under the law. Section 278: whoever voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the Neighbourhood or passing along a public way will get punishment.	Applicable.	It is required to take all the measures proposed and suggested by DoE, Bangladesh during both construction an operation phase to minimize the environmental pollution
The Protection and Conservation of Fish Act, 1950 and The Protection and Conservation of Fish Rules, 1985	Prohibit or regulate the construction, temporary or permanent of weirs, dams, bunds, embankment and other structures	Taken from Not Applicable.	No such structure is proposed to be constructed by BEZA for the proposed EZ. However water supply will be Kushiyara River through pipeline. Pipeline will be laid by BWDB.
The Explosive Act, 1884	To prevent any accident due to explosive storage, use or transportation due to careless	May be Applicable depending on quantity of fuel	Fuel will be stored and used at site for running various construction

Name	Key Requirement	Applicability	Remarks
	handling/management	storage	machinery and equipment
Water Pollution Control Ordinance 1970	Prevention of water pollution	Applicable from the prospective of prevention of pollution	Applicable primarily during construction stage (e.g. sewage and equipment washing and maintenance liquid waste discharges at construction camps)
Water Supply and Sanitation Act, 1996	Management and Control of water supply and sanitation in urban areas.	Applicable for all development projects	Regulatory authority is Ministry of Local Government, Rural Development and Cooperatives
The ground Water Management Ordinance 1985	Management of Ground Water Resources. Tube well shall not be dug in nay place without permission from Upzila Parishad.	Applicable, if tube wells will be dug to develop water supply system during operation phase	Permission should be taken if ground water is used, before digging tube wells
Natural Water Bodies Protection Act 2000	The character of water bodies i.e. rivers, canals, tanks, or floodplains identified as water bodies in the master plans or in the master plans formulated under the laws establishing municipalities in division and district towns shall not be changed without approval of concerned ministry.	Not applicable. No water body at present is under planning to be filled up. Part B which is water body will be retained.	Regulatory authority is RAJUK/Town Development Authority/Municipalities
The Embankment and Drainage Act 1952	An Act to consolidate the laws relating to embankment and drainage and to make better provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of lands and for their protection from floods, erosion and other damage by water.	Not applicable, as project development will not interfere with any surface water body and its embankment. Water supply pipeline from Kushiyara River to site will be laid by BWDB.	Regulatory authority Ministry of Water Resources and FCD
Wetland Protection Act 2000	Adhere to a formal environmental impact assessment (EIA) process, as set out in EIA guidelines and manuals for water sector projects or related to alteration of natural drainage. No construction of roads if likely to effect the flow of navigable water ways without clearance from concerned authorities Upland flow in water channels to preserve eco-system	Not Applicable. Site is not a wetland area. Part A agricultural land and Part B is water body which receives the storm water from nearby area and carries water throughout the year	Permission to be taken from the Ministry of Water Resources and DOE prior carrying out any activity in Part B of EZ site. However as per current planning, Part B of EZ site will be retained in its existing condition.

Name	Key Requirement	Applicability	Remarks
	Protection against degradation and resuscitation of natural water-bodies such as lakes, ponds, beels, khals, tanks, etc. affected by man-made interventions or other causes. Completely stop the filling of publicly-owned water bodies and depressions in urban areas for preservation of the natural aquifers and environment. Stop unplanned construction on riverbanks and indiscriminate clearance of vegetation on newly accreted land.		
Antiquities Act 1968	Governs preservation of the national cultural heritage, protects and controls ancient monuments, regulates antiquities as well as the maintenance, conservation and restoration of protected sites and monuments, controls planning, exploration and excavation of archaeological sites.	Not applicable as no structure of national cultural heritage will be affected due to project development	Regulatory authority is Ministry of cultural Affairs
The Building Construction Act 1952 (with amendments)	An Act to provide for the prevention of haphazard construction of building and excavation of tanks which are likely to interfere with the planning of certain areas in Bangladesh	Applicable as the project involves development of infrastructure	Regulatory authority is Ministry of Works
The Vehicle Act, 1927 The Motor Vehicles Ordinance, 1983 The Bengal Motor Vehicle Rules, 1940	To regulate vehicular exhaust emissions	Applicable as heavy vehicle movement is involved both during construction and operation phase	Regular maintenance and upkeeping of the vehicles should be carried out. Regulatory authority is Bangladesh Road Transport Authority
The Land Acquisition Act, 1894 The Acquisition and Requisition of Immovable Property Ordinance 1982 and subsequent amendments in 1994, 1995, 2004	To provide appropriate compensation for the land acquired	Applicable as the project requires small piece of land acquisition	Regulatory authority is Revenue Department
The Factories Act, 1965 Bangladesh Labour Law, 2006	This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions.	Applicable as the workers will be employed during construction and operation phase of EZ	Regulatory authority is Ministry of labour

Name	Key Requirement	Applicability	Remarks
Policies			
National Environment Policy, 1992	For sustainable development	Applicable for all development projects	Usage of energy efficient building material, fuel etc. should be encouraged
National Environment Management Action Plan 1995	Conservation of natural habitats, bio-diversity, energy, sustainable development and improvement of life of people	Applicable for all development projects	Usage of energy efficient material, green building techniques, reduction of carbon foot prints etc.
National Conservation Stratergy	Sustainable development of Industrial Sector	Applicable for all development projects	Usage of energy efficient material, green building techniques, reduction of carbon foot prints etc.
The National Forest Policy (1994)	conserve the existing forest areas and to increase forest cover of country and increase the reserve forest	Not Applicable, no diversion of forest land is involved	Not applicable
The National Energy Policy, 1995	Protecting the environment by requiring an EIA for any new energy development project, introduction of economically viable and environment friendly technology.	Not Applicable. EIA study is to be carried out	Energy efficient materials and techniques should be explored
The National Water Policy, 2000	To ensure efficient and equitable management of water resources, proper harnessing and development of surface and ground water, availability of water to all concerned and institutional capacity building for water resource management	Applicable. Ground water is required to be withdrawn for fulfilling water requirement during operation phase	Conjunctive use of water should be explored
The National Water Management Plan, 2001	Addresses options for water quality, considerations behind measures to clean up industrial pollution, where effluent discharge monitoring and zoning regulations for new industries are emphasized	Applicable as it is industrial project and will involve generation of effluent and sewage	Installation of effluent treatment facility within the premises
World Bank's Safeguards			
OP 4.01 Environmental Assessment	Ensures sustainability and environmental feasibility of the project. Projects are classified into A, B & C category depending on the nature and extent of the impact.	Triggers	EZ development is classified as Category A as per this policy which requires detailed EIA study. Off-ste development is classified as Category B considering nature of activities and impacts and requires site-specific EIA study
OP 4.04 Natural habitats	Ensures conservation of natural habitats and discourages disturbance of nay natural habitat due to project development by recommending adoption of alternative method/route/approach or adopting management measures	Not Triggered	Applicable for projects lying in close vicinity to eco-sensitive zones like wildlife sanctuary, wetlands under Ramsar convention, mangroves, national parks bird sanctuary, turtle

Name	Key Requirement	Applicability	Remarks
			breeding grounds etc. No such natural habitat is located in close vicinity of the projects.
OP 4.36 Forests	Ensures that project activities does not disturbs/interfere with the forest, forest dwellers activities, fauna and flora of the forest. Prevents and discourages deforestation and impacts on rights of forest dependant people.	Not Triggered	No diversion of forest land is involved
OP 4.12 Involuntary Resettlement	Ensures minimal involuntary resettlement by considering feasible alternatives project design, assisting displaced people to improve their former living standard.	Triggered	Private land is app. 88 ha. which is to be acquired. Resettlement & Rehabilitation plan is to be prepared for the project.
OP 4.10 Indigenous people	Ensures protection of the dignity, right and cultural uniqueness of indigenous people and ensures they receive social and economic benefits	Not Triggers	No indigenous group of people will be affected
OP 4.11 Physical Cultural Resources	Ensures preservation of property of cultural and religious importance, heritage and property of natural importance and enhancement of cultural properties	Not Triggers	No property of cultural and religious importance, heritage and property of natural importance will be impacted
Private Sector Development Support Project			
Environment Management Framework	Describes all the mandatory environmental and social clearances and purpose of the same required to be taken before development of the project	Applicable	EIA report is prepared referring to the guidelines mentioned in EMF
Social Management framework	Enhances positive social development outcomes of PSDSP with economic activities undertaken in the EZ, mitigating adverse social impacts, ensures participation of stakeholders and compliance to GoB policies	Triggers	EIA report is prepared referring to the guidelines mentioned in SMF

3.2. Procedure for Obtaining Environmental Clearance from DoE, Bangladesh

Bangladesh has very simple administrative framework regarding environmental aspect. It has strong interface between local government and federal Government. Department of Environment is responsible for grant of environmental clearance to a project. In addition to three are other ministries to deal with specific area of importance to the country like Forests, Water.

According to the Section 12 of the Environment Conservation Act 1995 no project will be established or undertaken without obtaining permission, in the manner prescribed by the Environment Conservation Rules 1997, an Environmental Clearance Certificate from the Director General. Therefore, every development projects/industries which are specified under the Schedule – 1 of the Environment Conservation Rules 1997 require obtaining site and environmental clearance from the

Department of Environment. According to the Rule 7 (1) of the Environment Conservation Rules 1997; for the purpose of issuance of Environmental Clearance Certificate (ECC), every projects, in consideration of their site and impact on the environment and will be classified into the four categories, i.e. green, orange A, orange B and red. Development of off-site facilities for economic zone will fall under red category. Thus EIA study is required to be carried out for the project. The present EIA study has been conducted for the proposed project complying with the ToR issued vide Memo No. DoE/Clearance/5341/2014/2021 dated 14th May, 2015, EMF of PSDS project and applicable World Bank guidelines. Focused group stakeholder consultation has also been conducted to discuss the environmental issues associated with the project. Proceedings of stakeholder consultation have also been included in the report. A schematic representation of the various steps involved in obtaining the Environment Clearance certificate from DoEB for red category projects is given in figure 7 below.

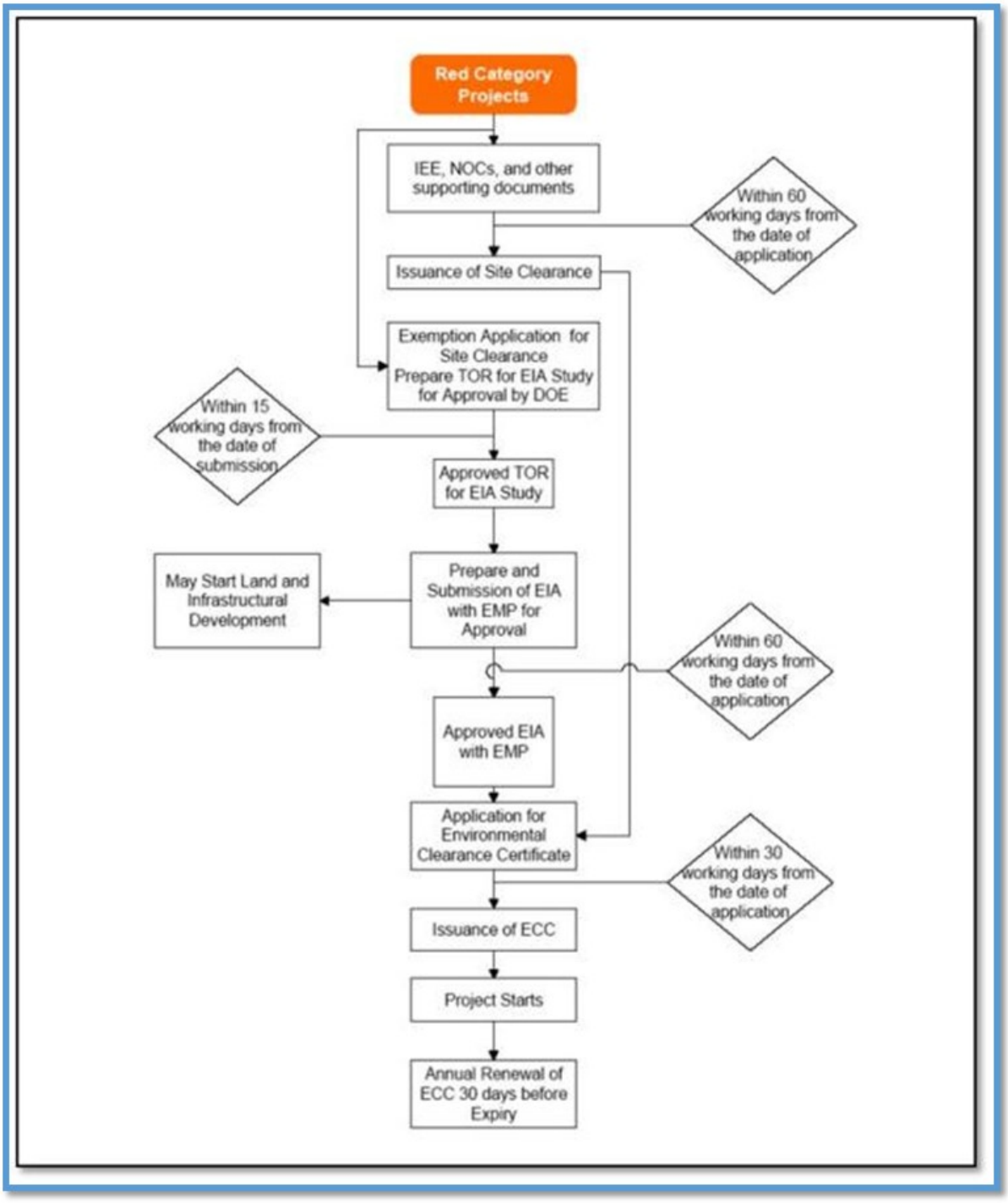


Figure 7: Steps for Obtaining Environment Clearance from DoEB

4. Project Description

4.1. Introduction

The proposed project involves development of EZ and associated off-site facilities for the upcoming Shreehatta EZ. At present off-site facilities will be constructed for the project site. EZ will be developed at later stage by the developer. The off-site development will include the following:

- Site preparation & development
- Administration Building
- Boundary wall

Map showing location of EZ site and off-site facilities is given in figure 8 below

Source: Google Earth

Figure 8: Map Showing Location of EZ Site and Off-site facilities

The total area of the upcoming Shreehatta EZ at Sherpur is about 143 ha (353.53 acres) out of which the development area is 88 ha. 88 ha is part A of the EZ site and remaining 55 ha is part B of the EZ site. 55 ha land is Government land but is a water body called Gong by locals. EZ can have following components as per EZ Act, 2010:

- Economic Processing Zone (EPZ), (It is proposed to have primarily integrated textile, ceramics, pharmaceuticals, food processing & paint. This area will be developed by prospective developer)
- Domestic processing area
- Commercial area and

- Non processing area. The off-site components (site development, administrative buildings & boundary wall) will be part of non-processing areas.

EZ development will be carried out by the developer at later stage. As per the preliminary planning, industries like primarily integrated textile, ceramics, pharmaceuticals, food processing & paint will come up within EZ.

4.2. Project Objective and Options

The project is aimed to develop economic zone of international standards with the support of the World Bank. The EIA study is also being undertaken with the intent of integrating best environmental management practices in the project design.

BEZA, the overall agency responsible for establishment of EZs in all the potential areas of Bangladesh including the backward and undeveloped regions, has identified four potential sites, i.e. Anwara, Mirsharai, Sherpur and Mongla, for development of EZs. These areas has been identified considering factors such as land use, land ownership, accessibility & connectivity, linkage to economically important towns/cities, infrastructure availability and engineering, environmental and social feasibility of the site.

The proposed project site (88 ha-to be developed) identified for the upcoming Shreehatta EZ is a continuous section of land. This is private land and is of agriculture use and has few scattered habitations. The proposed land site does not lie within any city Corporation, Municipality and Cantonment Board Area as per requirement of sub-section 3 of section 5 of Economic Zone Act, 2010.

A site suitability analysis was carried out for the development of EZ for assessing environment and social feasibility of the proposed project. As per the analysis, both limitations and benefits are associated with the land for developing EZ at the proposed site location. However, identified weakness and threats can be overcome by adopting alternative technologies and preventive measures.

Identified strength and weakness of the site as carried out by BEZA are given in the table 10 below.

Table 10: Strength and Weakness of Site (as per BEZA)

Parameters	Strength	Weakness
Location, Contiguity & surroundings	• Land area measuring 88 ha is available which is sufficient for development of EZ • Does not lies within any city Corporation, Municipality and Cantonment Board Area as per requirement of sub-section 3 of section 5 of Economic Zone Act, 2010 • Lies at distance of app. 108 kms from River terminal at Ashuganj on River Meghna • Close proximity to River Kushiyara • Agro based and aquaculture industry can flourish well in this area as most of people are engaged in agriculture and aquaculture activities • Site is well connected by road as it abuts Sylhet Dhaka Highway and Sylhet Maulvi Bazar Highway • Availability of power, gas and fresh water in the area • Site is not surrounded by large habitations	• Region prone to flooding due to presence of Kushiyara River • Requirement of construction of dikes/boundary wall to protect EZ site from floods. • Water body section (part B) of the site should be retained in its original state • Distant from Chittagong port, i.e. 435 kms • Absence of urban living & recreational facilities in nearby areas
Accessibility	• Site is well connected by road as it abuts Sylhet Dhaka Highway and Sylhet Maulvi Bazar Highway	• Distant from Chittagong port, i.e. 435 kms • Kushiyara river is perennial river but

Parameters	Strength	Weakness
	• Osmani International Airport is at distance of 55 km • Sylhet Railway station is at distance of 35 km & Sree Mangal Railway Station is 43 kms from site. Railway transportation till Sylhet is possible • Availability of inland water transportation system through Kushiyara River	have low flow during dry season and navigation is not possible through out the year
Proximity to urban hubs & industrial areas	• District headquarters is at distance of app. 20 kms • Upzila headquarters is at distance of app. 25 kms • ICD at Sreemangal Railway station which is 43 kms from the EZ site	• No major industrial area exists close to EZ site thus insignificant competition is expected • Insufficient Cargo handling facilities by Rail transport • Water transportation of heavy containers is not possible through nearby Kushiyara River. • Air shipment of Cargo facilities is virtually absent
Available Infrastructure Facility	• Land is flat • Availability of dredged material within 3 kms distance from EZ site through Kushiyara River • Abuts highway thus ease of goods transportation through road • Availability of power as 1200 MW Bibiyana Thermal power Plant is within 1 kms of site • Availability of fresh water through Kushiyara river • Availability of Gas supply through pipelines of Bibiyana Gas field. • Setting up of all infrastructure facilities will induce setting up of new townships and other developments. • Optical fibre line telecom system is present at the site • No pakka structure exists at the site	• No development can be undertaken on the land parcel falling under HT 230 KV line through the site • Site is prone to flood and thus requires filling and flood protection by constructing high boundary wall. • Area to be developed as EZ, i.e 88 ha of land is private land. Large capital is required to aquire the privte land also R & R of the affected people is to be carried out • Absence of urban living & recreational facilities in nearby areas
Availability of Raw Material	• Major activities in the area are agriculture and aquaculture thus raw material available for food processing industries • Fishing is a major activity in the region, hence availability of raw material • Large nos. of unskilled and semi-skilled labour available	• Shortage of skilled labour • Dhaka and Chittagong are distant locations from site which are major hub of raw material
Eco-sensitivity and threat to bio-diversity	• No significant flora and fauna within development area (88 ha) • No eco-sensitivity associated with the site	• Industries, if discharge waste/effluent in part B/waterbody (55 ha), it may disturbs the aquatic ecosystem of that water body
Quality of life & Employment generation	• Creation of large nos. (pp. 25446) of direct and indirect jobs for skilled, semi-skilled and un-skilled labour • Enhanced infrastructure facilities • Developments in nearby area after development of EZ	• Unavailability of adequate skilled labour • Large land acquisition (88 ha) and R & R activities involved • Adequate environment management plan is to be prepared to prevent

Parameters	Strength	Weakness
		damage of environment and the health of the residents in nearby area due to discharge of effluents/gases from EZ site

4.3. Interventions under selected options and Project Activities

Site abutting the Sylhet Dhaka Highway and Sylhet Maulvi Bazar Highway at Sherpur is selected for development of economic zone. BEZA will develop the off-site facilities for the EZ site so as to provide ready to develop land and attract developers for development of EZ. EZ will be developed by developer in later stages. Off-site facilities to be carried out by BEZA at site are listed below

- Site preparation & development
- Administration Building
- Boundary Wall

Total area of selected site is 143 ha out of which development area is 88 ha. 55 ha of area which is Government land is a water body whih contains the storm water run-off from nearby areas and have average depth of 15 ft.

4.4. Existing Infrastructure in and around the Project Site

Shreehatta EZ is proposed to be located in Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway. Project site is agricultural land and is surrounded by agricultural land and small habitations. EZ site is well connected by roads. Site abuts Sylhet Dhaka highway and Sylhet Maulvi Bazar highway. Details of immediate surroundings if EZ site is given in table 11 Photographs of EZ site is given in figure 9.

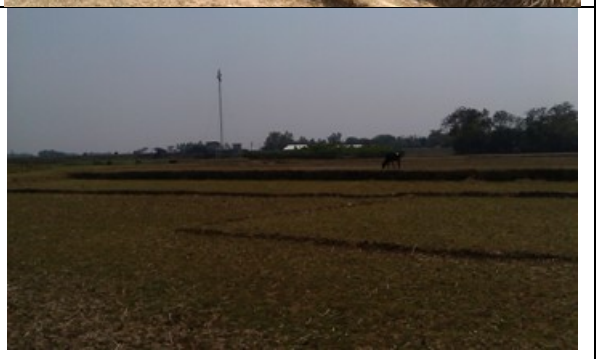
Bibiyana Thermal Power Plant having capacity of 1200 MW (400 X 3) is witin 1 km radius from site, thus power connection can be obtained from Bibiyana TPP. Bibiyana Gas field is within 10 km distance from site. There is existing gas pipeline from Bibiyana Gas field to Bibiyana TPP within 1 km radius area of EZ site. Kushiyara river flows within 1 km radius of EZ site and is fresh water river.

At present there is no infrastructure development within the site except 230 KV HT line which crosses the EZ site. Site measure 143 ha, out of which only 88 ha will be developed. This 88 ha is privately owned land and is flat land. However average elevation of the site is 10.4 m amsl. This portion is required to be filled by 0.8 m further. For filling of 88 ha of land by 0.8 m, 7,16,899.14 cum of sand is required. Sand can be dredged from Kushiyara River especially during lean flow periods. Map showing EZ sites and existing facilities in nearby are is given in figure 10 below.

Table 11: Existing Features surrounding the project site

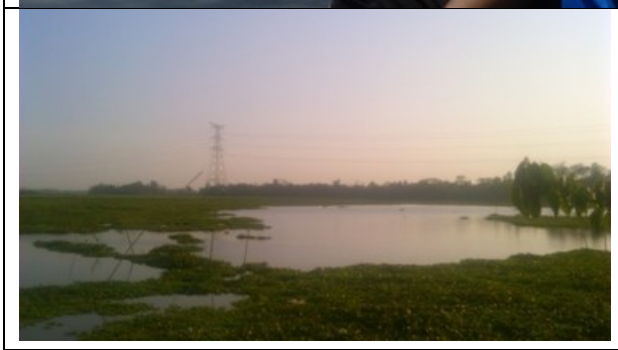
Direction	Features
NW	Agriculture Land
North	Agriculture Land & Bibiyana TPP (app. 800 m)
NE	Agriculture Land, Scattered Settlements & Kushiyara River (app. 1 km)
East	Agriculture land, Village Sherpur (app. 300 m), Kushiyara River (app. 800 m) & Sylhet Maulvibazar highway (abuts site Part B)
SE	Agriculture land & Marshy Land
South	Agriculture Land, Water Body (connected to Part B of site), small water body (app. 1 km) & small villages
SW	Water Body (connected to Part B of site) & Agriculture Land
West	Dhaka Sylhet Highway, Agriculture Land & Village Pitua (1.4 km)



Part A of EZ Site





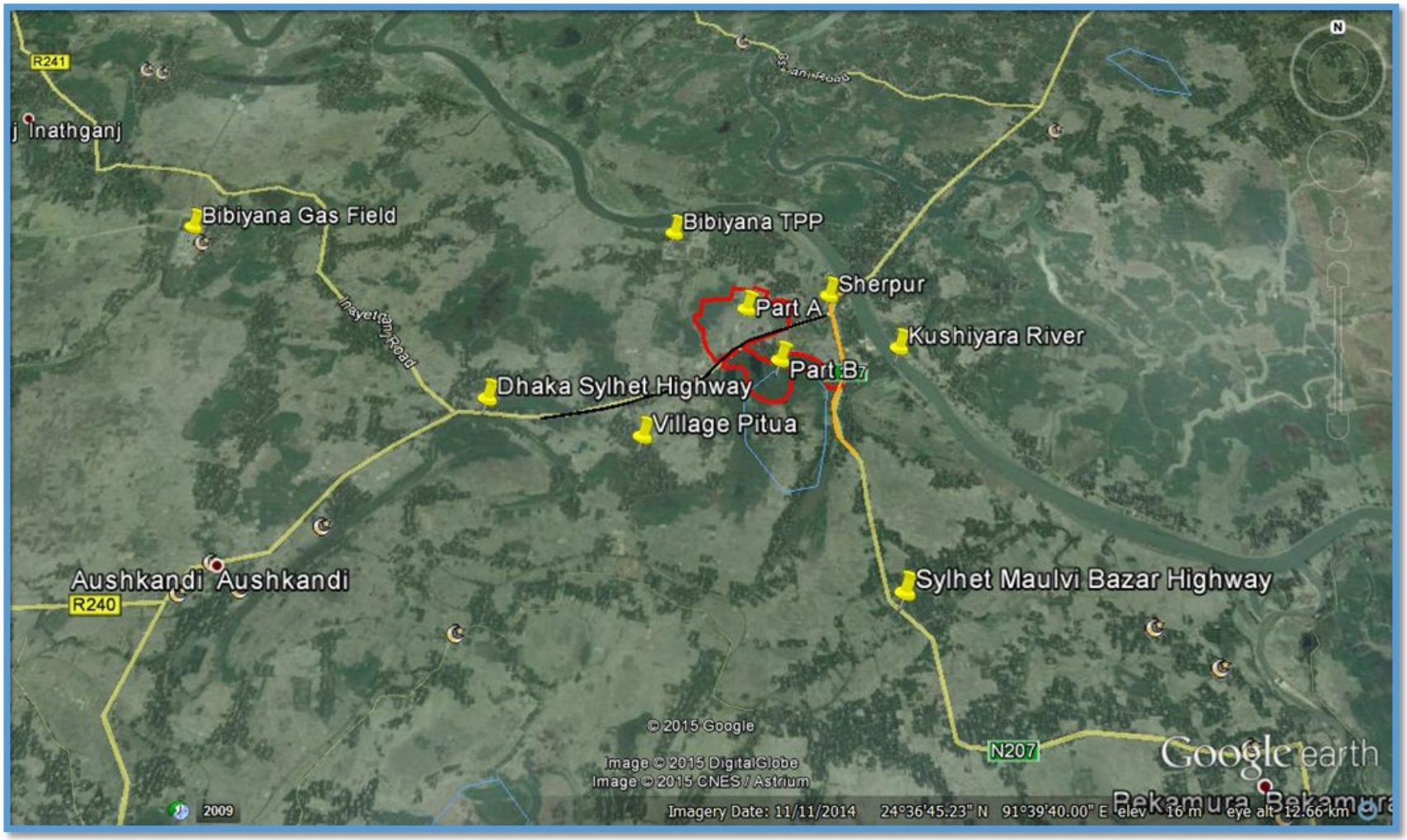

Part B of EZ Site

Dhaka Sylhet Highway

Existing HT Line

Kushiyara River

Figure 9: Photographs of the project site



Source: Google Earth

Figure 10: Map showing location of site and existing facilities

4.5. Project Activities and Area Statement

Area of the site considered for development is 88 ha. At present only off-site developments will be carried out by BEZA. Details of off-site facilities are given in table 12 below

Table 12: Details of Off-site facilities

S. No.	Proposed Infrastructure	Details
1	Administration building	Administration building will be constructed within EZ site. Building will have ground coverage of 3600 sq. m and built up area of 1680 sq. m. It will consist of 3 floors (G+2). Site plan of the administration building is given in figure 11.
2	Site preparation and development	Site is low-lying and requires some of leveling. It is required to fill the site by 0.85 m. Total quantity of the sand required for filling is 7,16,899.14 cum. Source of the sand will be Kushiyara River Sand as identified by the BWDB. Location is app. 3.5 kms downstream the Sherpur Bridge. Identified stretch is app. 2.5 kms long. BEZA will be responsible for carrying out dredging through contractors having license for dredging.
3	Boundary Wall	A compound wall all along the EZ boundary to a height of 2.1 m above NGL is proposed to be constructed and provided with 0.9 m height barbed wire fencing on top. The total length of the compound wall is estimated to be 4000 m. Area covered by boundary wall will be 400 sq. m. Section and elevation of boundary wall are given in figure 12 & 13 below

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)

Planning for EZ Development

Developer will be appointed as per the guidelines mentioned in EZ Act, 2010. Preliminary planning has been made for the economic zone on the basis of market and pre-feasibility study. As per the current planning, land use pattern of the EZ site is given in table below. Integrated textile, ceramics, pharmaceuticals, food processing & paint are planned to be developed within EZ. After appointment of developer, developer will explore other options as per the investor's interest and there may be changes in the planning. Other developments like internal storm water drainage, power distribution, water distribution network, plotting, water treatment plant etc. will be carried out by developer. Preliminary land use planning for EZ zone is given below in table 13 below. Layout map for EZ as per preliminary planning is given in figure 14.

Table 13: Preliminary Land Use Planning for the Economic Zone

Shrehatta EZ - landuse computation			
S. No	**Particulars**	**Area (in acre)**	**Percentage**
1	Light engineering	55.72	15.78%
2	RMG	19.11	5.41%
3	JUTE	20.75	5.88%
4	Food processing	18.16	5.14%
5	Other industrial	11.33	3.21%

6	Utility (OHT,MRSS,CETP,STP,SWM)	5.82	1.65%
7	Admin building	1.56	0.44%
8	Guest house	1.30	0.37%
9	Educational building	2.04	0.58%
10	Residential zone	8.09	2.29%
11	Road	38.37	10.87%
12	Green space & open space	26.16	7.41%
13	Existing water body	144.59	40.96%
	Total site area	**353.00**	100.00%

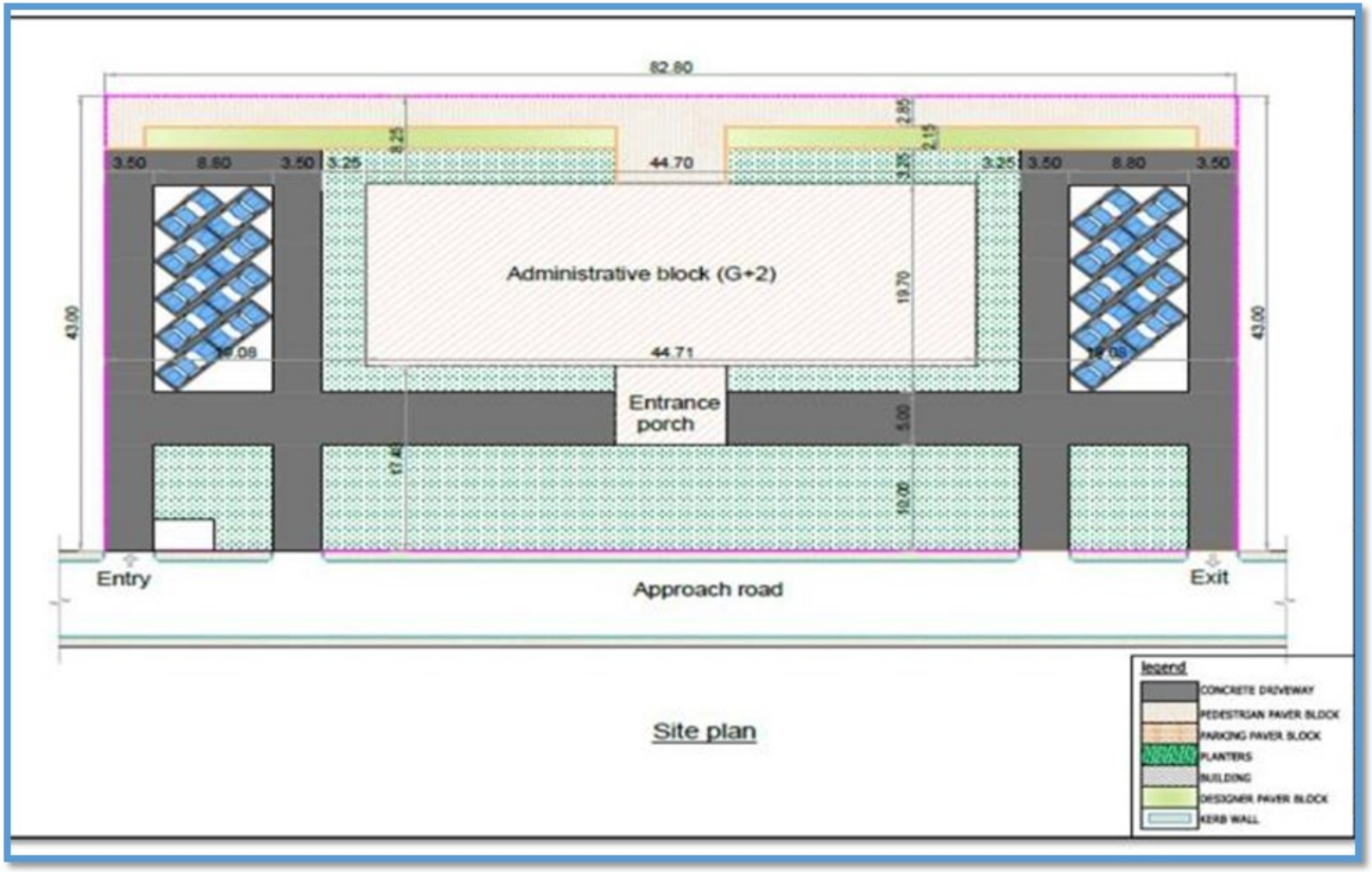
Source: JDI/BEZA (Pre-feasibility study report of EZ zone)

It is expected EZ will be ome operational by year 2019. Land will be utilized gradually and it is expected within 4 years time EZ will be fully operational with complete utilization of land. Details of the area of the land to become operational are given in table 14 below.

Table 14: Land under Operation

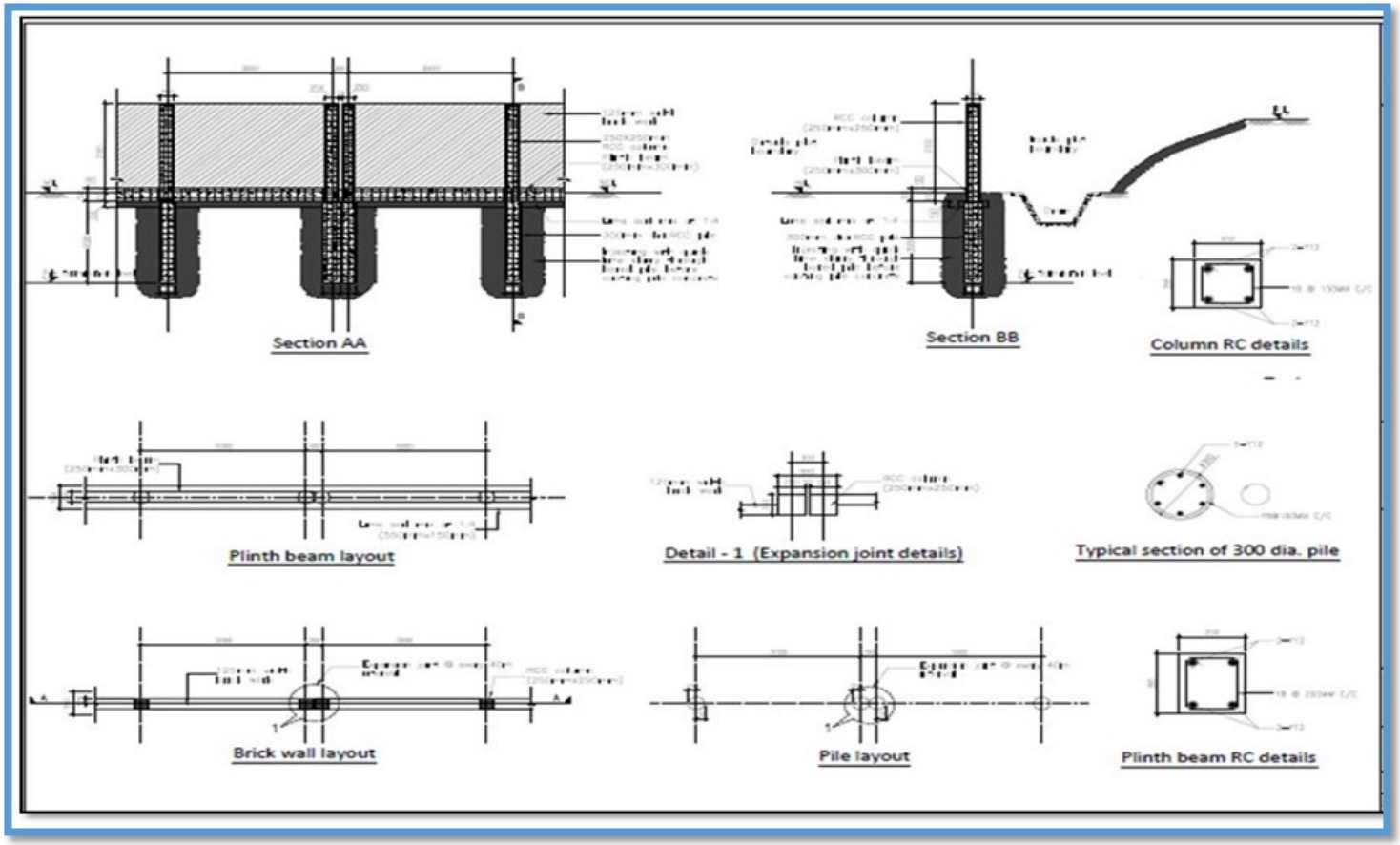
Land	Operating Land Area (Ha)				Total Area (Ha)
	Yr 2019	Yr 2020	Yr 2021	Yr 2022	
Integrated Textile	8.65	4.325	4.325	0	17.30
Ceramics	5.585	4.6325	3.7125	0.92	14.85
Pharmaceuticals	12.53	9.225	7.745	1.48	30.98
Paints	0	2.38	1.19	1.19	4.76
Food Processing	4.68	6.545	4.4425	2.1025	17.77
Rental Factory	1.095	0.5475	0.5475	0	2.19
Commercia Zone	0.415	0.2075	0.2075	0	0.83
Total Area (Ha)	32.96	27.86	22.17	5.69	88.68
Cumulative Land Area Under Development	32.96	60.82	82.99	88.68	

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)



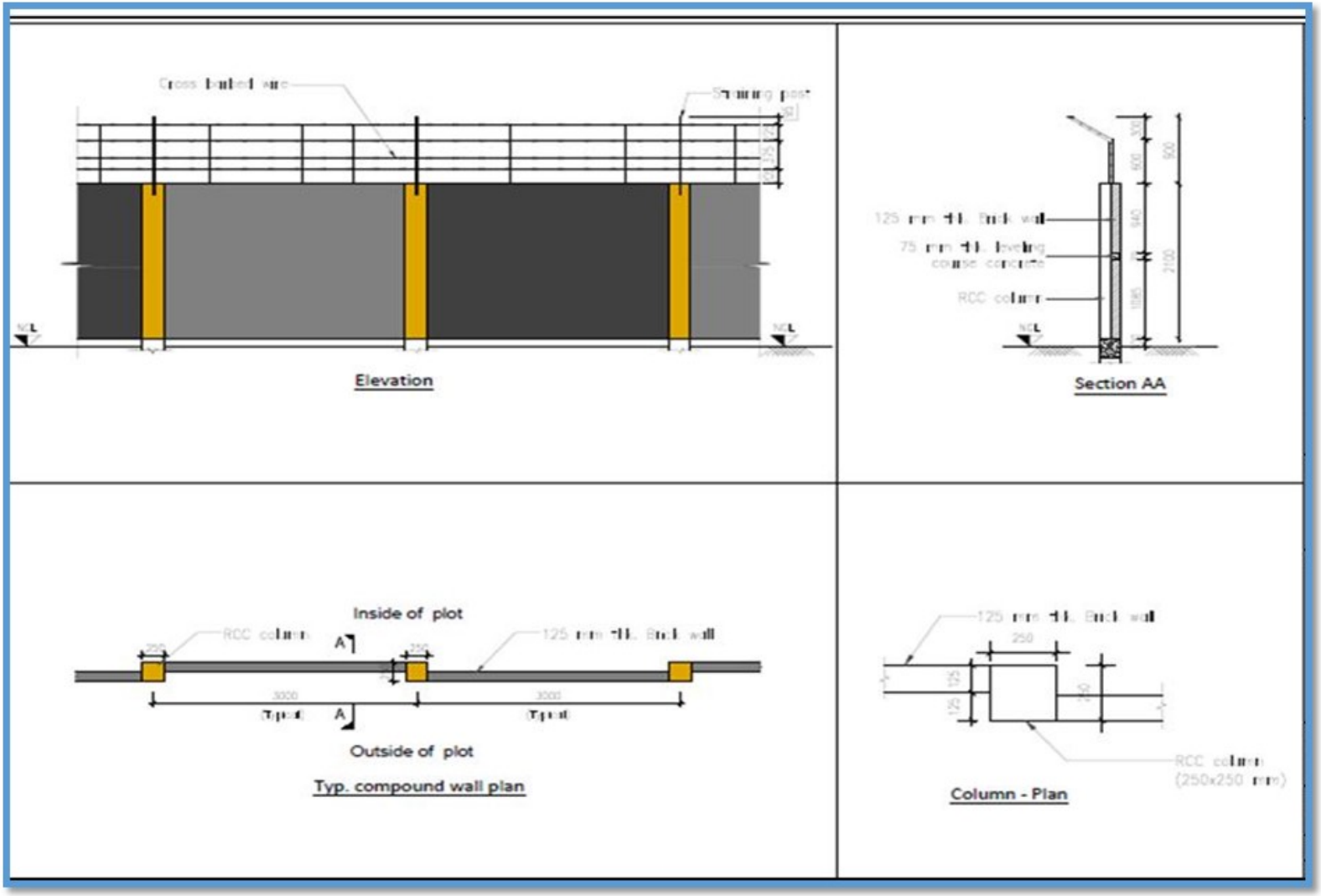
Source: Mahindra

Figure 11: Site plan of administration building



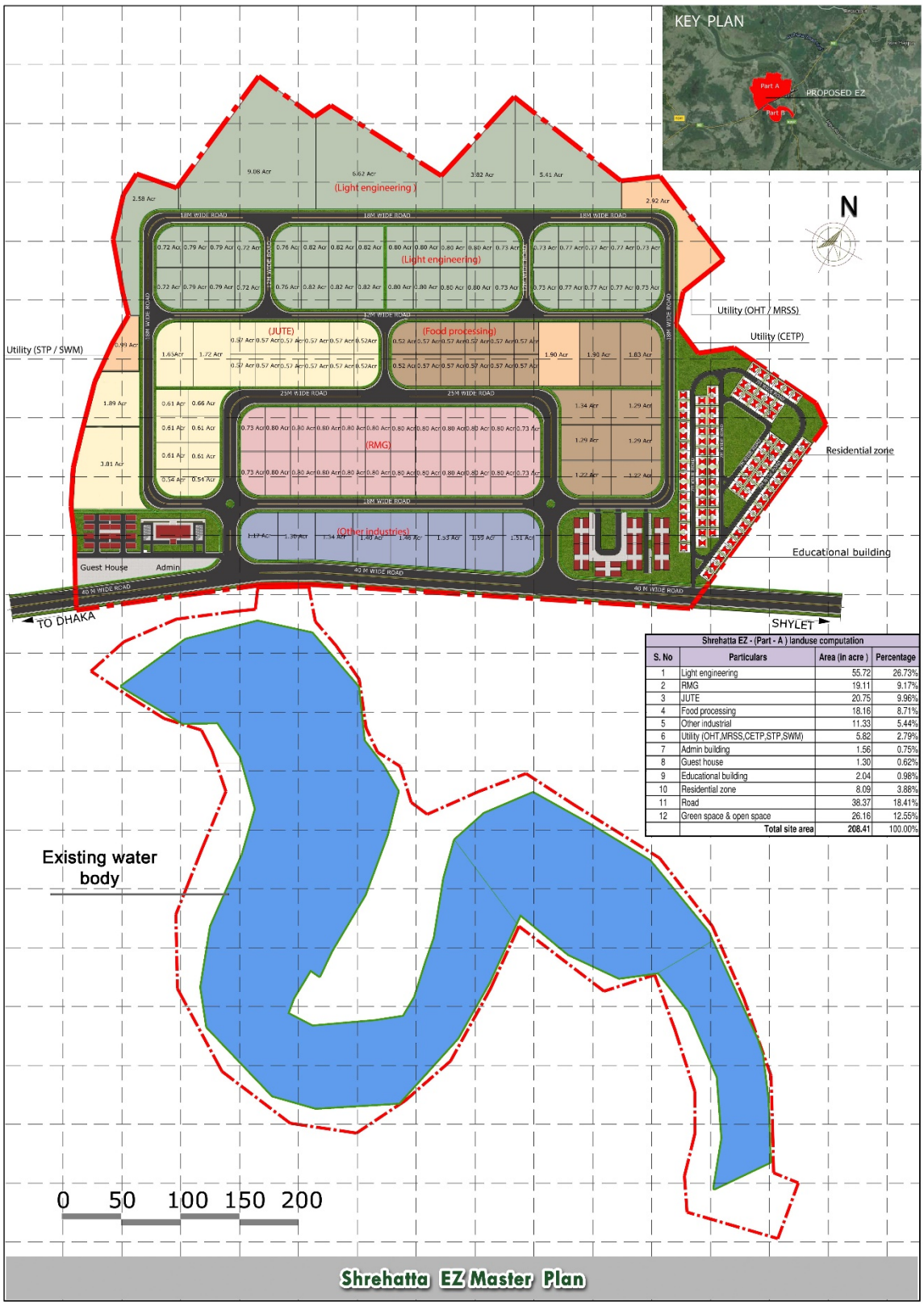
Source: Mahindra

Figure 12: Section of the proposed boundary wall



Source: Mahindra

Figure 13: Elevation of the proposed boundary wall



Shrehatta EZ - (Part - A) landuse computation

S. No	Particulars	Area (In acre)	Percentage
1	Light engineering	55.72	26.73%
2	RMG	19.11	9.17%
3	JUTE	20.75	9.96%
4	Food processing	18.16	8.71%
5	Other industrial	11.33	5.44%
6	Utility (OHT,MRSS,CETP,STP,SWM)	5.82	2.79%
7	Admin building	1.56	0.75%
8	Guest house	1.30	0.62%
9	Educational building	2.04	0.98%
10	Residential zone	8.09	3.88%
11	Road	38.37	18.41%
12	Green space & open space	26.16	12.55%
	Total site area	208.41	100.00%

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)

Figure 14: Master Plan-Shreehatta EZ

4.6. Project Schedule

Table 15 presents the implementation schedule of the off-site infrastructure details at the proposed Shreehatta EZ site.

Table 15: Implementation Schedule of Off-site Infrastructural Details

S.No	Offsite infrastructure	Duration in months from start
1	Site Development	10
3	Admin building	12
4	Boundary Wall	8

Source: Mahindra

BEZA targets to start the work from January, 2016. The EZ development activities could be undertaken by the prospective developer following the off-site infrastructure development.

4.7. Resources and Utilities Demand

Construction Materials Sourcing

Construction material like steel, cement, concrete, bricks, aggregates etc. will be required for each of the proposed off-site facilities and EZ development. Since the planning has been carried out for offsite development, the detail provided below pertains to off-site facilities. The EZ development requirement though will remain similar in nature but these details for EZ shall be available after the master developer is appointed and his plan is finalized. Raw material requirement for the off-site facilities is given in the table 16. Raw material will be sourced from Dhaka and Chittagong which are located at app 160 kms and 435 kms from project site. Raw material can be transported through the road.

Table 16: Construction Material Requirement for Off-site facilities

S. No.	Material	Quantity
Boundary Wall		
1.	Concrete	535.77 cum
2.	Bricks	7900.2 sq. m
3.	Steel	74865.41 kg
4.	Cement	18377.39 sq. m
5.	Cement Paint	18377 sq. m
6.	Barbed wire	4305.0 sq. m
Administration Building		
•	Sand	1098 cum
•	Mass concrete	139.20 cum
•	Polyethene sheet	84.5 kg
•	RCC	777.0 cum
•	Concrete	256 cum
•	Steel	174674.30 kg
•	Bricks (1.5 brick thickness)	557.00 cum
•	Bricks (1 brick)	213 sqm
•	Cement sand (6 mm thick plaster)	2514 sqm
•	Cement sand (12 mm thick plaster)	4092.00 sqm
•	Cement sand (12 mm thick plaster)	1178.00 sqm
•	Plastic emulsion paint	6606.0 sqm
•	Weather Coat Paint	589 sqm
•	Textured Paint	589 sq. m
•	Paint for door & windows	165.50 sqm
•	Polish for door & windows	156.00 sqm
Site Development		
1.	Sand	7,16,899.14 cum
2.	Concrete	50 cum

Source: Mahindra

Water

Water requirement during construction phase is estimated to be app. 50 KLD, which includes Domestic water requirement of construction workers. For storing rain water during construction phase, temporary rain water harvesting ponds can be constructed at the site. Water for construction shall be sourced from rain water harvesting ponds, River Gong (Part B water body), adjacent larger water body or River Kushiyara.

The total water requirement for operational phase is estimated at about 59.011 MLD. This is peak estimated demand and is expected to reach by year 2022. Detailed calculations are given in table 17 below. Source of fresh water for EZ during operation phase will be Kushiyara River which is app. 1 km from EZ site. Water supply system will be developed by BWDB for the EZ. Water treatment plant is proposed to be provided within the EZ site to treat the river water prior usage. Rain water harvesting also can be carried out which can supplement the water supply system.

Table 17: Estimated Water Demand

Land Use	Unit Rate (cum/day/ha)	Demand Water (cum/Day)				
		2019	2020	2021	2022	Total (cum/ day)
Integrated Textile	1921	16617	8308	8308	0	33233
Ceramics	80	447	371	297	74	1188
Pharmaceuticals	650	8145	5996	5034	962	20137
Paints	700	0	1666	833	833	3332
Food Processing	33	154	216	147	69	586
Rental factory	676	259	130	130	0	518
Commecial Zone	20	8	4	4	0	17
Total Demand (cum/day)		25630	16691	14753	1938	**59011**
Cumulative Demand (cum/day)		25630	42321	57073	**59011**	

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)

Power Requirement

Power demand during construction phase is insignificant. Power required during operation phase is estimated to be 33.04 MW. Power requirement calculations are given in table 18 below. Power supply system source will be Bibiyana TPP located at 800 m from EZ site. Power supply system will be developed by Power Grid Company of Bangladesh. Map showing location of Bibiyana TPP is given in figure 15.

Table 18: Estimated Power Demand

Land Use	Unit Rate (MW/ha)	Demand Power (MW)				
		2019	2020	2021	2022	Total (MW)
Integrated Textile	1.38	11.94	5.97	5.97	0	23.87
Ceramics	0.04	0.22	0.19	0.15	0.04	0.59
Pharmaceuticals	0.21	2.63	1.94	1.63	0.31	6.51
Paints	0.08	0	0.19	0.1	0.10	0.38
Food Processing	0.04	0.19	0.26	0.18	0.08	0.71
Rental factory	0.35	0.38	0.19	0.19	0	0.77
Commecial Zone	0.25	0.10	0.05	0.05	0	0.21
Total Demand (cum/day)		15.47	8.79	8.26	0.53	**33.04**
Cumulative Demand (cum/day)		15.47	24.25	32.51	**33.04**	

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)

Source: Google Earth

Figure 15: Map Showing Location of TPP & EZ Site

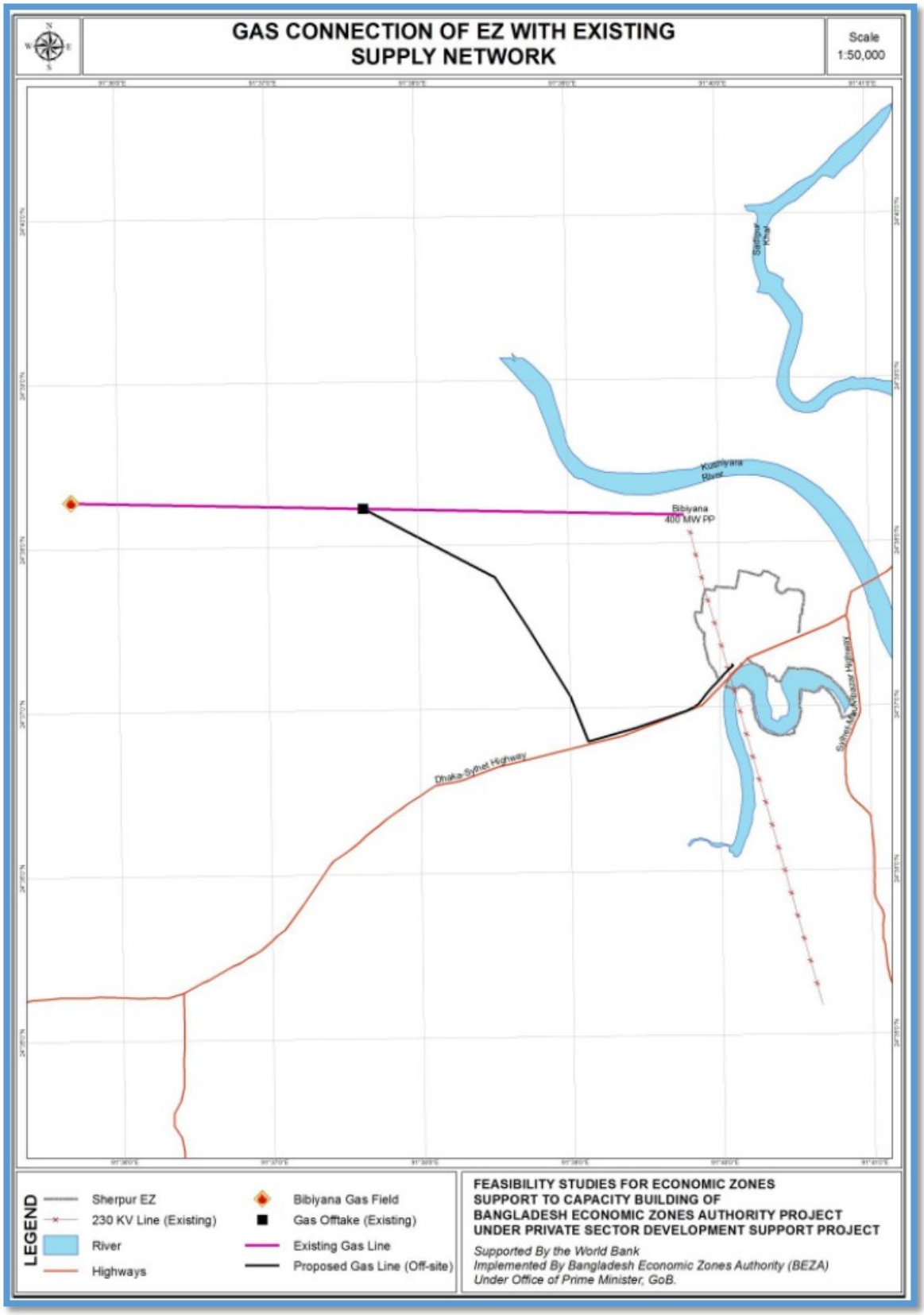
Gas Requirement

Gas is available in the zone and will be taken through the pipeline from Bibiyana Gas field to Bibiyana TPP. It is estimated demand of gas for the project will be 666,312 cum/day. Gas supply system is proposed to be developed by Jalalabad Gas Company. Calculations for gas estimation are given in the table 19 below. Map showing the alignment of the gas supply is given in figure 16.

Table 19: Estimated Gas Demand

Land Use	Unit Rate (cum/ha/day)	Demand Gas (cum/day)				
		2019	2020	2021	2022	Total (cum/ day)
Integrated Textile	14173	122596	61298	61298	0	245193
Ceramics	6832	38157	31649	25364	6285	101455
Pharmaceuticals	8333	104412	76872	64539	12333	258156
Paints	7087	0	16867	8434	8434	33734
Food Processing	45	211	295	200	95	800
Rental factory	7294	7987	3993	3993	0	15974
Commercial Zone	0	0	0	0	0	0
Total Demand (cum/day)		273363	190974	163828	27146	**655312**
Cumulative Demand (cum/day)		273363	464338	628166	**655312**	

Source: JDI/BEZA (Pre-feasibility study report of EZ zone)



Source: JDI/BEZA(Pre-feasibility study report of EZ zone)

Figure 16: Gas Supply Alignment

Street Lighting

Street lighting will be provided on the internal roads within the EZ. Solar street lights should be proposed in ratio of 1:2. Average illumination of 20 lux should be maintained on the access road.

Telecommunications

Sherpur has mobile connectivity from almost all mobile companies. There is no fixed network. It is recommended to install BTCL (Bangladesh Telecom Company Limited) network, as fixed Phone Network of BTCL is the only reliable network.

Sewage & Effluent Treatment

All industries should be responsible for treatment of the sewage and effluent generated from their unit so that all industries are zero discharge. Sewage should be treated in the STP and effluent should be treated in the ETP. Treated water should be recycled and re-used within the site. There is provision of wastewater treatment plant at the site which will cover 1.9 acre of land.

Green Belt Development

Green buffer of 10 m width will be developed all around the EZ site. Multi-layered plantation will be carried out in the buffer. Peripheral green belt will be developed by the developer. In addition to this all industries will develop green belt all around their respective plots. Native plant species consuming less water and requiring less after care and monitoring should be considered. Such species include Neem, Chambol, Sirish, Palms, Gewa, Mango, Mahagony etc. Green buffer should consist of minimum 3 rows of vegetation. First row of green buffer should be small shrubs and herbs, second row of tall shrubs and small/medium height trees and last row of medium to tall heighted trees. Total 4.33 ha of area will be covered under green.

Solid Waste Generation from Proposed EZ Project

Waste to be generated during construction phase will be left out construction material like metal piece, wood piece, unused concrete, broken bricks, glass, ceramic, demolition waste etc. Quantity of the solid waste to be generated during construction phase may vary from 30-50 kg/day. This waste should be collected and segregated at the site itself. Recyclable and Re-usable waste should be separated. Reusable waste should be stored at site appropriately in covered conditions for its use. Recyclable waste should besent to recycler. Rejected waste should be disposed off at the designated sites by local authority.

Nature of solid waste generated during the operation phase will be highly variable due to presence of different kind of industries in the EZ. Majorly as per the feasibility study, integrated textile, ceramics, pharmaceuticals, food processing & paint industries may come up in the EZ. These industries are less polluting industries. Solid waste generated by industries should be managed by industries. Solid waste to be generated from EZ can be industrial non-hazardous waste, hazardous waste, bio-degradable, non-biodegradable, e-waste, construction debris, hospital and bio-medical waste. A secured scientific landfill should be developed for disposal of municipal solid waste within the EZ site. Hazardous waste from industries should be disposed off only through authorized hazardous waste handling agencies by DoEB. Else all industries should incinerate the hazardous waste generated by them taking the required air pollution control measures.

Storm Water Management System

Part A of EZ site is agricultural land and drains into the part B of EZ site which is a water body. Other nearby areas also drains into part B of the EZ site. Part B finally drains into the River Kushiyara through Beels and Khals. Rain water harvesting system shall be developed at EZ site to harvest and store rain water. Rain water shall be used to fulfil the water requirement during construction and operation phase of the project. A peripheral drain will be constructed all along the part A of the EZ site and will be connected to part B of EZ site. This peripheral drain will cater the overflow, if any from the rain water collection and storage system. Part B, i.e. water body shall be maintained in its existing condition thereby maintaining the existing drainage pattern of the area.

4.8. Map and Survey Information

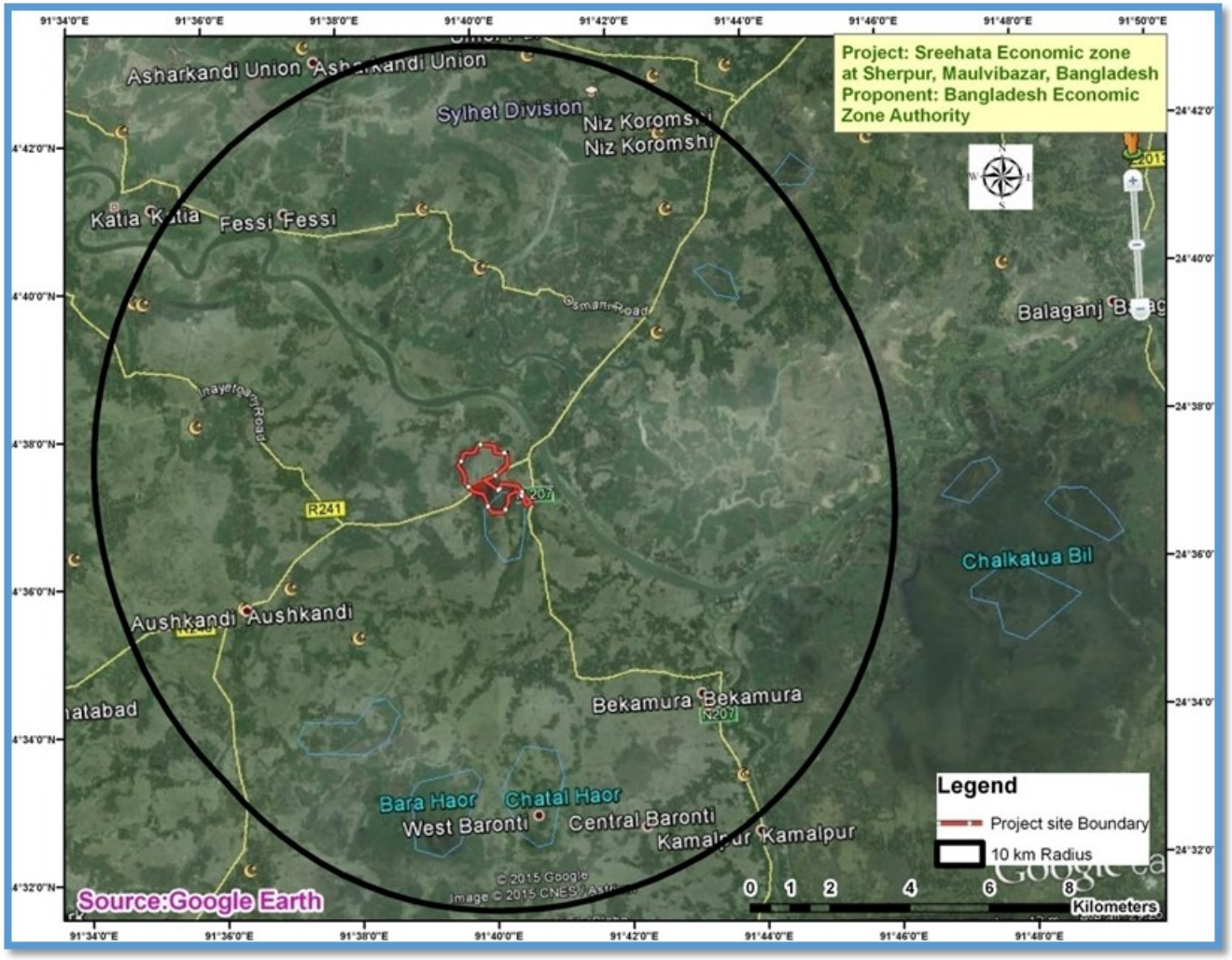
Project Location

Shreehatta EZ is proposed to be located in Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway. Sherpur Upzila map showing location

of the proposed project site is shown in figure 17 below. The project surrounding within 10 kms region is shown in figure 18 below.

Source: Google Maps

Figure 17: EZ location on Sherpur Upzila Map

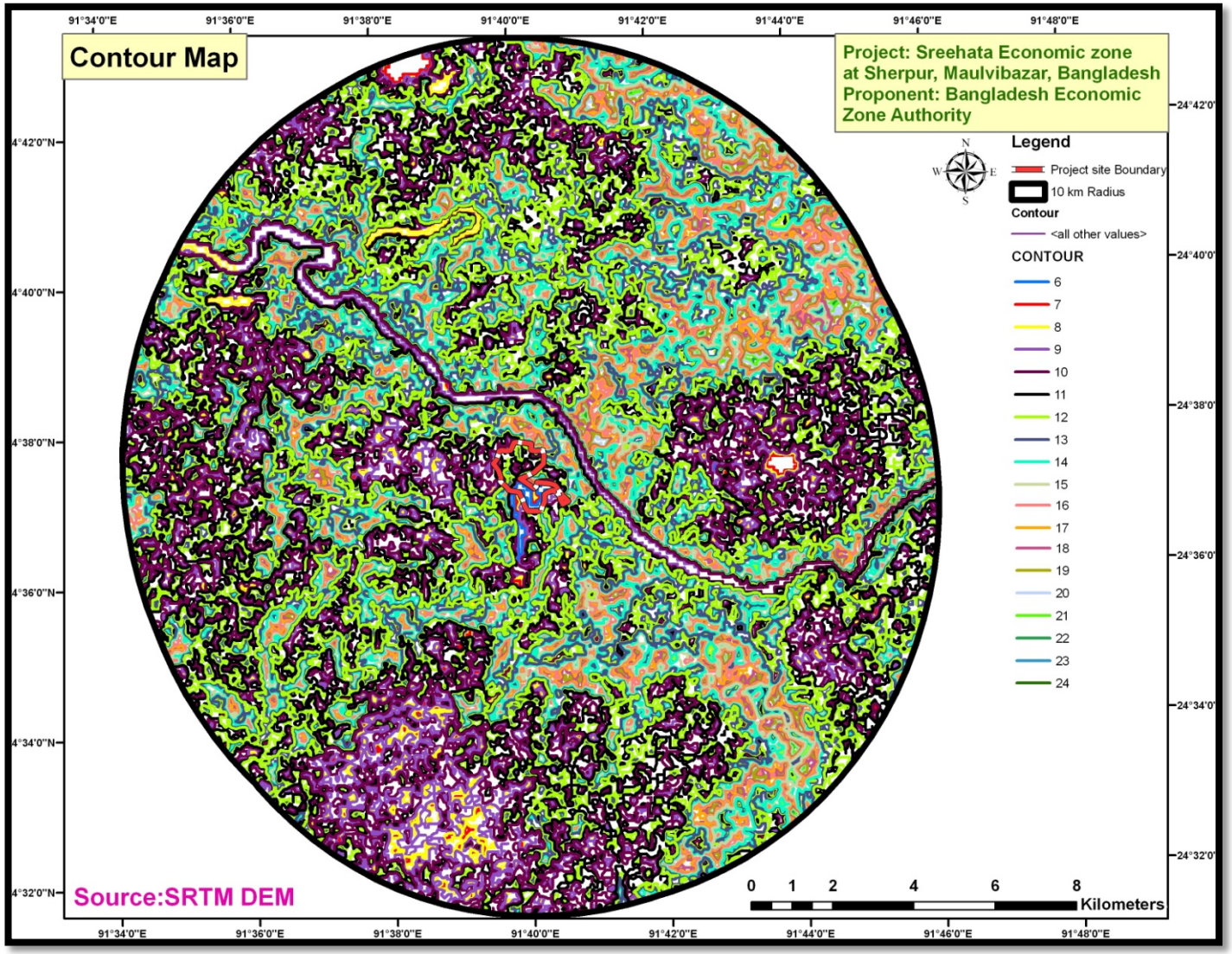


Source: Google Earth

Figure 18: Project site and surroundings within 10 km radius

Topography of the Project Site

EZ site is divided into part A & B by Dhaka Sylhet Highway. Part A of EZ site is generally flat and the elevation varies from 11-13 m amsl. Level of the land is below the road abutting the site. Site is currently being used for agriculture purpose. It is required to level the land and fill the sand to level of 0.85 m. Part B of the Site is water body locally called as river Gong. Average depth of the water in the water body is 15 ft. Contour map of the project site is given in figure 19 below. Photographs showing the site conditions are given in figure 20 below.



Source: Pre-Feasibility Study, Sherpur

Figure 19: Contour Map of EZ Site

Part A

Part B

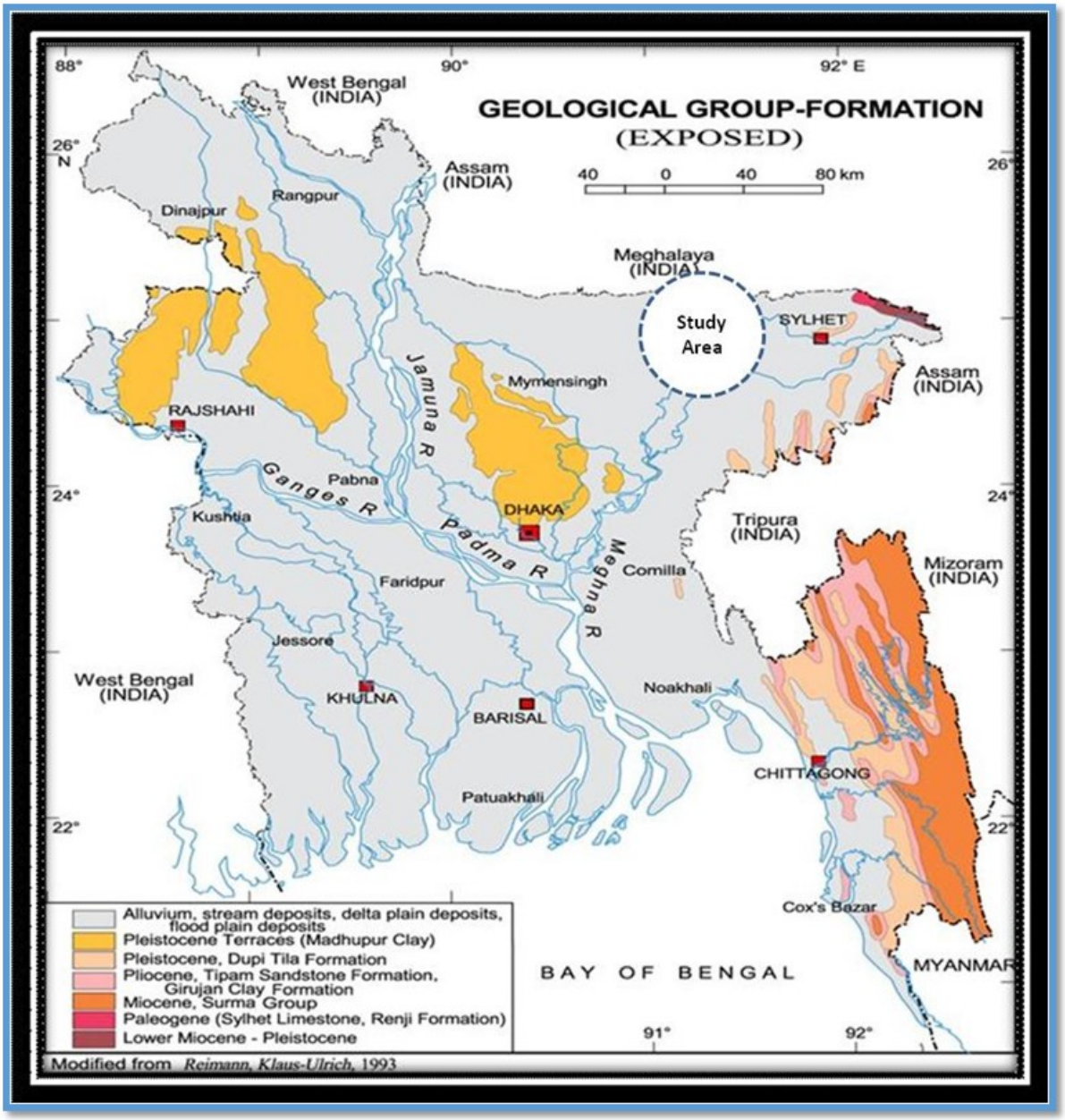
Figure 20: Topography of the Site

Eco Sensitivity

There are no ecological sensitive locations such as National Park, Sanctuary, Elephant/Tiger Reserve, Migratory routes and wetlands within the 10 km radius of the study area. Part A of the site is agricultural land. Crops grown at the site are Paddy, Tea and Beetle majorly and others are vegetable, Coconuts, Khejur, Mango, Banana and Papaya. Part B of the site is water body and contains the fishes like Ruhi, Catla, Cheetal etc. There are no endangered species found in ths area. Nor the area is declared as eco-sensitive. However the part B, which is water body receives the storm water run-off of nearby areas and manage the drainage of the area. Water body will be retained.

Geology

The geology of the project area can be generally be classified as Alluvium and stream/flood plain deposits and is part of Surma-Kushiyara flood plains. Kushiyara river is app 800 m distance from EZ site. Kushiyara river is formed from the Barak river thus carried the sediments of Eastern Himalayas and are classified as Surma group sediments. In most of the Surma flood plain, there is no annual deposition of new sediments; however the soils are older and more developed, and in rainy season, flood water is clear. Soil in the area is silty to loamy topsoils and silty to clayey sub-soils. Most soils overlie stratified material at 2-5 feet depth. Almost all soils are seasonally flooded, and dry out by the middle of the dry season. Geomorphology map (figure 21) of Bangladesh shows Geological classification of study area.



Source: GSB

Figure 21: Geological Map of Bangladesh

4.9. Transportation Options for the EZ

The EZ has options of road, rail, air and water ways transportation. Availability of seafront makes project more viable for industrial development. Project site has good road and rail connectivity as well. The details of available options are given in the following section.

Road Transportation System

Shreehatta EZ is connected with all the major locations of Bangladesh by road. The EZ site lies on the Dhaka – Sylhet national highway. It is spread on both sides of the 7 meter bitumen road and is below the road level. Currently this highway is catering to passenger buses and trucks destined for Northern Bangladesh. A small bridge on the highway bifurcates the two sides of the site. It is about 20 Km to the nearest town of Maulvibazar (district headquarter) and about 25 Km from the Upazila headquarters and about 35 Km from Sylhet. Dhaka lies at a distance of about 208 Km from this point. Chittagong Port is about 435 Km from this site.

Rail & Air Transportation System

There are two railway stations near the EZ site – Sylhet Station (35 Km from the site) and Sreemangal Station (43 Km from site). Sylhet Station is crowded and does not have adequate land for developing any new facility. Sreemangal Railway Station, on the other hand, is catering to the passenger traffic arriving mostly from Dhaka (south) and Sylhet (north).

Osmani International Airport in Sylhet is about 55 Km from the site. There are direct passenger flights from Dhaka to Sylhet operated by domestic airline companies Novo Air, Regent Airways, United Airlines and Biman Bangladesh Airlines. International flights operated by Biman Bangladesh Airlines operate between Sylhet and Abu Dhabi, Doha, Dubai, London and seasonally to Jeddah. At present, no freight services are available.

Inland Water Transportation System

The closest navigable river to Shreehatta EZ is the Kushiyara River located at about 1.5 km from the proposed EZ. River is navigable in rainy season but not throughout the year, thus for transportation of goods through IWT cannot be dependant mode of transportation.

Ashuganj River Terminal on Meghna River is about 108 Km from the proposed EZ by road. Thus material can be transported through IWT through Ashuganj River Terminal.

4.10. Cost of the Project

Cost of each component are given in table 20 below. The total estimated cost of the proposed off-site facilities is about 1881.7 lakh taka that includes the cost of site development and construction of boundary wall and administration building.

Table 20: Cost of the Development of Proposed Off-site Facility for EZ

S. No.	Description of work	Amount in Lakh Taka
1	Site development	706.7
2	Administration Building	560
3	Boundary Wall	615
Total		**1881.7**

Source: Mahindra

5. Description of Environment (Environment and Social Baseline)

5.1. Prelude

The environmental status around the proposed project site is analysed for valued environmental components viz., air, water, land, noise, soil, and ecology and socio-economic in a 10 km radial radius around the site. The baseline provides the basis for assessment of impact (likely changes in the baseline conditions) due to the proposed interventions (EZ development project).

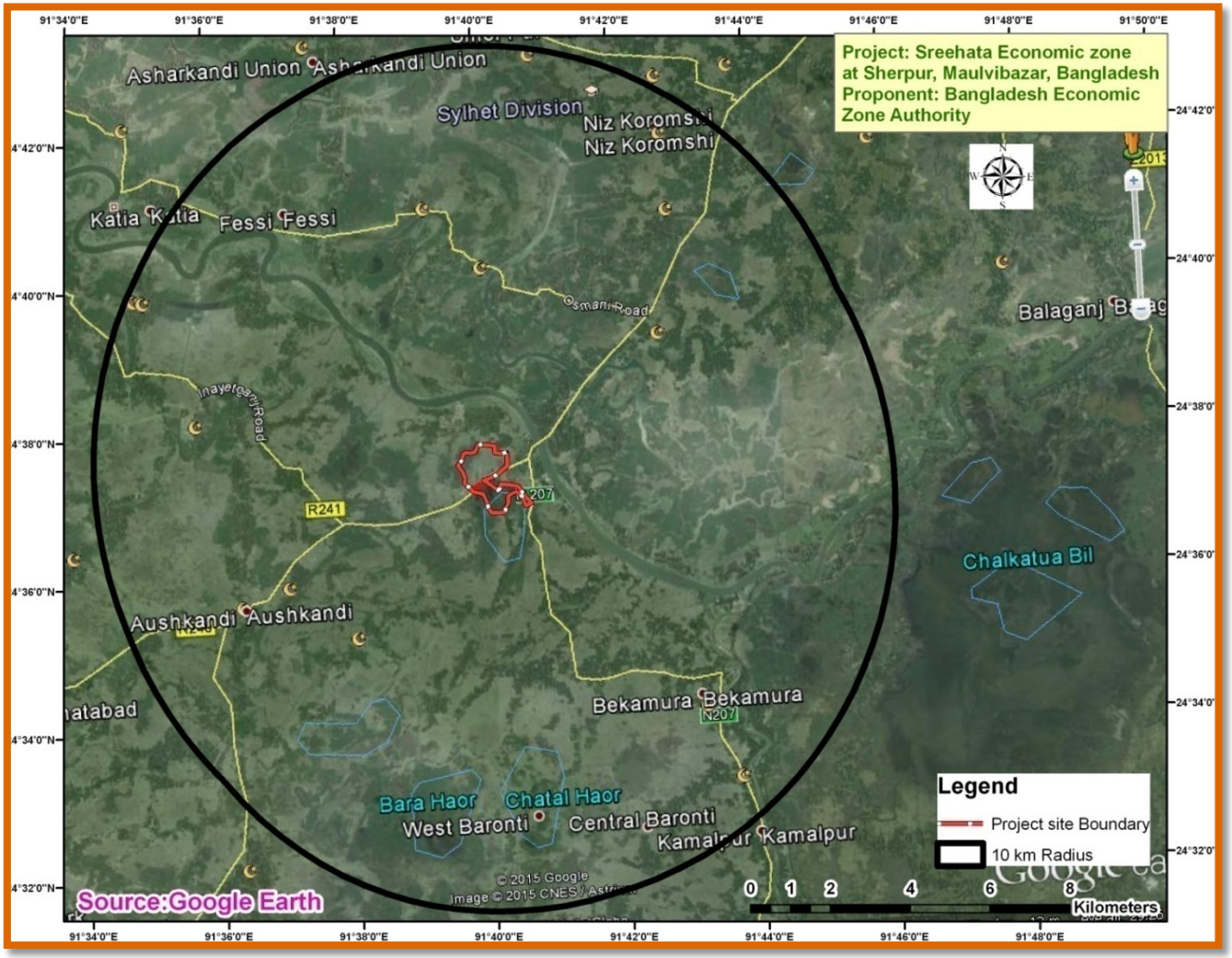
5.2. Site Description and Its Environs

The site and surrounding details have already been presented under chapter 4. The study area considered as 10 km radius around the EZ site. The project activity areas are considered as core area and remaining study area as buffer zone. Environment setting of 10 km radius area around EZ site is given in figures 22 & table 21 below.

Table 21: Environmental Setting

Particulars	Details
Location	Sherpur & Bamongaon Mouza, Maulvibazar Sadar Upzila, Maulvibazar District, Sylhet Division, along Dhaka Sylhet Highway & Sylhet Maulvi Bazar Highway **Part A:** Latitude: 24°37'29.37"N Longitude: 91°39'58.22"E **Part B:** Latitude: 24°37'4.40"N Longitude: 91°40'12.80"E
Nearvy Villages	Sherpur Village (Abuts Part B, N) Muzlishpur (Abuts Part B, SE) Bamangaon (Abuts Part A, NE) Iyanpur (Abuts Part B, S)
Site Elevation	Part A- Almost flat (11-13 m amsl) Part B- Water body with average depth of 15 ft. (~4.6 m)
Nearest Airport	Osmani International Airport (55 km, NE)
Nearest Railway Station	Sylhet Rail Station (35 km, NW) Sreemangal Rail Station (43 km, S)
Nearest Port	Ashuganj Ruver Terminal (108 km, SW) Chittagong Port (435 km, South)
Climatic conditions	Avg. Daily wind speed at Sylhet– 2.42 m/s Avg. Daily wind speed at Srimangal-1.07 m/s Monthly Min. Temp. – 6.5°C (January) Monthly Max. Temp. – 35.8°C (May) Annual Avg. Rainfall at Sylhet – 4180 mm Annual Avg. Rainfall at Sreemangal – 2420 mm Monthly Average Humidity – 77-84%
Seismic Zone	Zone I
Forests / National Parks	None within 10 kms
Archaeologically important places/monuments	None within 300 m from the EZ site

Source: Google Earth & Site Visits



Source: Google Earth

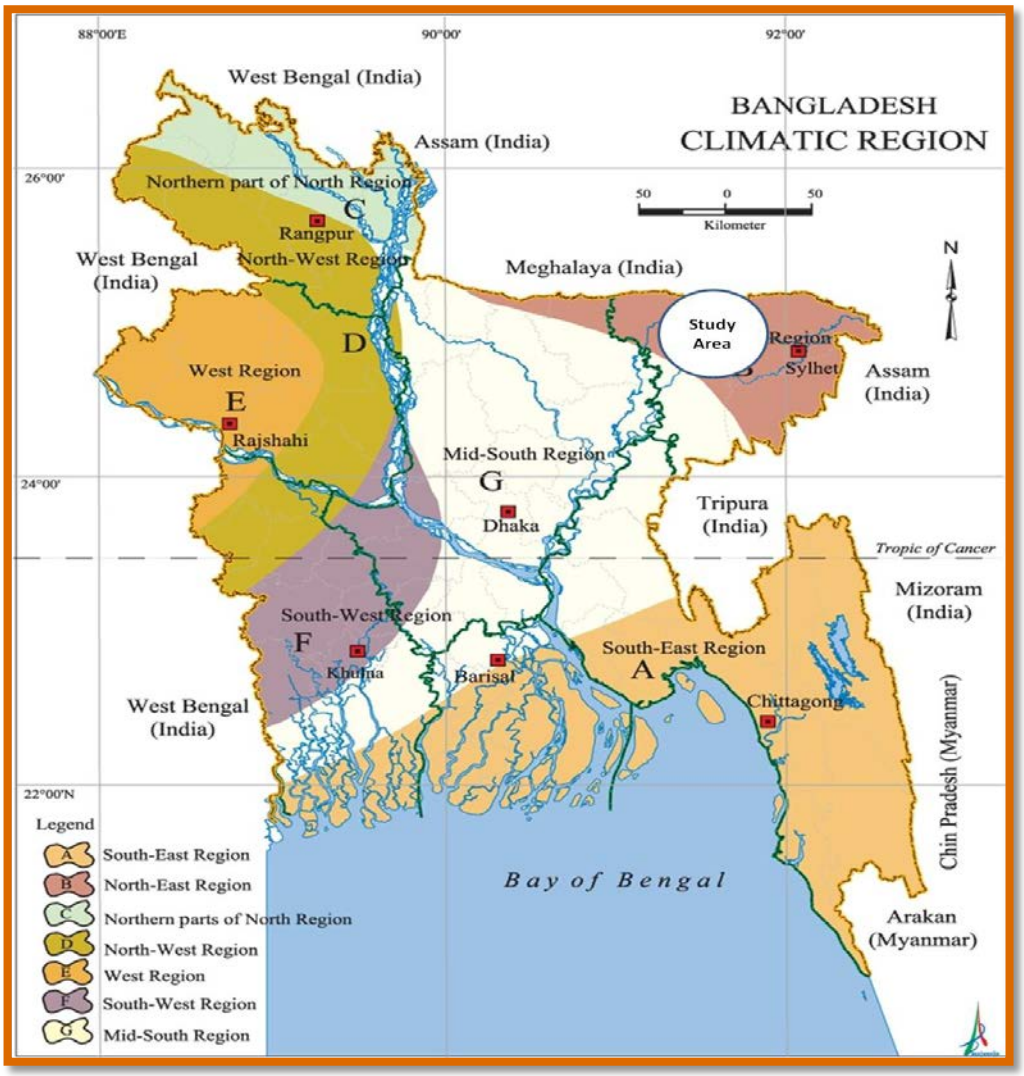
Figure 22: Map Showing Environmental Settings within 10 km Radius of Project Site

5.3. Baseline Data Collection and Monitoring Stations

The present EIA Report has been prepared based on the Primary field investigations / assessment, and secondary data from data collected from Department of Public Health and Engineering (DPHE), Bangladesh Water Development Board, Forest Department, Bangladesh Meteorological Department, Bangladesh Bureau of Statistics, existing studies, DoEB, published journals, and books, public consultation and site observations. Secondary data available on air quality, water quality and soil quality is used for the defining the baseline environment of the area.

5.4. Meteorology

The project area lies in the North-Eastern climate zone of the country and have tropical monsoon climate. There are three main seasons, i.e. monsoon (May to October), dry season/winter (November to February) and pre-monsoon season (March to April). Meteorological condition has been established using data on different metrological parameters accumulated from Bangladesh Meteorological Department for Sreemangal & Sylhet Division. Summary of the analysis of metrological parameters are given in the following sections.

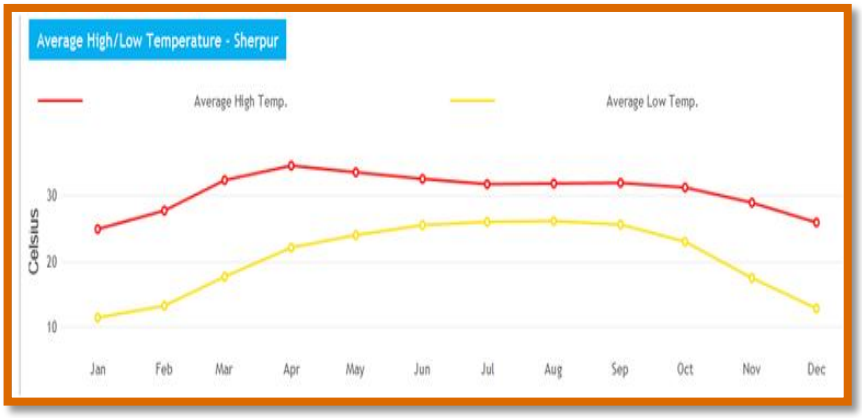


Source: BMD

Figure 23: Climate Region Map of Bangladesh

5.4.1. Temperature

June is the hottest month in Sherpur with it's average high temperatures at 29^0 C. The coldest month is January with average highs at 18.2^0 C. Average annual temperature of Sherpur region is presented in figure 24. In Maulvibazar district, Annual Maximum temperature is 33.2°C, and minimum 13.6°C. Temperature of Srimangal & Sylhet area nearby the proposed EZ is given below in tables 22 & 23 and figure 25 & 26. Met stations in Srimangal city and Sylhet area are at distance of app. 34 and 36 kms respectively from the site.



Source: BMD

Figure 24: Average Annual Temperature of Sherpur Region

Table 22: Temperature Data of Srimangal City

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal Maximum (^{0}C)	25.2	27.5	31.7	32.9	32.1	32.0	32.0	32.4	32.0	31.6	29.1	26.4	32.9
Normal Mean (^{0}C)	17.35	19.65	24.45	27	27.5	28.3	28.55	28.8	28.25	26.8	22.85	18.85	29.05
Normal Minimum (^{0}C)	9.5	11.8	17.2	21.1	22.9	24.6	25.1	25.2	24.5	22.0	16.6	11.3	25.2

Source: BMD

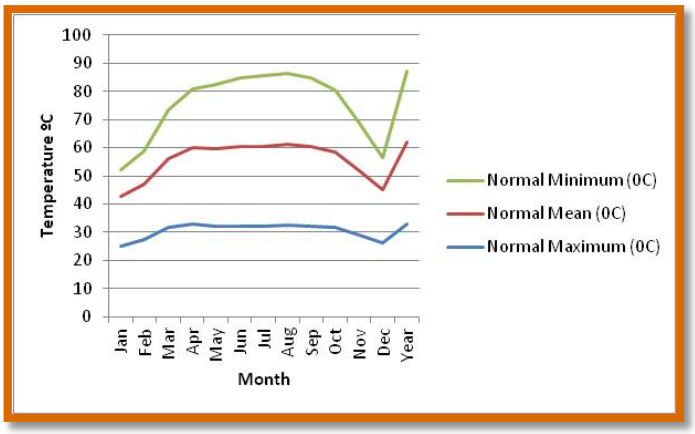


Figure 25: Climate Region Map of Srimangal

Table 23: Temperature Data of Sylhet Area

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Normal Maximum (⁰C)	25.3	27.1	30.4	30.8	30.7	30.9	30.9	31.6	31.2	31	29.2	26.3	31.6
Normal Mean (⁰C)	17.4	19.45	23.8	25.95	26.8	27.75	28	28.4	27.85	26.5	22.9	18.8	20.55
Normal Minimum (⁰C)	9.5	11.8	17.2	21.1	22.9	24.6	25.1	25.2	24.5	22.0	16.6	11.3	9.5

Source: BMD

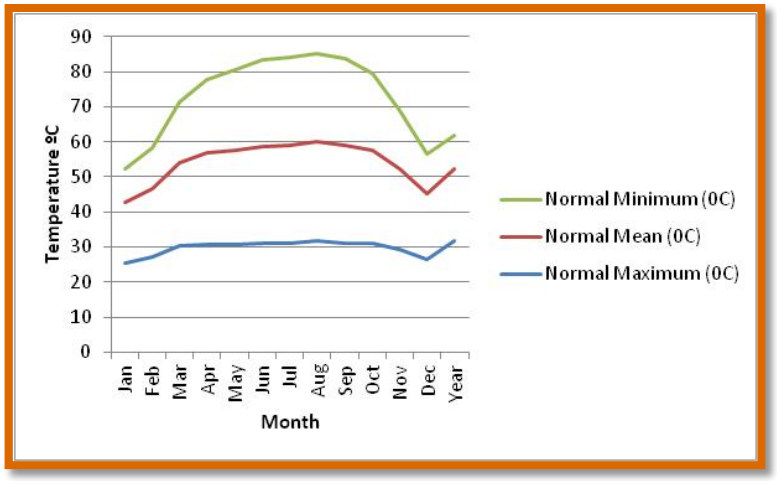


Figure 26: Climate Region Map of Sylhet

Humidity

Average humidity in Sherpur region varies from 57-83%. Humidity in Maulvibazar District varies from 63.7-79%. Average humidity of Sherpur region is presented in figure 27 below. Humidity in nearby area, i.e. Sylhet & Sreemanagal is given in table 24 and figures 28 & 29 below.

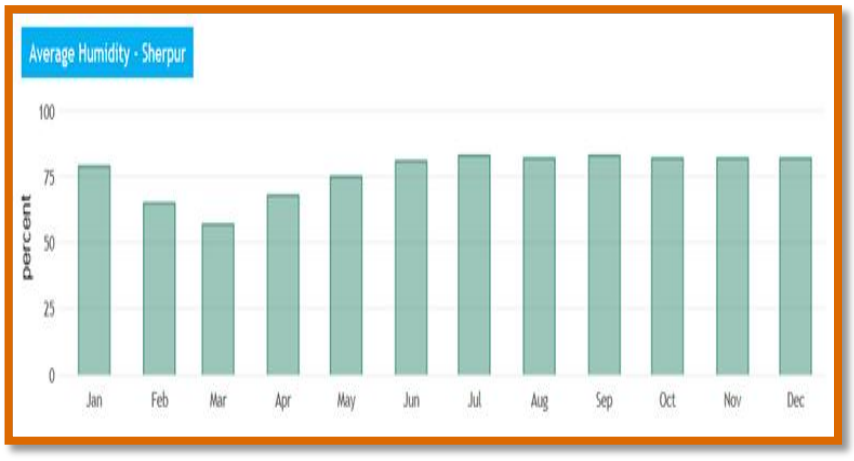
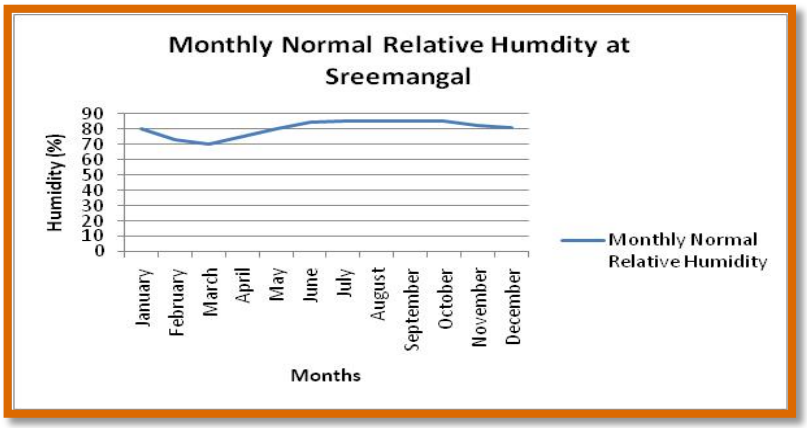


Figure 27: Average Monthly Humidity at Sherpur

Table 24: Monthly Normal Humidity in Srimangal and Sylhet

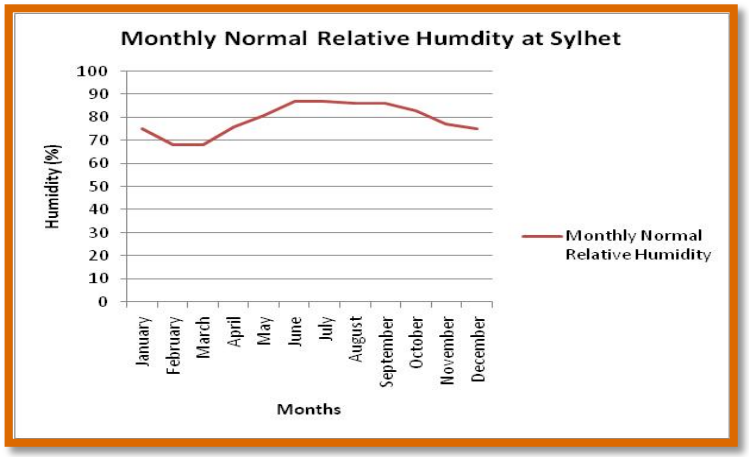
S. No.	Month	Monthly Normal Relative Humidity (%)	
		Srimangal	Sylhet
1	January	80	75
2	February	73	68
3	March	70	68
4	April	75	76
5	May	80	81
6	June	84	87
7	July	85	87
8	August	85	86
9	September	85	86
10	October	85	83
11	November	82	77
12	December	81	75

Source: BMD



Source: BMD

Figure 28: Monthly Normal Relative Humidity of SreeMangal



Source: BMD

Figure 29: Monthly Normal Relative Humidity of Sylhet

5.4.2. Rainfall

Climate of the region is tropical monsoon and region receives high rainfall. Rainfall during year 2008 in Maulvibazar district was 3356 mm, in 2009 was 2407 mm, in 2010 was 1868 mm and in 2011 was 2071 mm. Maximum annual rainfall received in Sherpur region is 3770 mm. Monthly maximum rainfall of 1400 mm was recorded at Sherpur in monthly of July in 2004. Daily maximum rainfall of 240 mm was received in Sherpur during October, 2012. Three hourly maximum rainfall of 120 mm was received in Sherpur in July, 2005. Hourly maximum rainfall of 40 mm was received in Sherpur in July, 2005. Figure 30 depicts the average rainfall of Sherpur Area.

Figure 30: Average Rainfall of Sherpur

Nearest Meteorological station of BMD to the site is Sylhet and Srimangal which is app. 36 km (NE) and 34 km (S) respectively to EZ site. The Average normal rainfall of Srimangal and Sylhet is shown below in table 25.

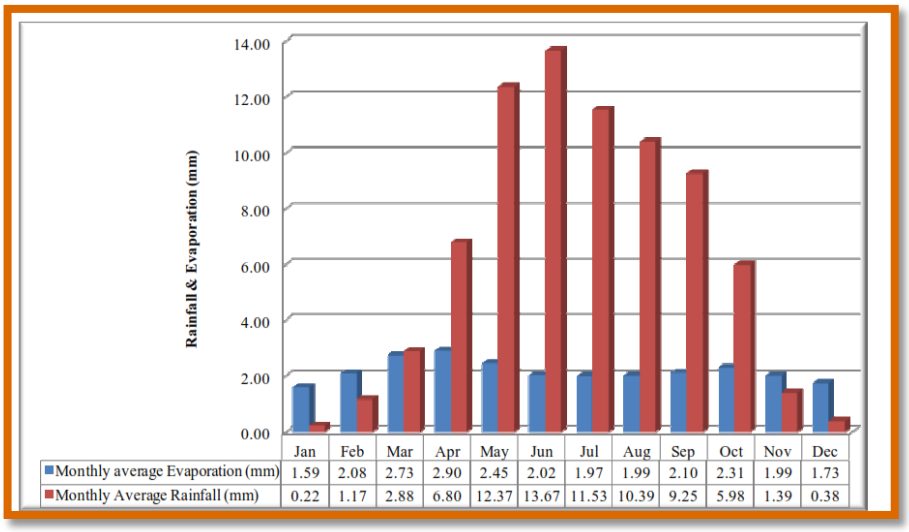
Table 25: Average Normal Rainfall of Srimangal and Sylhet

S. No.	Month	Srimangal		Sylhet	
		Rainfall (mm)	Nos. of rainy days	Rainfall (mm)	Nos. of rainy days
1	January	5.0	1	9.4	2
2	February	31.3	3	36.2	4
3	March	84.1	5	155.3	9
4	April	216.1	11	375.6	16
5	May	449.9	18	569.6	20
6	June	449.7	18	818.4	22
7	July	339.4	17	819.2	25
8	August	299.3	18	612.6	22
9	September	278.5	14	535.9	18
10	October	150.0	7	223.9	8
11	November	40.3	3	30.4	2
12	December	11.2	1	9.4	1

Source: BMD

5.4.3. Evaporation

Evapo-transpiration reaches its maximum level in April when temperature, sunshine and wind are all at, or close to, their maximum levels for the year. Potential evapo-transpiration data for a station of the Maulvibazar Region are presented in table below. Srimangal is nearest to the site at distance of app 13.0 km in SW direction. The monthly average evaporation in Sreemangal varies from 1.59 to 2.9 mm/day in a year. The monthly maximum average evaporation occurs in the month of April and it is 5.2 mm/ day. Figure 31 shows the evaporation trend of the Sreemangal station.



Source: BMD

Figure 31: Thirty years (1978-2008) average of monthly and minimum evaporation

5.4.4. Winds

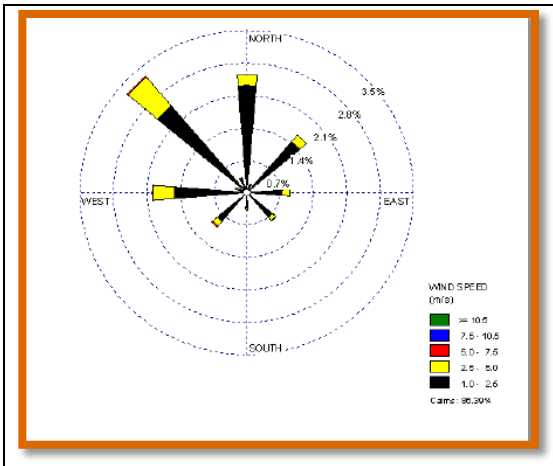
Windspeed data for Sreemangal station and Sylhet station is taken from BMD website and is given below in table 26.

Table 26: Normal Wind Speed Data of Srimangal and Sylhet Area

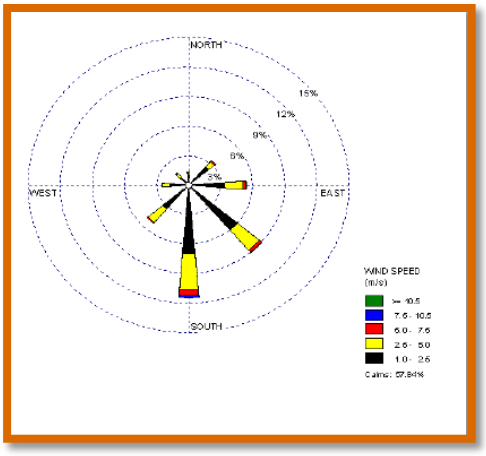
Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
Srimangal	0.46	0.91	1.63	1.83	1.53	1.42	1.63	1.21	0.87	0.58	0.36	0.30	1.07
Sylhet	2.18	2.68	3.25	3.25	2.82	2.56	2.39	2.18	1.84	1.84	1.98	2.07	2.42

Units: m/s & Source: BMD

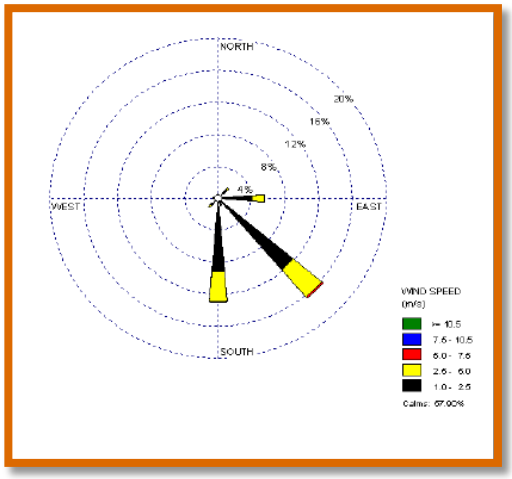
Windrose diagram has been obtained for Sreemangal meteorological station. Windrose diagrams for Sreemangal are given in figure 32 below. During winter (e.g. January) wind prevail to S or S-E direction with maximum calms (86.4%) wind. Wind direction become reverses which prevail to N or N-W direction during pre-monsoon or monsoon with 57% calm wind. However, maximum wind behaves quite turbulence nature with lower wind speeds during post monsoon.



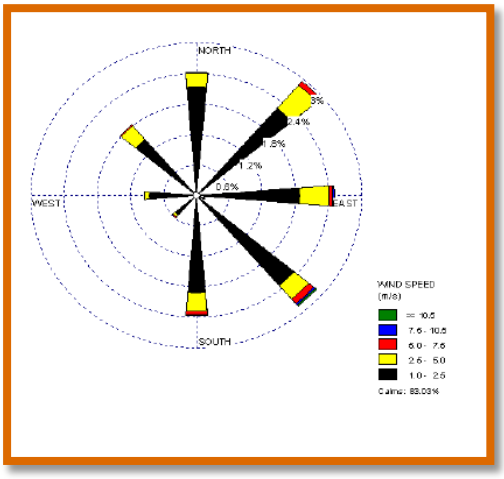
Windrose Diagram-January



Windrose Diagram-April



Windrose Diagram-July



Windrose Diagram-October

Source: EIA Report of Bibiyana 300-450 MW Gas based combined cycle power plant at Nabiganj, Habiganj

Figure 32: Windrose Diagram-Sree Mangal

5.4.5. Sunshine Hours

The monthly average insolation hours in Maulvibazar varies from 13-14 hours in a day. However sunshine hours vary from 3.8 to 8.2 hours/day in a year. Monthly minimum average sunshine hours occur in month of February, i.e. 9.8 hours/day.

5.5. Air Environment

Study area is more of rural area surrounded by villages. However a national highway abuts the site and Bibiyana Thermal Power station of capacity 400 MW lies at app 700 m distance from the EZ site. Major

source of air pollution in the area are observed to be vehicular traffic, operation of Bibiyana TPP, Domestic bio-mass burning, Rice husks industries along the highway and Kushiyara river traffic. To measure the air pollution levels, ambient air quality data has been collected through the secondary sources for the study area. Reference from the Audit reports submitted by Bibiyana TPP has been taken for ambient air quality data. Ambient air quality monitoring has been carried out by BPDB from November, 2013 to December, 2014. Map showing locations of site where ambient air quality monitoring was carried out by BPDB is given in figure 33 below. The data is given in table 27 below.

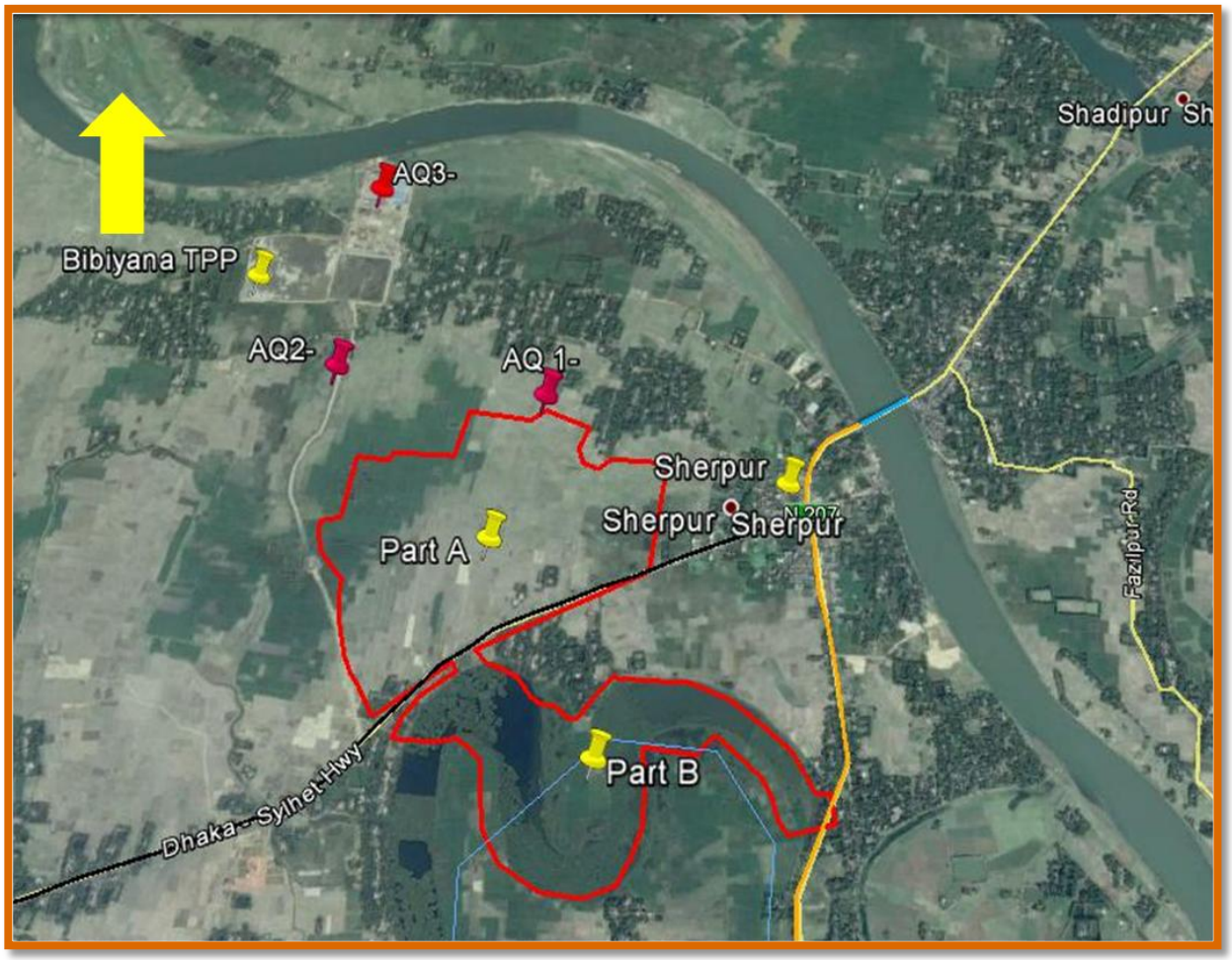


Figure 33: Map Showing Location of Ambient Air Quality monitoring Stations

Table 27: Ambient Air Quality Monitoring (Nov, 2013-Jan, 2014)

Period	Location	Ambient Air Quality Concentration (µg/cum)				
		PM_{10}	$PM_{2.5}$	SPM	SO_2	NO_2
November, 2013	Near Part A of EZ Site	95.13	44.51	124.28	4.01	8.74
		94.14	42.52	139.22	3.28	9.65
		96.37	43.53	127.42	3.69	8.54
		94.24	42.5	129.21	4.36	7.95
		92.51	37.73	126.45	3.18	5.08
		91.29	36.61	126.5	4.8	6.24
		95.74	46.93	126.32	3.43	9.47
November 2013	Bibiyana TPP	120.15	65.41	154.22	5.45	10.84
		112.16	56.62	156.27	5.35	9.42
		114.33	65.54	157.27	4.66	10.14
		120.24	62.5	169.21	4.33	9.85
		123.21	53.52	132.41	4.14	7.05
		120.22	52.41	156.80	3.8	6.24
		117.44	44.73	166.22	3.73	7.43

Period	Location	Ambient Air Quality Concentration (µg/cum)				
		PM_{10}	$PM_{2.5}$	SPM	SO_2	NO_2
December 2013	Along the road from Part A of EZ Site to Bibiyana TPP	150.21	68.15	154.26	3.14	6.53
		141.15	65.73	149.23	3.24	6.65
		142.25	54.33	156.16	3.52	6.17
		136.24	56.5	166.26	3.44	6.25
		144.51	54.33	166.33	3.11	6.02
		151.30	56.45	156.54	3.5	6.22
		139.24	54.83	166.12	4.63	7.44
Standards (NAAQS Bangladesh)		150 (24 hrs) 70 (annual)	65 (24 hrs) 15 (annual)	200 (8 hrs)	365 (24 hrs) 80 (annual)	100 (annual)

Source: Draft Environment & Social Compliance Audit, Bibiyana II Gas Power Project, Parkul, Nabigonj, Habigonj

It is observed that dust levels are high in the region and are even crossing the permissible limits as per NAAQS. However values of SO_2 & NO_2 are well within the prescribed limits. Construction activities may further aggravate the dust levels in the area, thus it is required to undertake all the dust control measures during the construction phase. Similarly dust control management plan should be prepared for operation phase.

5.6. Noise Environment

Average noise levels in the area were measured during the visit. Day time noise levels and night time noise levels were measured. Noise levels at the site were found to be lower. However at the Highway noise level were found to be higher. Noise levels recorded at the site and at the highway are given below in table 28.

Table 28: Noise Level Monitoring (Nov, 2013-Jan, 2014) at EZ Site

S. No.	Location	Period	Leq Day dB(A)	Leq Night dB(A)
1	Part A (middle of the site)	April, 2015	46	35
2	Part B (middle of site)	April, 2015	47	38
3	Dhaka Sylhet Highway	April, 2015	65	46
4	Sylhet Maulvibazar Highway	April, 2015	62	44
Standards for Noise (ECR, 1997)			75	70

Average noise levels in the area are within the prescribed limits as per ECR, 1997. Construction activities will increase the noise level in the area so management plan is required to be prepared for controlling construction noise levels. Noise generation during operation phase will depends on the type of the activities to be carried out by industries. All industries should maintain the noise levels by using the acoustically treated equipments/machinery & vehicles.

5.7. Water Resources

5.7.1. Surface Water System & Drainage

Major water body within 10 km study area is river Kushiyara, Part B of site/water body which is locally called as River Gong, large water body in southern direction of the site, River Manu and other Beels and Khals. Kushiyara river is perennial river. Average depth of the River Gong is 15 feet.

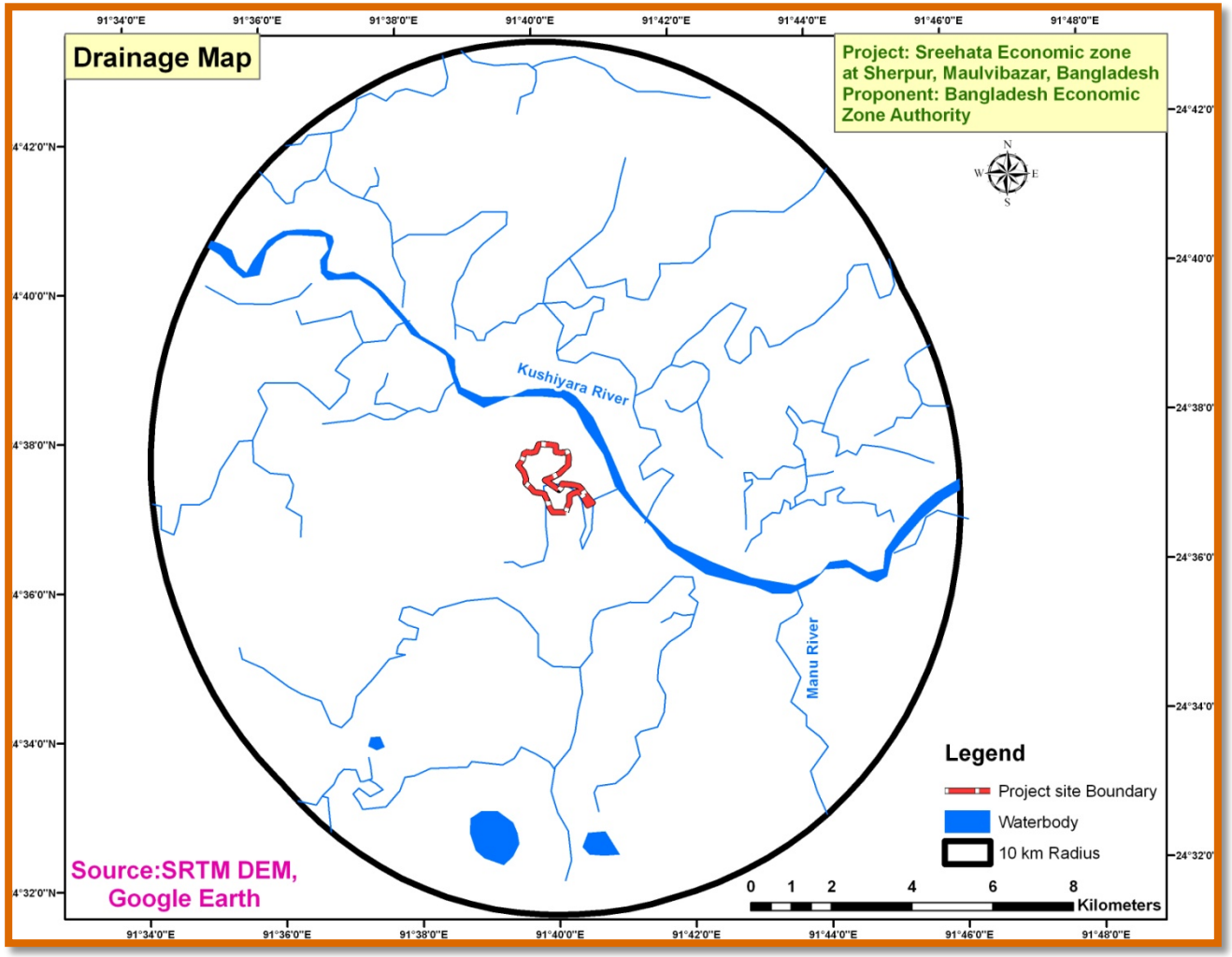
Kushiyara River is one of the trans-boundary Rivers of Bangladesh. The Kushiyara River originates from India. The Kushiyara passes through the Eastern side of the project site. The flood period is generally from the last week of May to the middle of October. The Kushiyara River is approximately 150 m wide when full and the average depth is about 12 m. The slope of the river bed is higher in Kushiyara which is 100mm/Km. Profile of the Kushiyara River is given in table 29 below. The principal tributaries of the Kushiyara River are the Langai, the Manu, the Juri, the Gopla, the Khowai and the Sutang, all

originating from Tripura hills. The river is navigable almost throughout the year although sand bars often create difficulties for smooth navigation. The Manu river, which originates in the Tripura hills and follows a meandering north-westerly course between Rajkandi and Ita hills and along the northern face of Balisira range past Maulvibazar it meets the Kushiyara river near Bahadurpur. The Manu has a catchment area of 1000 sq. kilometers. Monsoon floods and flash floods occur in the area. Flash floods occur during April to May in the area. Beside this water body, there are beels and canals around the project sites that add to the floods during monsoon season. Boundary wall will protect the EZ site from getting flooded.

Table 29: Profile of Kushiyara River

S. No.	Characteristics	Description
1.	Off take	Borak River (It's coming from south bangle of India (Asam) and entering Bangladesh at Amalshid, Sylhet District and then is divided in to Khusiyara river and Surma River)
	Geographical Location	Amalshid, Zakiganj, Sylhet
2.	Outfall	Kalni River
	Geographical Location	Ajmerigonj, Hobigonj
3.	River flow path	Upazila: Zakigonj, Birani Bazar, Gopalgonj, Fanchugonj, Balagonj, Jogonnathpur, Dirai, Salla and Ajmerigonj District: Sylhet, Sunamgonj, Hobigonj and Kishorgonj
4.	Physical settings of river	
	Length	229km (in Bangladesh)
	Width	157m (Rainy Season)
	Depth	14.57m (Salla, Birani Bazar) 9.7m (Sherpur)
	Catchment area	10945 sq. km
5.	Discharge	
	Seasonal/Perennial	Perennial
	Minimum discharge month	February and March
	Approximatly Minimum of monthly Average minimum discharge and depth (February)	169.1m3/s and depth 3.1m at Sherpur
	Maximum discharge month	July to August
	Approximatly Maximum of monthly Average maximum discharge and depth	1913.8 m3/s discharge and 8.4m Depth at Sherpur
	Maximum Discharge ever recorded in wet season	3950 m3/s at Sherpur
	Maximum depth ever recorded in wet season	9.7m at Sherpur
	Tidal	No
	Flooding pattern during normal Flood	Yes
6.	Station name	BWDB Surface Water and Discharge-175.5(Sherpur)
7.	BWDB project/government or non-government Project	N/A
8.	Location of Major urban area	Zakigonj, Fanchugonj, Salla, Ajmerigonj and Markuli Port

Source: Rivers of Bangladesh & NWRD



Source: SRTM

Figure 34: Drainage Pattern of 10 km Radius

5.7.2. Tropical Cyclones & Tidal flooding

Since the Maulvibazar district is not coastal area so there are no threats of tropical cyclones or tidal flooding in the area.

5.7.3. Floods

Floods are the most significant natural hazard in the country causing extensive damage to human life and property. The country lies on the downstream part of three major river basins: Brahmaputra, Ganges and Meghna and thus is frequently flooded. There have been many destructive floods in Bangladesh, including very severe floods of 1987, 1988 and 1998. The 1988 flood set a new record for flooded area, while 1998 flood was unprecedented with its long duration. The flood damage potential in Bangladesh is increasing due to the possible causes of climate change, urban concentration in the three river basins, encroaching of settlements into flood prone areas, and overreliance on the safety provided by flood control works such as levees, reservoirs. There are two types of floods which occur in Bangladesh: annual floods (barsha) that inundate up to 20% of the land area; and low frequency floods of high magnitude that inundate more than 35% of the area (bonna). The major floods that occurred in 1954, 1955, 1974, 1984, 1987, 1988, 1993, 1998, 1999, 2000 and 2007 have been very destructive and caused serious threat to lives and economy. In the context of human exposure in flood hazard zones, nearly 19,279,960 people are present in these zones and Bangladesh ranks 1st among 162 nations. Similarly, the modeled amount of GDP in seismically hazardous zones puts Bangladesh 3rd among 162 countries.

Major River in the study area is Kushiyara River. Total length of Kushiyara River in Bangladesh is 157 kms and has mean depth of 9.7 m at Sherpur. The average highest and lowest discharges recorded by BWDB at Sherpur station are 1913.8 cum/sec & 169.1 cum/sec respectively. River generally floods in rainy season, i.e. middle May to October.

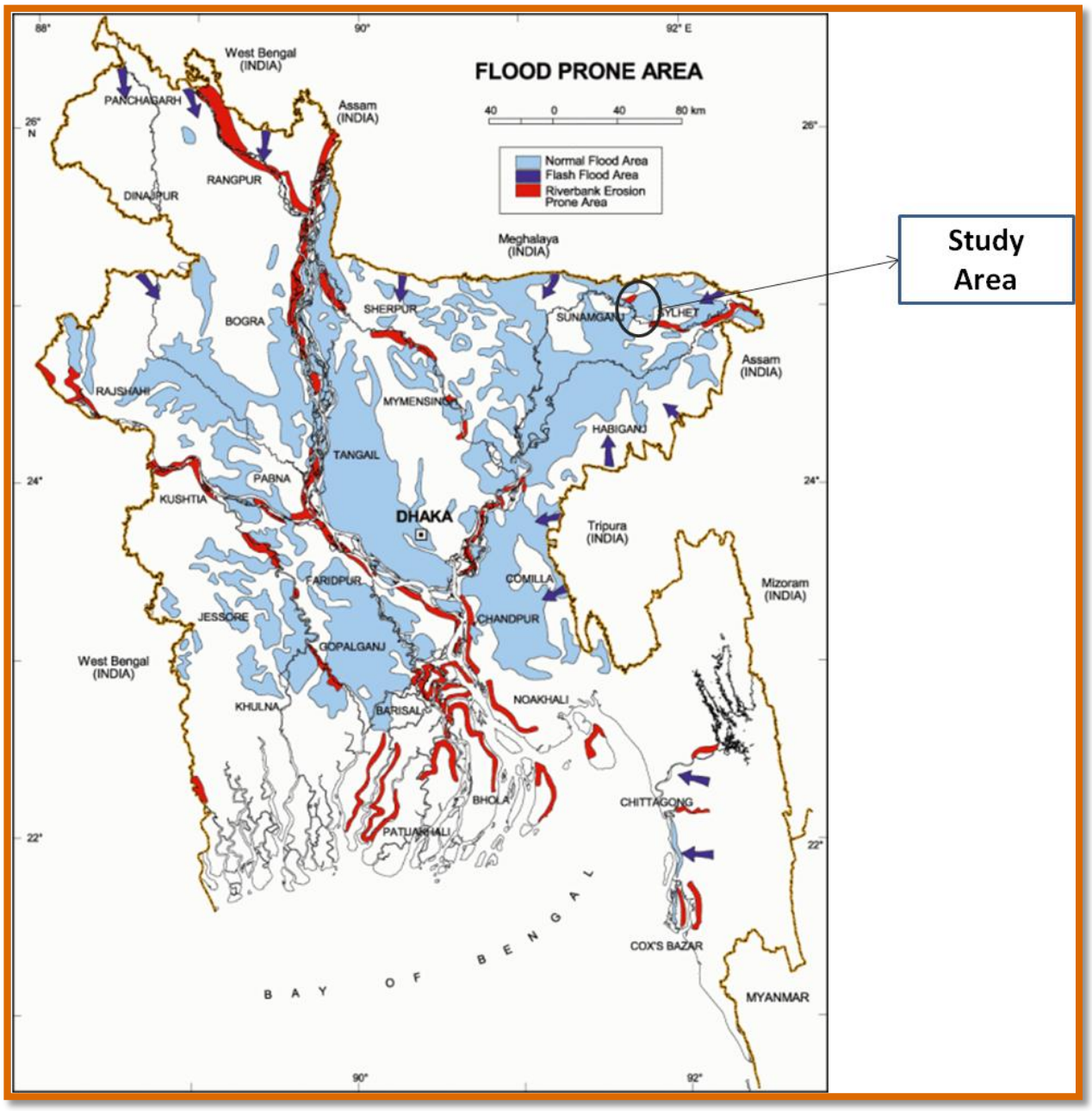
According to Annual Flood report 2014, (FFWC, BWDB), at Sherpur the river flowed with a gradual rise and fall trend and crossed the DL (Danger Level) several times in the month of August and September in this monsoon. It remained above DL for total 11 days where 3 days in August and 8 days in September. It attained its yearly highest peak of 9.18 m PWD on 25th August, which was 18 cm above its DL (9.00 m). Thus the area is prone to flooding due to floods in Kushiyara River. As per the Flood map of Bangladesh (figure 35) area falls under normal flood prone area and floods are experience for short to moderate duration. However flash flood does not occurs in the area. Also erosion of river bank is observed due to action of Kushiyara River. Boundary wall is provided around the project site as flood protection measure. Peripheral drain will be developed around the EZ boundary to drain the storm water from site. Flood inundation map of Bangladesh is given in figure 36 which shows that inundation level due to flood in the area varies from 910-1810 cms.

As a flashy river, the WL of the river Manu at Manu Railway Bridge and at Moulvibazar observed several peaks during the monsoon -2014. The WL of Manu river did not cross the DL at Manu Railway Bridge with a peak flow of 17.85 m PWD, which is 15 cm below the DL (18.0mPWD). At Moulvibazar the WL of Manu didn't cross the DL, flowed with peak of 11.58 m PWD, which was 17 cm below its DL (11.75m) at this point. Data for comparison of water leve; of Kushiyara River & Manu River in year 2014 & historical events in year 1998 & 1998 is given in table 30 below. Hydrographs of the River Kushiyara and River Manu are given below in figure 37 & 38.

Table 30: Mean Comparison of Water Level of 2014 and Historic Events of 1988 & 1998 of Kushiyara & Manu River

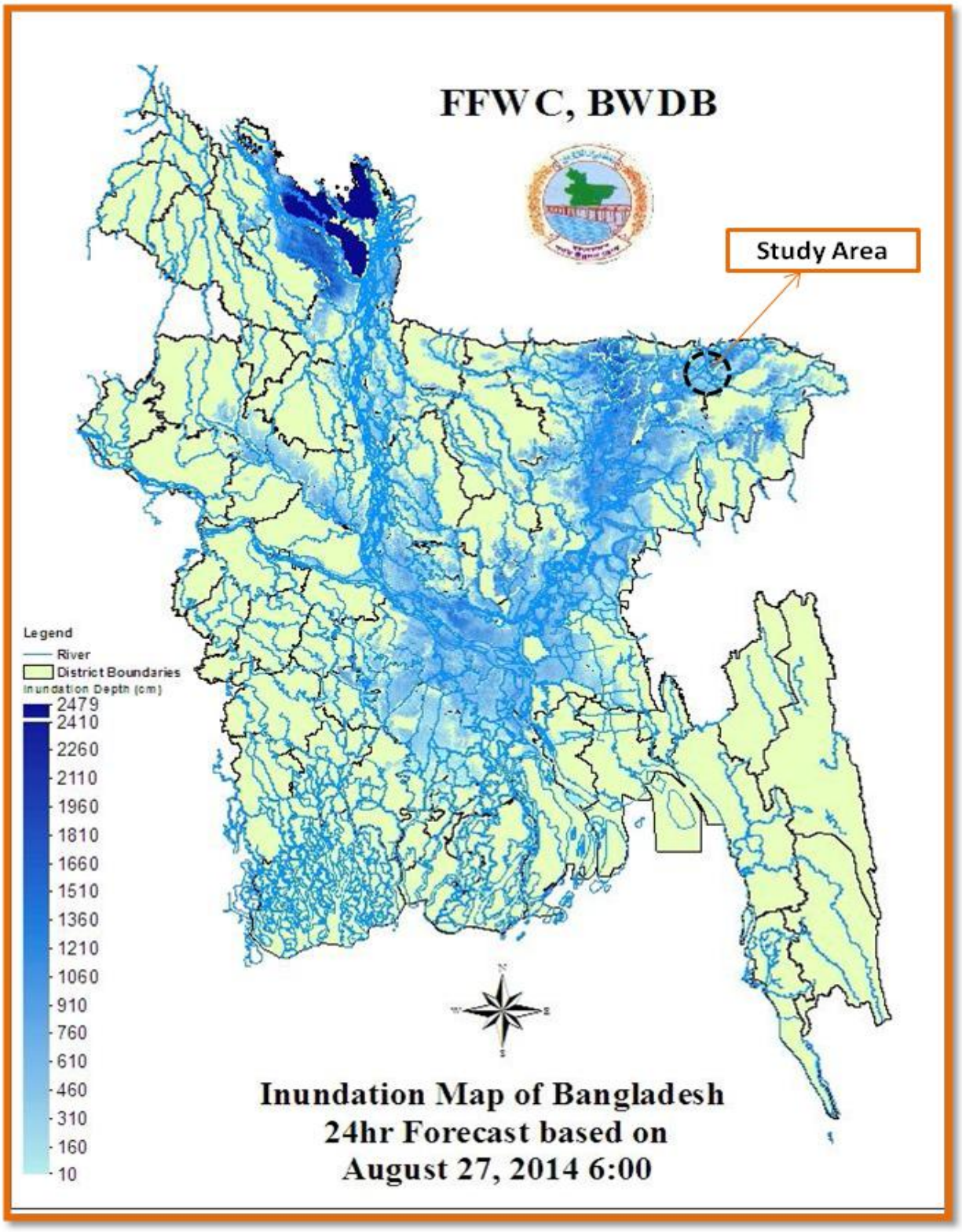
Sl. No	River	Station	Recorded Maximum (m)	Danger Level (m)	Peak of the year (m)			Days above Danger level		
					2014	1998	1988	2014	1998	1988
1	Kushiyara River	Sherpur	9.68	9	9.18	NA	NA	10	NA	NA
2	Manu River	MaulviBazar	15.50	11.75	11.58	11.68	13.01	-	-	25

Source: Annual Flood Report, 2014, FFWC, BWDB



Source: mapofbangladesh.blogspot.com

Figure 35: Flood Prone Area Map of Bangladesh



Source: FFWC

Figure 36: Flood Inundation Map of Bangladesh

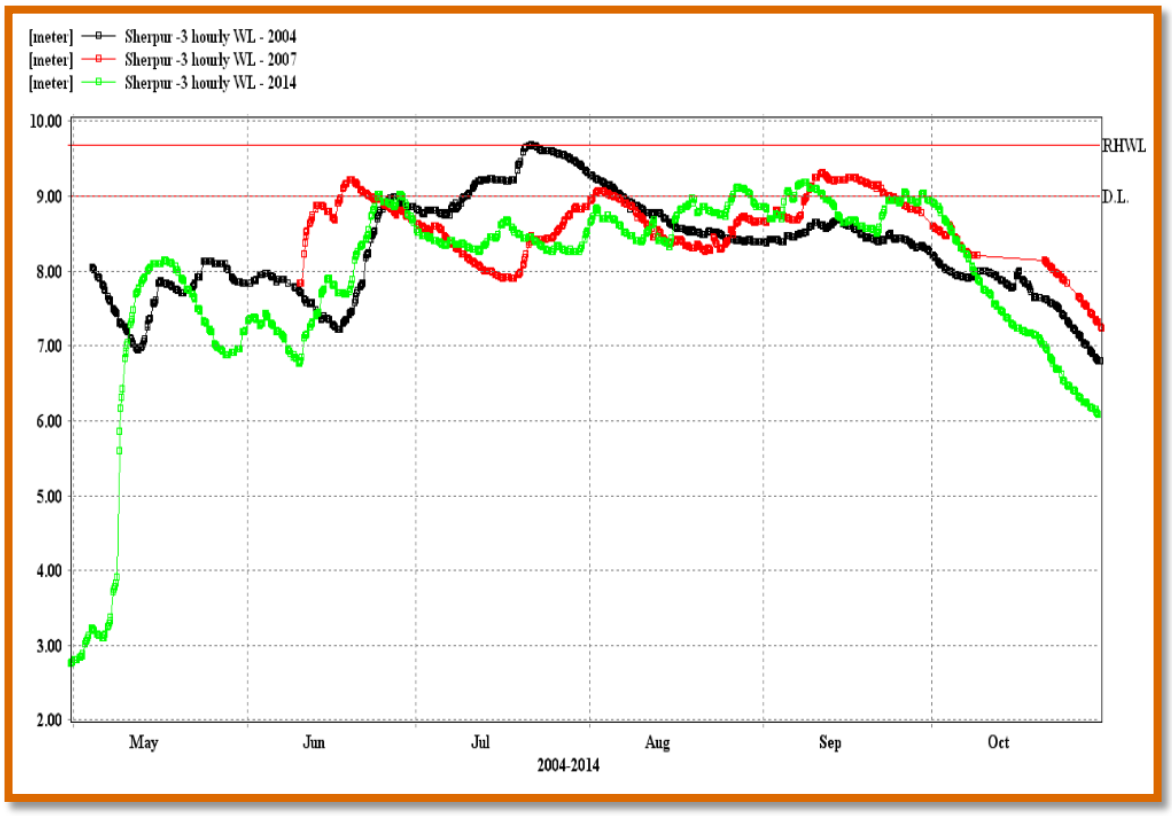


Figure 37: Hydrograph of Kushiyara River at Sherpur

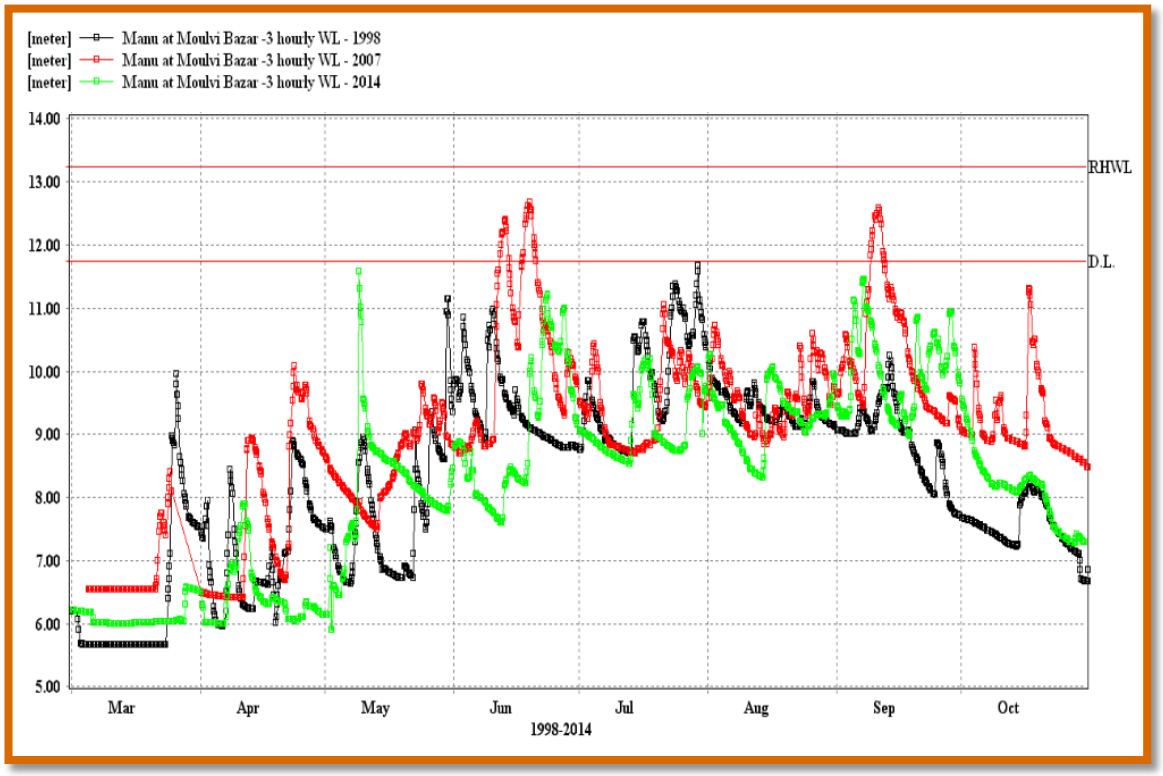


Figure 38: Hydrograph of Manu River at Maulvi bazaar district

5.7.4. Salinity

River water& ground water in the study area is fresh and TDS is found to be in limits as per standards given in ECR, 1997.

5.7.5. Drainage Congestion and Water Logging

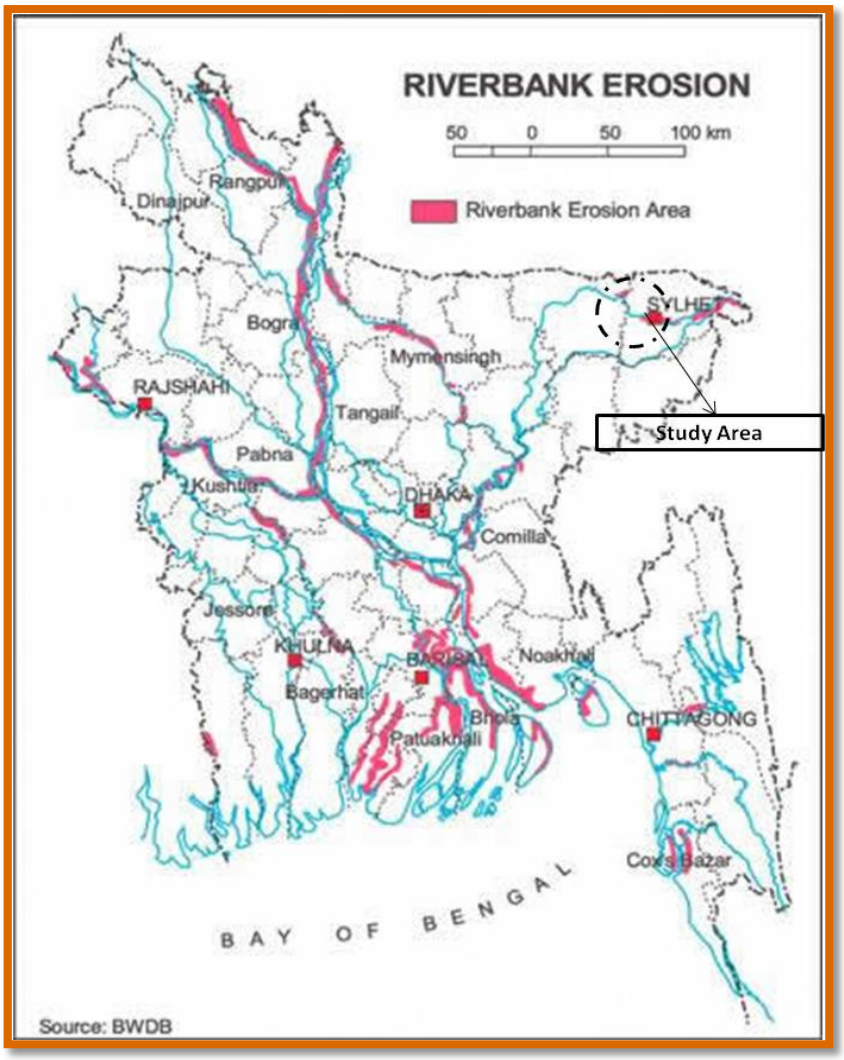
Study area is drained by Kushiyara River through various streams, khals, Beels and streams. Part B of project site is water logged area which receives the storm water from nearby locations. Part A of the site also drains into Part B through small drain. Study area drains finally into River Kushiyara through a khal meeting Kushiyara River at app. 5 kms distance from EZ site in North Direction. Due to encroachments on the Beel in Southern direction to part B, water cannot be drained properly to the Kushiyara River and water retains in Part B of the site. Encroachment is done by the farmers in the area for agriculture purpose. Similarly various Beels are encroached in the study area and water gets logged due to insufficient drainage. Map showing water logged areas, beels and drains in the area is given in figure 39 below.

Source: Google Earth

Figure 39: Water Logged Areas in Study Area

5.7.6. Erosion and Sedimentation

Kushiyara and Monu River can be characterized mainly as meandering river within a well defined high water level. Flash flood occurs at the upper reach of Kushiyara River. Monu River shows flashy characteristics for entire of its length. River carries heavy flow during the monsoon season and heavy sediment load. Due to which erosion of the bank and deposition of the sediments on the bank is being regular phenomenon in these rivers. River bank erosion is one of the major problems faced by local people. Figure 40, river bank erosion map of Bangladesh shows that area experience erosion and sediment deposition.



Source: http://www.livingwiththejamuna.com/essayintroduction.html

Figure 40: River Bank Erosion Map of Bangladesh

5.7.7. River Morphology

River Kushiyara and Monu are dynamic rivers and are being changing the geometry & width over time throughout its length in Bangladesh. A study has been conducted to study the meandering parameters of Kushiyara River using Remote sensing technology & GIS by Misbah Uddin, Mithun Deb & Dabojani Das in 2012. They have identified 8 critical bends throughout river length which are showing changes with time. Satellite imageries of Kushiyara River given in the above mentioned study are presented below in figure 41. Toposheet map and Google images showing the morphology of the river different years is given in figure 42.

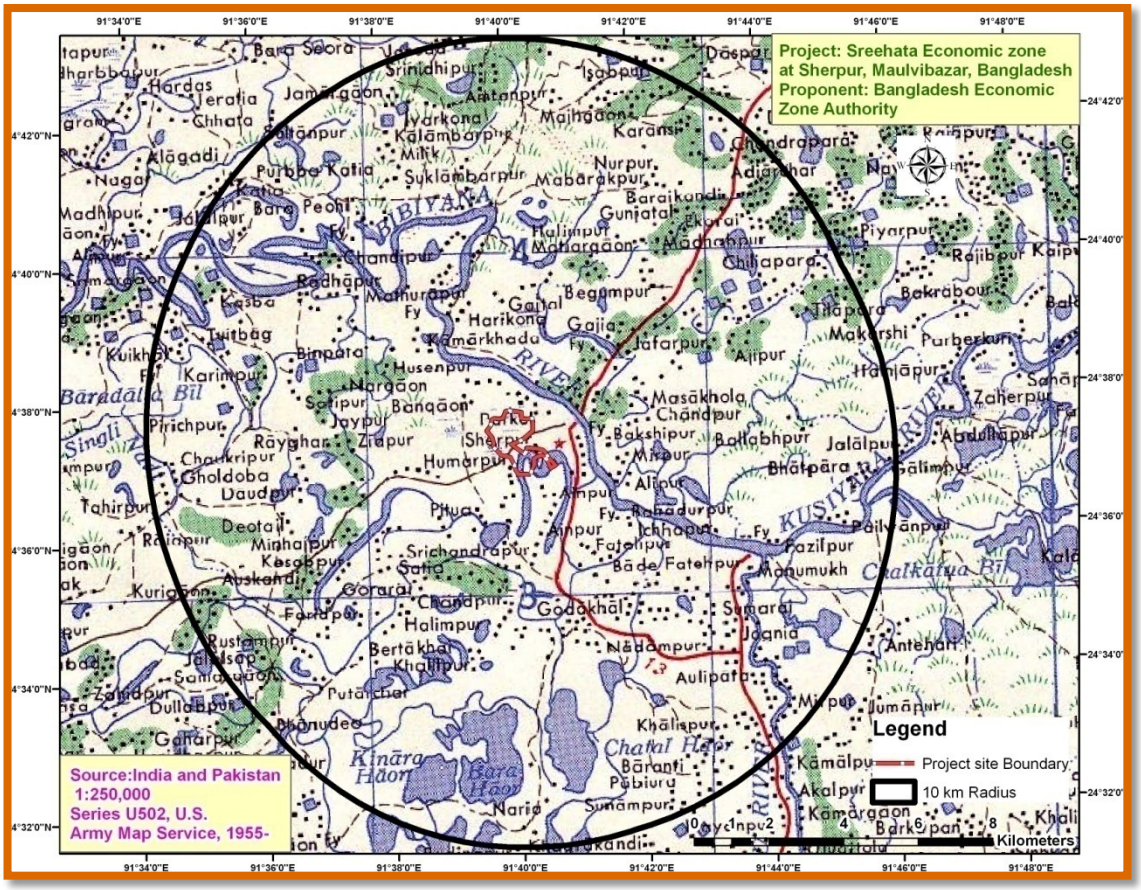
LandSat Image of Kushiyara River, 1997

LandSat Image of Kushiyara River, 2006

LandSat Image of Kushiyara River, 2010

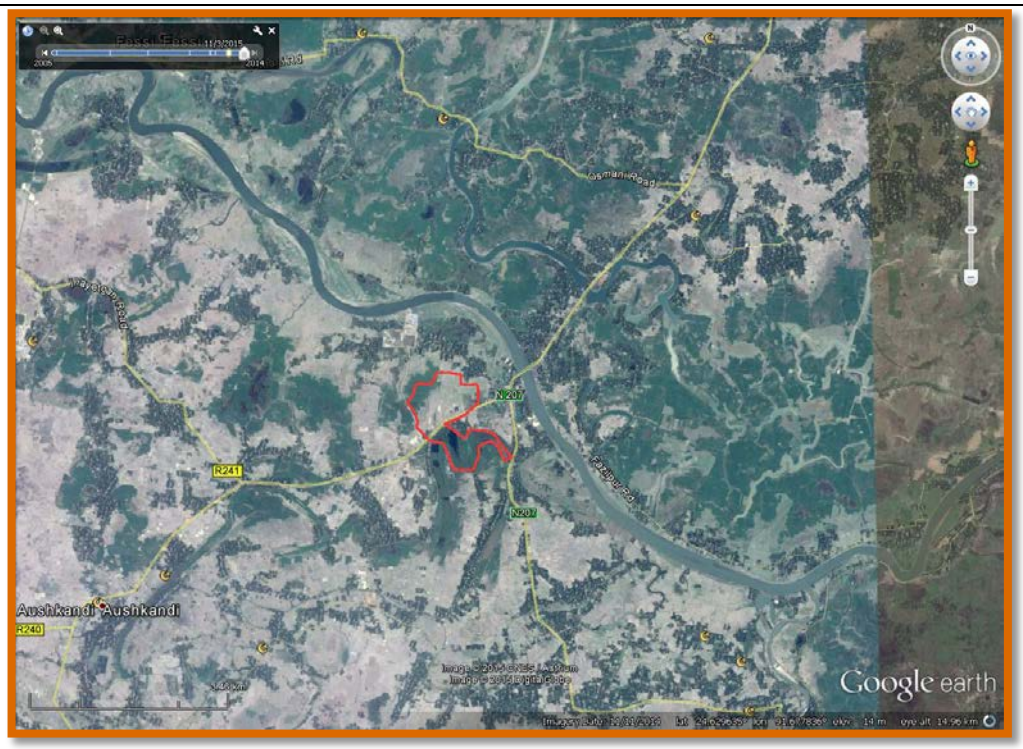
Source: Uddin M, Deb M & Das D.

Figure 41: Satellite Imageries of Kushiyara River



Toposheet Map Showing the Kushiyara River Course, 1955

Google Map Showing the Kushiyara River Course, 2009



Google Map Showing the Kushiyara River Course, 2015

Figure 42: Satellite Imageries of Kushiyara River

Parameters defining morphology of the river like width of river, meandering wavelength, radius of curvature, sinuosity of bends, meandering width, meandering length, meander ration and bend migration were studied. From the study following conclusion were made for Kushiyra River meandering that

- River within the study reach is predominantly irregular meandering channel. The Kushiyara River was found sinuous in the upstream side and less sinuous in downstream side within the study period during 1997 -2010.
- The bends of Kushiyara River was migrated inward or outward for the period during 1997 2010. All types of bend migration (extension, rotation and translation) were viewed to occur.
- Sinuosity of the Kushiyara River was greater than 1.5 at most of the time which indicates the river highly sinuous and the bends are critical (Akhand, 2008). The sinuosity of bends of the river Kushiyara varied from 1.11 to 2.24.

From another study carried out by Md. Misbah Uddin in 2010, it is found that reason for change in geometry of the river is erosion and deposition of sediments.

5.7.8. Navigation

The closest navigable river to Shreehatta EZ is the Kushiyara River, located at about 800 m from the proposed EZ. Water flow is high during rainy season and low in dry season. The average depth of the river is 10 m. Launches, cargoes, trawlers and all other kinds of boats are plied during wet seasons through Kushiyara River. So, it is possible to transport heavy equipments through this river system. Also aids for navigation during the night are not available for Kushiyara River.

Ashuganj River Terminal on Meghna River it is about 108 Km from the proposed EZ by road. Ashuganj River terminal is connected through Dhaka Sylhet Highway to the project site.

5.7.9. Surface Water Quality

Kushiyara is the main river which flows within the study area. It is app. 800 m from the project site. Surface water quality data for River Kushiyara is available for February, 2014 and is referred from the Environment & Social Compliance Audit Report Submitted by Summit Bibiyana II Power Company Limited Project for Bibiyana TPP located at app. 700-800 m from the EZ site. Water samples were taken from five different locations in Kushiyara River and the average results for river water quality are given in table 31 below.

Table 31: Average Surface Water Quality Data for River Kushiyara

Parameters	Units	Kushiyara River	Banagladesh Standards
COD	mg/l	14.1	200
DO	mg/l	3.5	4.5-8
Ammonia Nitrogen	mg/l	<0.97	50
Nitrites	mg/l	3.2	10
Mercury	mg/l	<0.03	0.01
Manganese	mg/l	<0.07	5
Phosphate	mg/l	0.6	1
Phosphorus	mg/l	0.6	1
Iron	mg/l	0.9	2
Chlorine	mg/l	ND	0.2
Calcium	mg/l	12.0	75
Arscenic	mg/l	<0.02	0.05
Total alkalinity	mg/l	73.0	200-500
Total hardness as $CaCO_3$	mg/l	69.0	-
Lead	mg/l	<0.02	0.05
Potassium	mg/l	2.5	12
Sodium	mg/l	10.02	200
pH at 25^0C	-	6.72	6-9
TSS	mg/l	12.4	10
TDS	mg/l	143	1000
Sulphate	mg/l	5.77	400
Turbidity	NTU	19	10
Conductivity	µS/cm	145	-

Source: Summit BibiyanaII Power Company Limited Project

Kushiyara River is main source of water for irrigation and navigation in the area. Also it is source of domestic & industrial water. A fertilizer factory is located 35 kms upstreams of project site along the River. Fertilizer factory discharges its treated effluent in the River. However no chemical pollution is traced in the River water, may be due to dilution due to travelling to this longer distance. TSS & turbidity is more than the prescribed standards. Source is the run-off from the nearby areas. Surface water will be used during the construction and operation phase of the project. Provision of WTP is in scheme to treat the raw surface water before utilization. Photographs of Kushiyara River are given below in figure 43.

River Kushiyara

Figure 43: Photographs of Kushiyara River

5.7.10. Ground Water System

Project site lies Surma Basin. Soils of the region are grey silty soils on the ridges and clayey in the basins. Aquifers of the region are confined and semi-confined (Md. Munir Hussain & S.K.M. Addullah, 2001). Depth of the ground water in the area varies from 4-5 mbgl during dry season. Due to the nature of strata area has very high potential for ground water recharge. Potential recharge varies from 1001-2500 mm. Map showing the ground water recharge potential is given in figure 44.

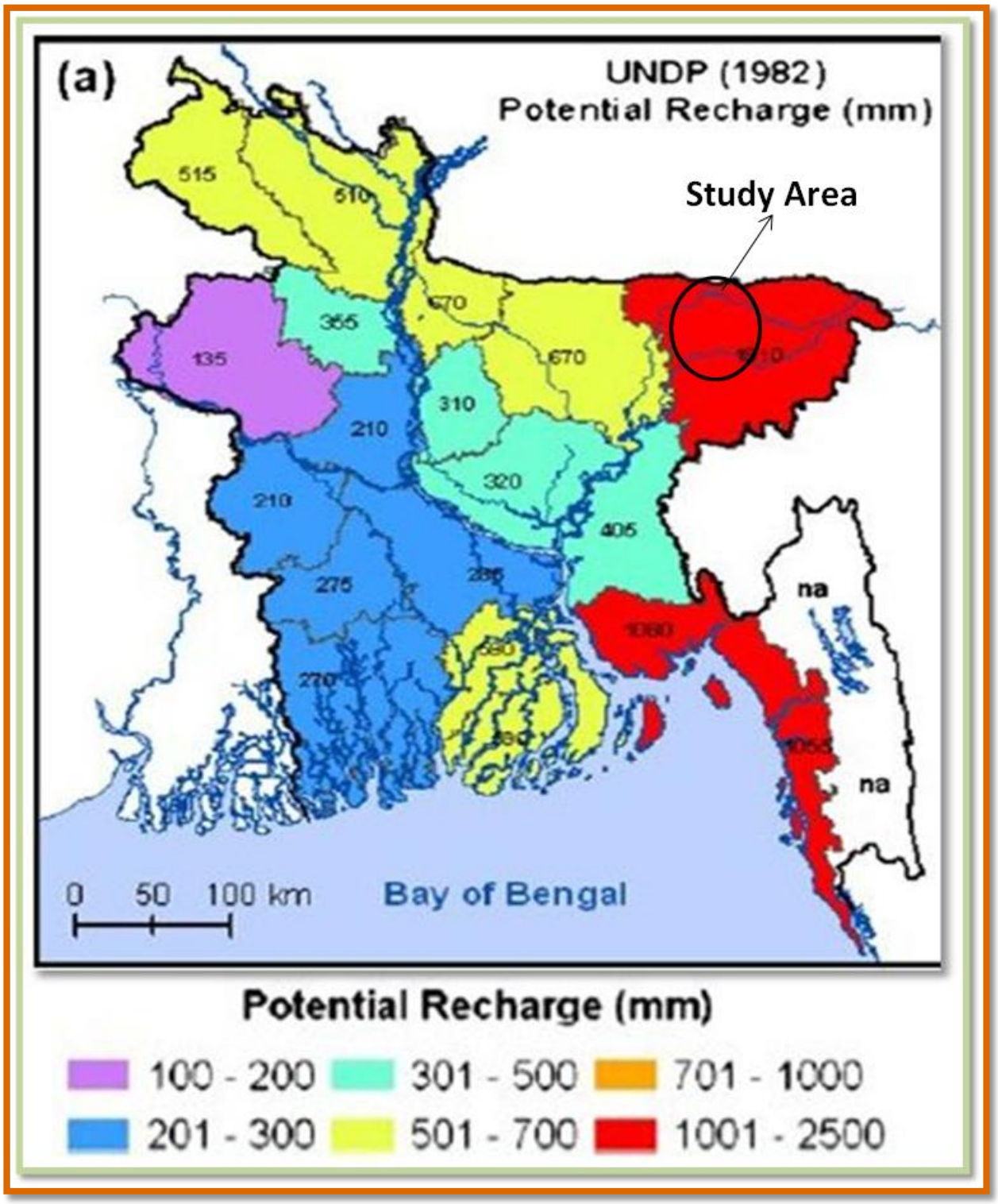


Figure 44: Map Showing Ground Water Recharge Potential of Bangladesh

5.7.11. Ground Water Quality

Ground water is main source of water to fulfill domestic water demand, irrigation and industrial demand in the area. Ground water is available in shallow depths but the shallow aquifers water is polluted with arsenic. As per WHO study, Arsenic value is common throughout the Bangladesh and is naturally occurring largely due to underlying arsenic rich strata. Shallow water is available easily at depth of 200 ft., however arsenic free water can be obtained at depth of 750 ft. Water quality results for the area has been refereed from Environment & Social Compliance Audit Report Submitted by Summit Bibiyana II Power Company Limited Project for Bibiyana TPP located at app. 700-800 m from the EZ site. Ground water samples are collected from Shallow as well as deep aquifers. Data for ground water quality is given in table 32 below.

Table 32: Ground Water Quality in the Study Area

Parameters	Units	Sample 1-Bibiyana TPP Site	Sample 2-1 kms in North direction from EZ	Sample 3-1.5 kms in NW direction from EZ site	Bangladesh Ground Water Quality Standards
Mercury	mg/l	<0.005	<0.005	<0.005	0.01
Phosphorus	mg/l	5.66	4.03	6.98	6
Calcium	mg/l	6.33	40.05	6.33	6
Total acidity	mg/l	18.2	42.88	15.01	No Standards (NS)
Alkalinity	mg/l	280	361	281	200-500
Total Hardness as $CaCO_3$	mg/l	25.99	193	32	NS
Lead	mg/l	0.012	<0.01	<0.01	0.05
Potassium	mg/l	1.40	7.60	2.06	12
Sodium	mg/l	101	45.01	106	200
DO	mg/l	1.45	1.62	1.21	4.5-8
Temperature	^0C	25	25	26	20-30
TSS	mg/l	6.96	5.76	5.01	10
TDS	mg/l	289	288	293	1000
Cadmium	mg/l	<0.001	<0.001	<0.001	0.005
Chromium	mg/l	<0.01	<0.01	<0.01	NS
Copper	mg/l	<0.01	<0.01	<0.01	1
Zinc	mg/l	0.04	0.03	0.03	5
Nickel	Mg/l	<0.01	<0.01	<0.01	0.1
Boron	mg/l	0.51	1.55	0.17	1
Ammonium Nitrogen	mg/l	10.01	65.03	9.02	50
COD	mg/l	19.4	59.04	12.07	NS
BOD	mg/l	13.0	12.3	6.5	NS
Manganese	mg/l	0.042	0.105	0.033	5
Phosphate	mg/l	20.06	11.18	21.20	NS
Iron	mg/l	1.79	4.45	1.83	2
Arsenic	mg/l	0.057	0.187	0.050	0.05
Chloride	mg/l	1.05	10.03	0.95	150-600

Source: Summit BibiyanaII Power Company Limited Project

All the parameters are well within the prescribed limits except value of Iron. Ground water is potable taken from deep wells. However Arsenic concentration is more than the prescribed limits in shallow wells. Ground water will not be used for development of EZ.

5.8. Land Resources

5.8.1. Archaeological Resources

Khoja Mosque of Laghati village in Dasher Bazar (Baralekha, 16th century), Madhab Mandir located near the Madhabkunda water fall, Rangirkul Viddyashram (established in the first quarter of 19th century, Kulaura upazila), Nawab Bari of Pritthim Pasha (first quarter of 18th century), Khoja Mosque (14th century, Goiyghar), the temple of Agnian Thakur, Nirmmai Shib-Bari (1454), Gaiyebi Eter Masjid at the premises of the tomb of Kazi Khandker (R), Persian manuscripts of Firoz Shah Tuglak's period (1330 AD), statue of Ananta Narayan (11th century, preserved in the Calcutta Museum) are the important archaeological heritage and relics of the Maulvibazar district

5.8.2. Historical Events

A battle between the great Pathan warrior Khawasa Osman and Raja Subidha Narayan was fought in 1595 at Rajnagar. During the Sepoy Revolt, in 1857 some 300 sepoys looted the Chittagong Treasury and took shelter to Gaus Ali Khan, zamindar of Pritthim Pasha. The physiography of the region was seriously changed due to the earthquake of 12 July 1897. In 1921 Deshbandhu Chittaranjan Das, Maulana Hossain Ahmed Madani and Sarojini Naidu attended the Khilafat Conference and inspired people to join the anti-British movement. At that time, Purnendu Kishore Sengupta established the Viddia Aashram at Rangirkul of Kulaura. Beside these, the Nankar Movement in 1931-32 and Haor Karaiya Movement in 1968-69 are noted historical events of Moulvibazar. A movement, known as Vanubal Peasant Movement, led by Panchanan Singh, Kasem Ali, Baikuntha Shawrma and Themba Singh was occurred in 1307 BS. During the War of Liberation in 1971 many sanguinary battles took place at Shamshernagar, Sherpur and other places. Martyr Birsrestha Sipoy Hamidur Rahman was killed at village Aambasa (a border-side village of Kamalganj).

5.8.3. Land Types

Land types are classified depending upon the depth of inundation during monsoon season due to normal flooding in an average year. SRDI has made the land type classification into five types, i.e. High land (Above flood level), Medium highland (Flooding depth 0-90 cm), Medium lowland (Flooding depth 90-180 cm), Lowland (Flooding depth 90-270 cm) and very lowland (Flooding depth >270 cm). Land type classification based on flooding during Monson Season by SRDI is given below in table 33:

Table 33: Land Type Classification

Land Type	Description	Flooding Depth	Flooding Characteristics
F0	Highland	0-30 cm	Non flooded to intermittent
F1	Medium Highland	30-90 cm	Seasonal
F2	Medium Lowland	90-180 cm	Seasonal
F3	Lowland	180-270 cm	Seasonal, but remains wet in early dry season
F4	Very Lowland	> 270 cm	Seasonal but remains wet in most of the dry season

Source: SRDI

The land type characteristics are almost uniform within the study areas. The cultivable land falls in two classes, such as (i) medium lowland where maximum flooding depth is below 180 cm and (ii) low land where maximum flooding depth is below 270 cm during the monsoon period. Part A of the EZ site is classified as medium low land.

5.8.4. Soil Texture

The topsoil at the EZ site is mainly silty clay. According to the sub-soil investigation record of this area (Maulvibazar District, Sylhet Division) the soil profile at shallow/beyond shallow depth is mainly dominated by non-cohesive soil. However, for better understanding a field soil bore log data of a bridge site (bore hole location on the land) in Maulvibazar district is presented here.

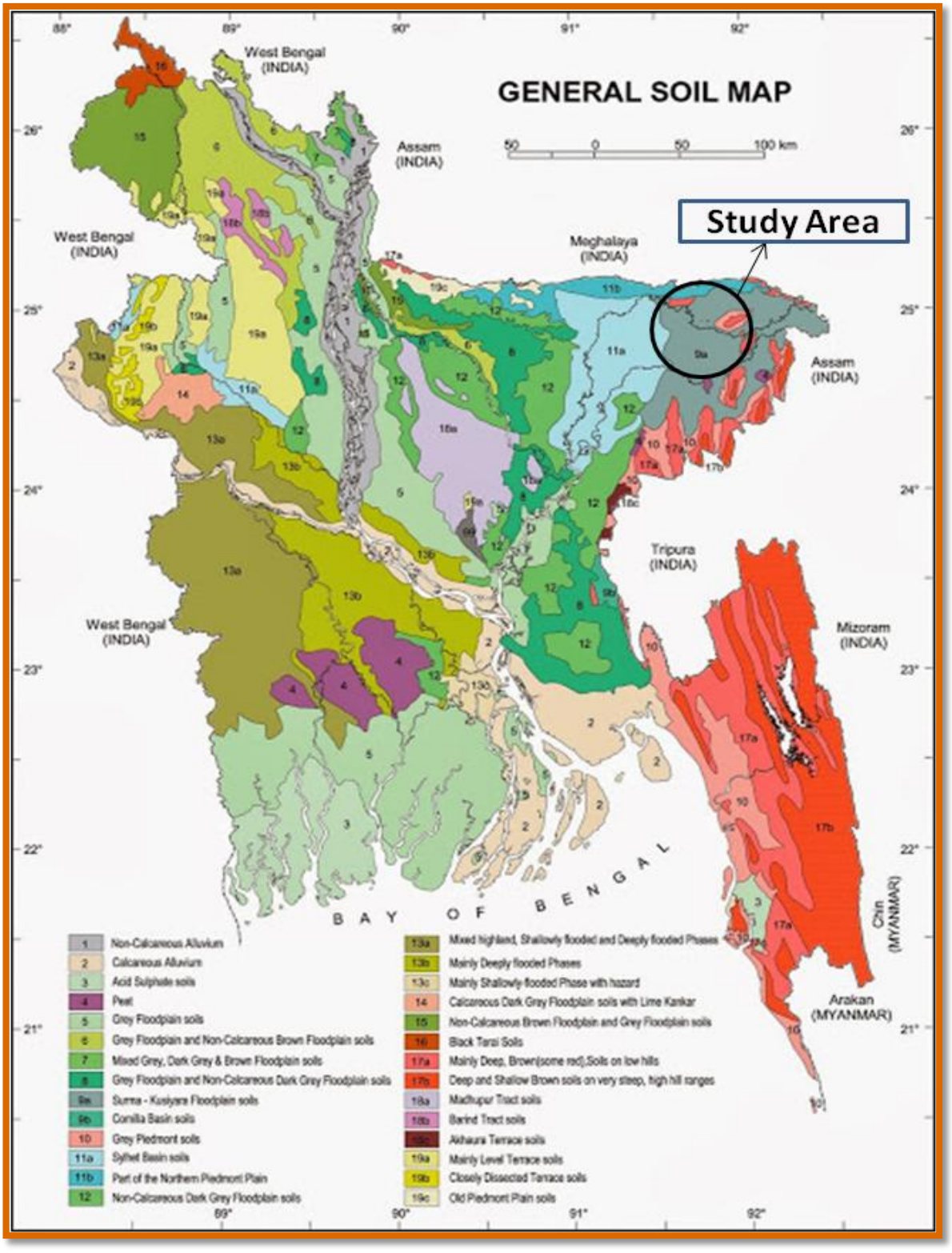
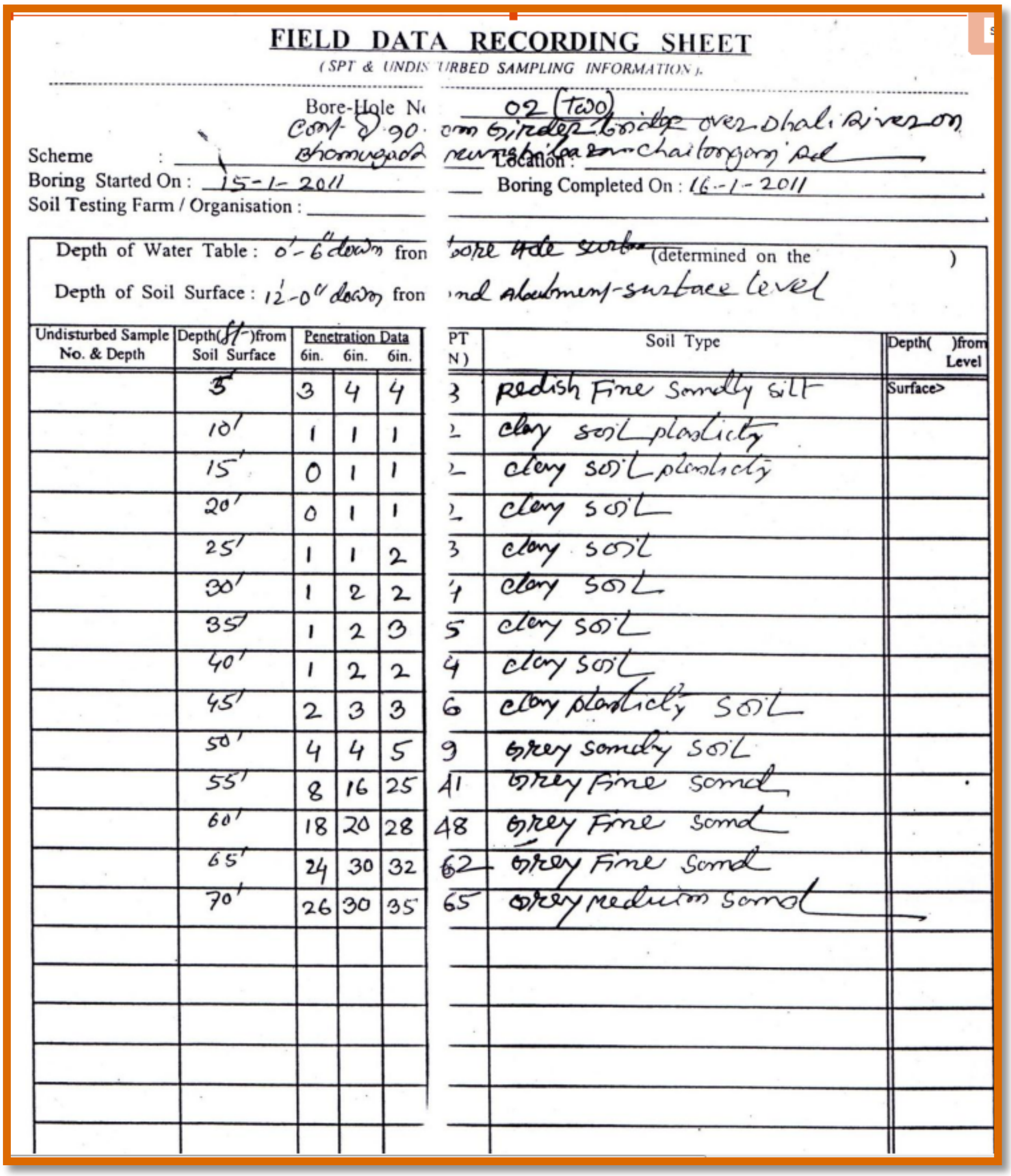


Figure 45: Soil Map of Bangladesh

As per the soil profile study, it is observed that upto depth of 5 feet soil is redish fine sandy silt. Beyond 5 feet upto 40 feet, soil is clay soil. At 45 feet, soil is clay plasticity soil. At 50 feet, soil is grey sandy soil. At 55 feet, 60 feet and 65 feet, the soil is grey fine sand. At 70 feet, soil; type is grey medium sand. Soil investigation report is given in figure 46 below.



FIELD DATA RECORDING SHEET

(SPT & UNDISTURBED SAMPLING INFORMATION).

Bore-Hole No: 02 (Two)

Scheme: Const. of 90 m Girder bridge over Dhali River on Bhomugadh nearest Chailongong Rd

Location:

Boring Started On: 15-1-2011

Boring Completed On: 16-1-2011

Soil Testing Farm / Organisation:

Depth of Water Table: 0'-6" down from bore hole surface (determined on the)

Depth of Soil Surface: 12'-0" down from end abutment-surface level

Undisturbed Sample No. & Depth	Depth(ft)from Soil Surface	Penetration Data 6in.	6in.	6in.	SPT (N)	Soil Type	Depth( )from Level
	5'	3	4	4	8	redish Fine Sandy silt	Surface>
	10'	1	1	1	2	clay soil plasticity	
	15'	0	1	1	2	clay soil plasticity	
	20'	0	1	1	2	clay soil	
	25'	1	1	2	3	clay soil	
	30'	1	2	2	4	clay soil	
	35'	1	2	3	5	clay soil	
	40'	1	2	2	4	clay soil	
	45'	2	3	3	6	clay plasticity soil	
	50'	4	4	5	9	grey sandy soil	
	55'	8	16	25	41	grey Fine sand	
	60'	18	20	28	48	grey Fine sand	
	65'	24	30	32	62	grey Fine sand	
	70'	26	30	35	65	grey medium sand	

Source: Pre Feasibility Study, Sherpur

Figure 46: Bore log data of Bridge Site in Maulvibazar District

5.8.5. Land Use

EZ site is divided into two portions, i.e. Part A & Part B. Part A is agricultural land with few settlements and Part B is water body. Land use land cover study has been carried out for 10 km radius area of EZ site. Maximum area in study area is covered under agriculture land which is 77.9% of the study area. 12.55% of study area is under vegetation followed by water body, settlement and open land. Land Use break-up of study area is given in table 34 & figure 47 below. Land Use Map of 0 km radius area is given in figure 48 below.

Table 34: Land use Details for EZ Site

Land Use Land Cover Class	Area (Sq. km)	Area Percentage (%)
Agricultural land	263.7	77.9
Water body	12.61	3.7
Settlement	4.04	1.2
Open land(Non A.L)	15.58	4.6
Vegetation	42.45	12.6
Total	338.4	100.0

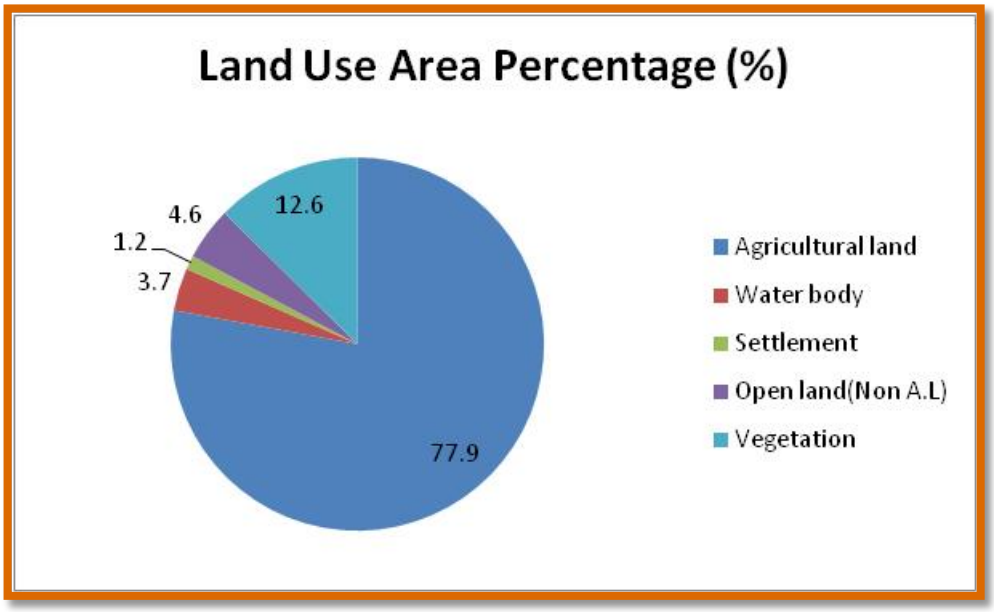


Figure 47: Area Percentage of land Use Class in Study Area

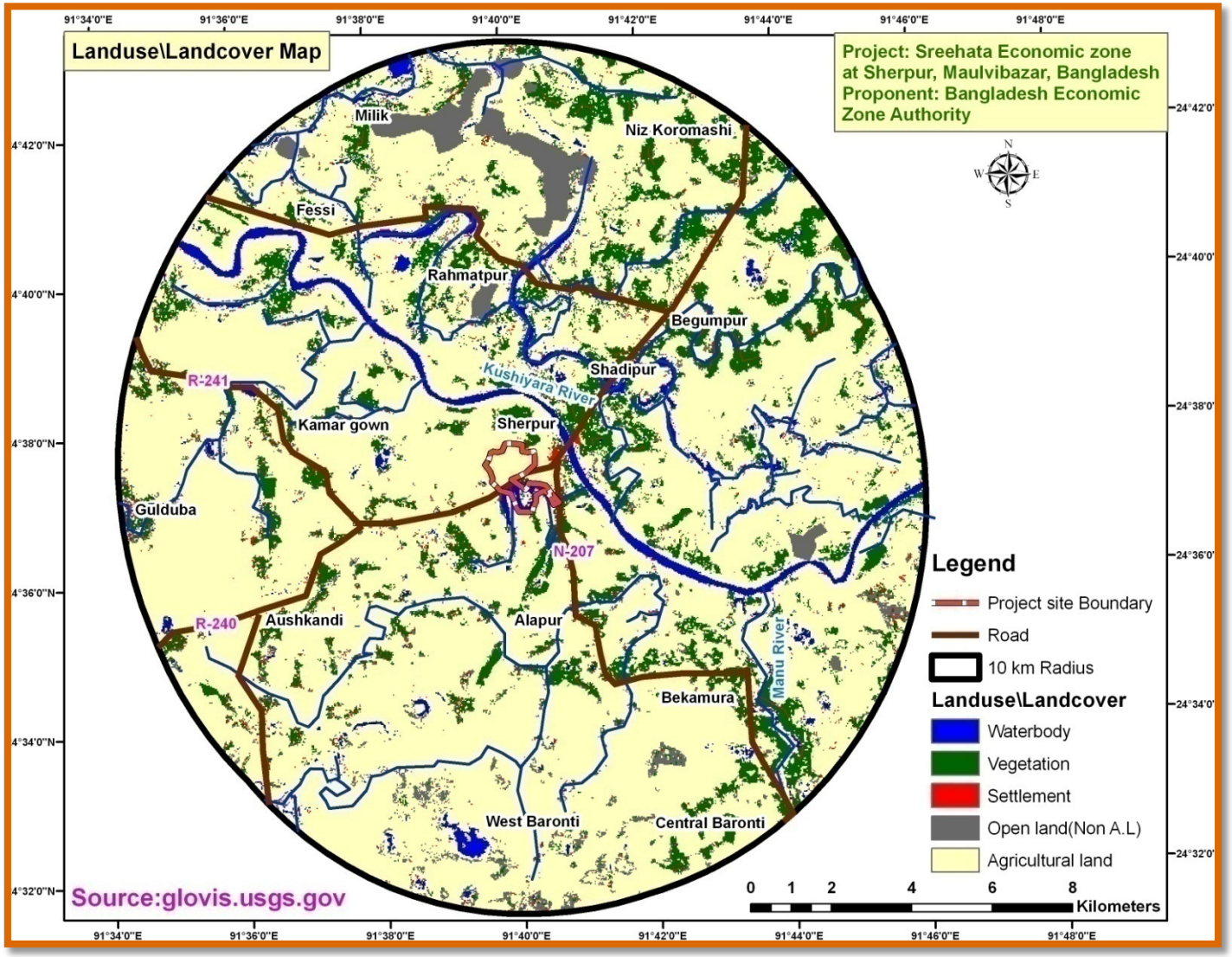


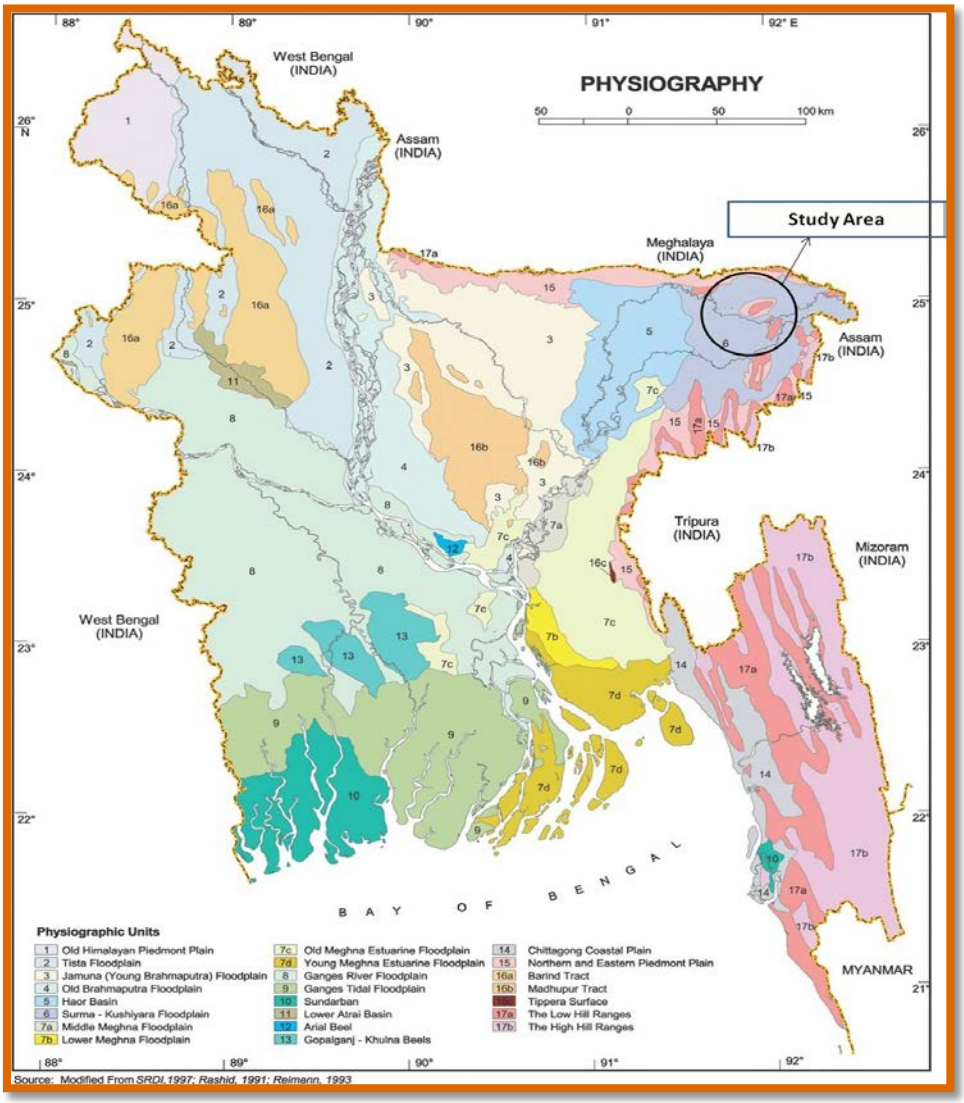
Figure 48: Land Use Map of the Study Area (10 km Radial Zone)

5.8.6. Topography

Bangladesh is the largest deltaic region in the world with most of its parts, at low elevations. It is a riverine country criss-crossed by innumerable rivers, rivulets and their tributaries. It is divided into five physical regions- the Ganges Delta proper to the southwest, the Paradelta to the northeast, and the southeast undulating Chittagong region.

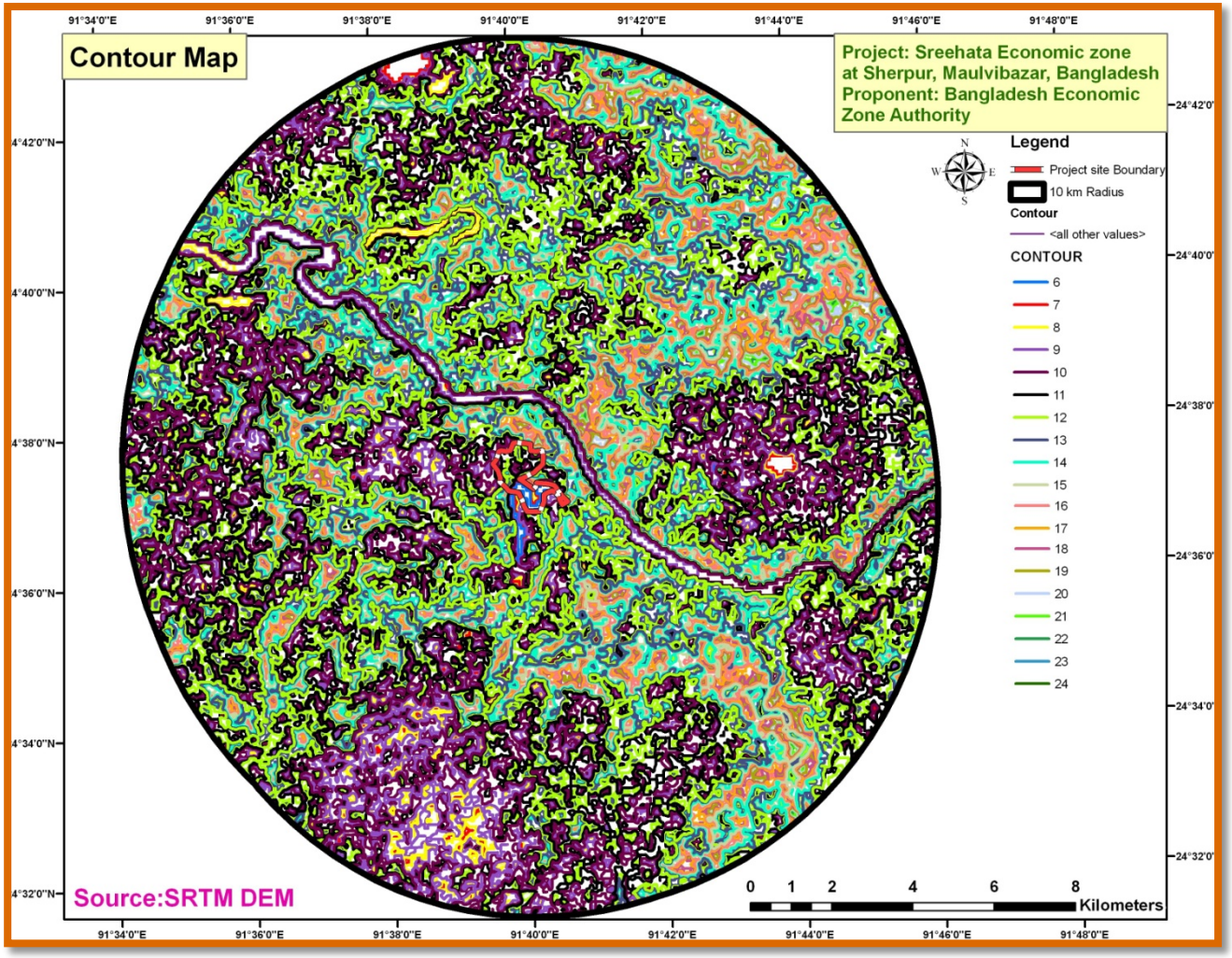
Ganges total flood plains is the tidal landscape has a low ridge and a basin relief crossed by many tidal rivers and creeks. Local differences in height are generally less than 1 m compared with 2-3 m on the Ganges floodplain. As per the physiographic map of Bangladesh the study area falls under the Surma Kushiyara Flood Plains. Physiographic map of Bangladesh is given below in figure 49.

EZ site is divided into part A & B by Dhaka Sylhet Highway. Part A of EZ site is generally flat and the elevation varies from 11-13 m amsl. Level of the land is below the road abutting the site. Site is currently being used for agriculture purpose. It is required to level the land and fill the sand to level of 0.85 m. Part B of the Site is water body locally called as river Gong. Average depth of the water in the water body is 15 ft. The elevation of the land within the 10 km radius area varies from 6 m to 24 m amsl. Contour map of the 10 km radius area is given in figure 50 below.



Source: GSB

Figure 49: Physiographic Map of Bangladesh



Source: SRTM

Figure 50: Contour Map of the 10 km radius of Shreehatta EZ, Sherpur

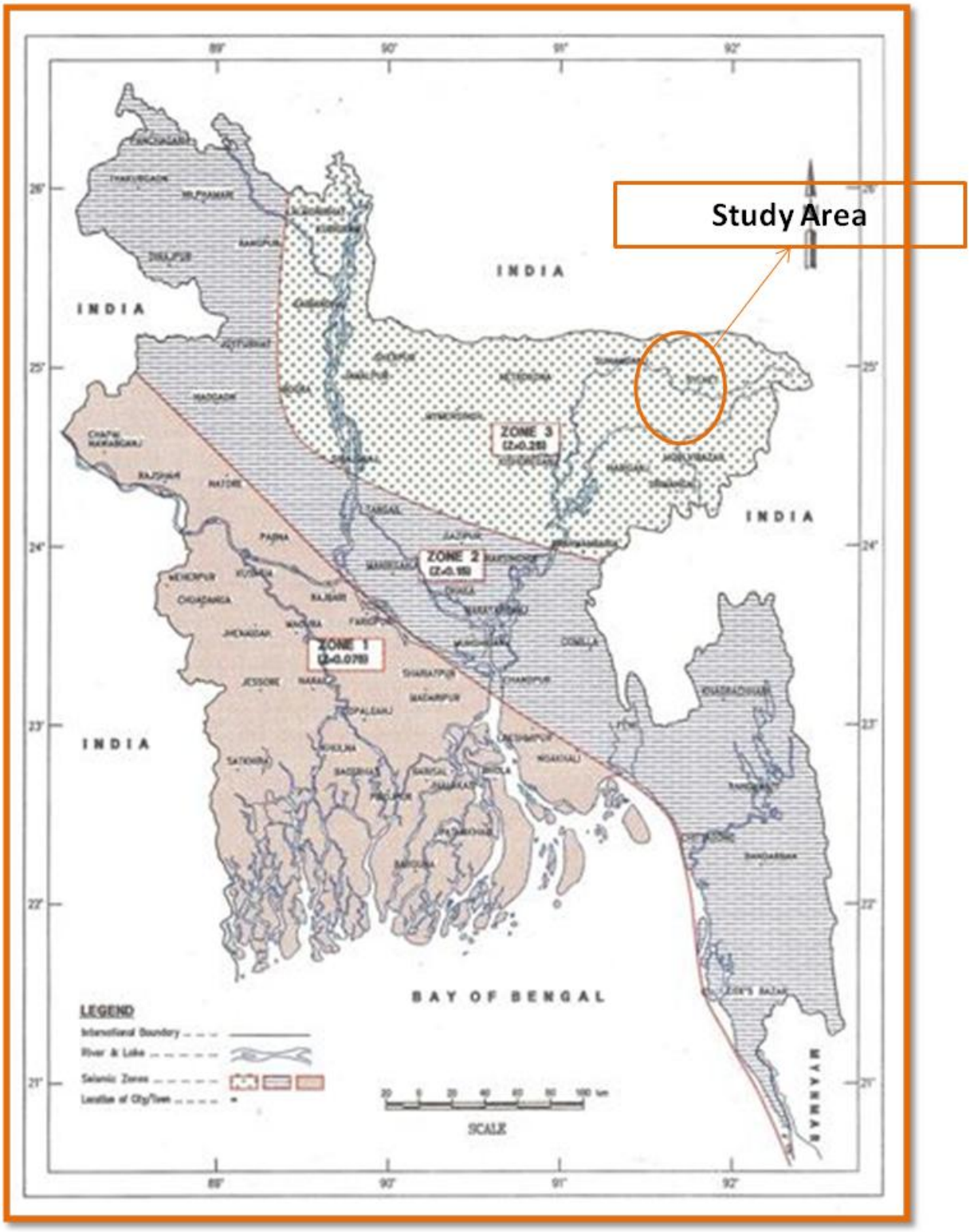
5.8.7. Seismicity

Bangladesh has been divided into three seismic zones. The north-eastern part of Bangladesh is in the most active seismic zone and has experienced earthquakes of moderate to high intensity. The great earthquake of 1897, which had its epicenter in Shilong Plateau in India, caused widespread damage. Two major earthquakes-the Bengal earthquake of 1885 and Sreemangal earthquakes with magnitudes between 7.0 and 8.7 on the Richter scale have been experienced, but they are rare events (Brammer and Khan 1990 cited in A Atiq Rahman et al (1994) v.1,p (166). Seismic zone map of Bangladesh is given in figure 51. List of major earthquakes hit & affected Bangladesh is given in table 35 below. EZ site lies in the seismic zone III which is most active seismic zone. The seismicity of Bangladesh is shown in figure 52 below.

Table 35: List of Major Earthquake Affected Bangladesh

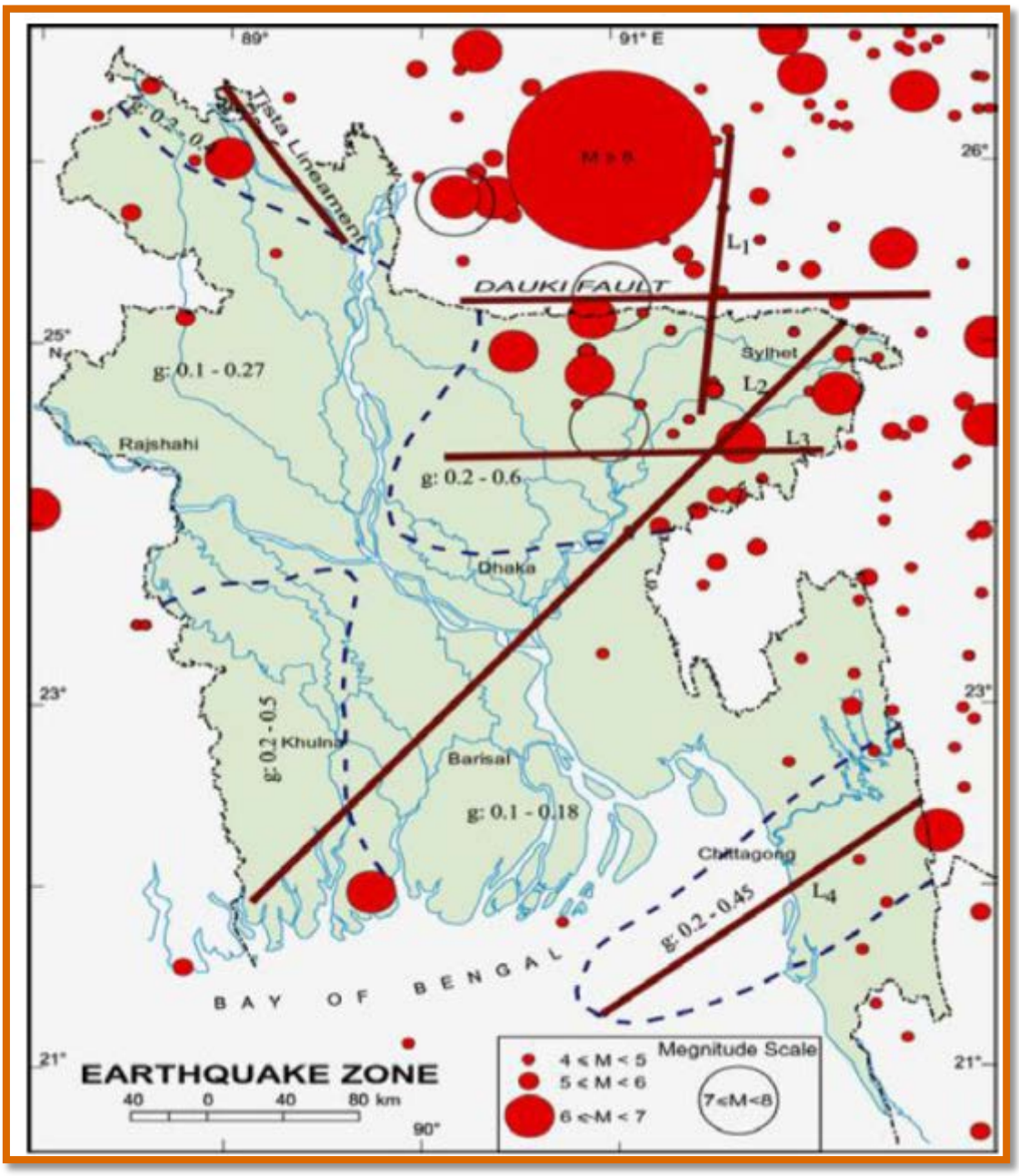
Date	Name	Magnitude (Richter)
10 January, 1869	Cachar Earthquake	7.5
14 July, 1885	Bengal Earthquake	7.0
12 June, 1897	Great Indian Earthquake	8.7
8 July, 1918	Srimongal Earthquake	7.6
2 July, 1930	Dhubri Earthquake	7.1
15 January, 1934	Bihar-Nepal Earthquake	8.3
15 August, 1950	Assam Earthquake	8.5
22 November, 1997	Chittagong Earthquake	6.0
22 July, 1999	Maheshkhali Earthquake	5.2
27 July, 2003	Rangamati Earthquake	5.1

Source: Bangladesh Disaster Knowledge Network



Source: Bangladesh Disaster Knowledge Network

Figure 51: Seismic zone map of Bangladesh (BNBC, 1993)



Source: Bangladesh Disaster Knowledge Network

Figure 52: Seismic Activity of Bangladesh

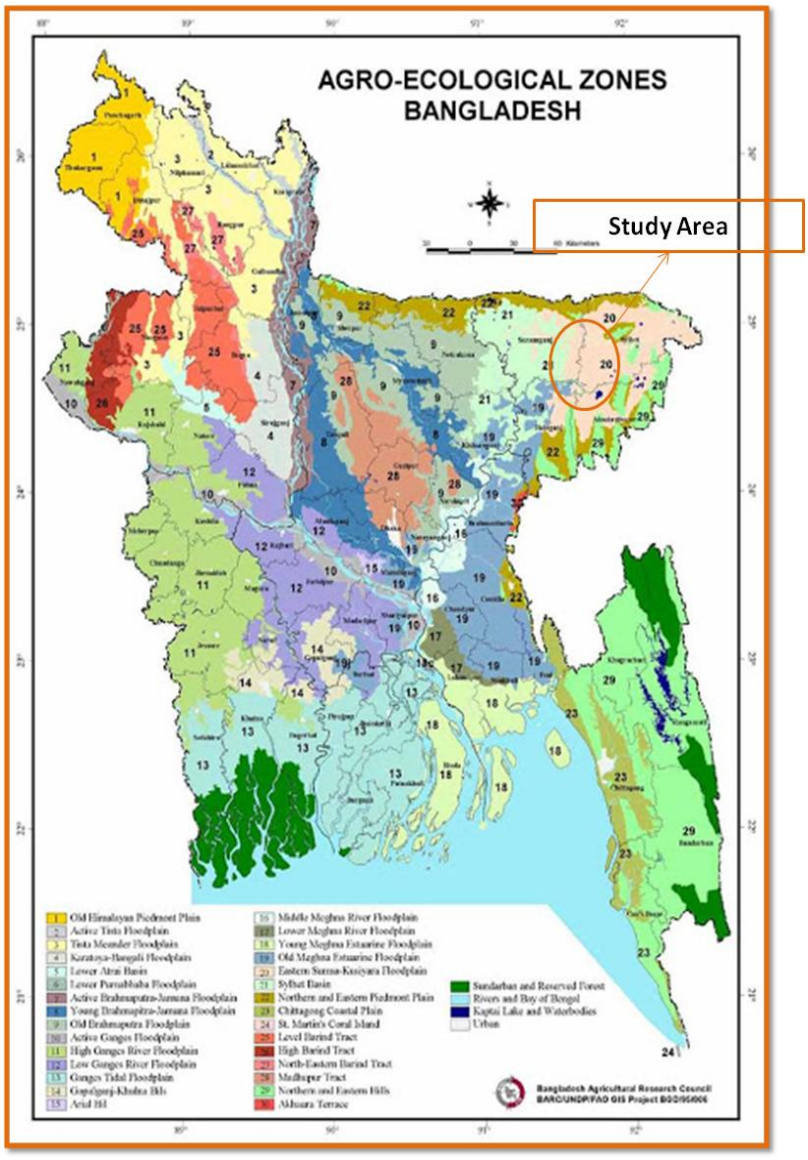
5.9. Agriculture Resources

As per the land use land cover study area 77.9% of the study area is covered under agriculture land use. Part A of EZ site is entirely an agriculture land and part B is water body. Crops grown majorly in the area majorly are paddy and vegetables. The study area comprises of three Agro-ecological regions: i.e Eastern Surma Kushiyara Flood Plains, Old Meghna Estuarine Flood Plain & Sylhet Basin. Majority of study area is under Eastern Surma Kushiyara Flood Plains. Details of the Agro-ecological regions within study area of 10 km radius are given below. Agro-ecological zones map of Bangladesh is given in figure 53 below.

Eastern Surma-Kushiyara Flood Plain; this area is occupied by grey, heavy silty clay loams on the ridges and clays in the basins. Most of the study area remains under this agro ecological region. It occupies mainly smooth, broad, ridges and basins, with 3-6 m local differences in elevation. Organic matter content of the soil is moderate. Soil reaction ranges from strongly acidic to neutral.

Old Meghna Estuarine Flood Plain; Silt loam soils predominate on highlands and silty clay to clay on lowlands. It occupies smooth, almost level, floodplain ridges and shallow basin. Organic matter content of the soils is moderate. Top soils are moderately acidic, but sub soils neutral in reaction. General fertility level is medium.

Sylhet Basin: Soils of the area are grey silty clay loams and clay loam on the higher parts that dry out seasonally and grey clays in the wet basins. It occupies mainly smooth, broad basins with narrow rims of highland along rivers. The difference in elevation between river banks and adjoining basin centers is 3-6 m or more. The soils have a moderate content of organic matter and soil reaction is mainly acidic. Fertility level is medium to high.



Source: FAO, Bangladesh

Figure 53: Agro-economic Zone of Bangladesh

5.9.1. Farming Practice

Agriculture

Farmers practice agriculture in this region for 3 seasons, i.e. Rabi, Kharif I and Kharif II. Source of irrigation in this region are storm water are rain water harvesting ponds, ground water, khals/canal, River Kushiyara & River Monu. Major crops of the region are paddy and other vegetables. Photographs of the agriculture activity in the area are given below in figure 54. Part A of the EZ site is agricultural land and farmers majorly practise Paddy cultivation, grow vegetables and fruits in the area.

Aquaculture:

No aquaculture activity is observed in the study area. However fishing is practised in the region in the river, canal, khals & ponds in the study area. Part B is utilized for carrying out fishing by nearby villagers. 10 fisherman of Sherpur village carry out fishing activity in Part B of EZ site which is water body. This is the only livelihood to these fishermen. Some villagers from Iyanpur also practise fishing in this part of EZ site but for meeting domestic needs. Photographs of fishing boats at Part B of EZ site and in Kushiyara River are given in figure 55.

Agriculture Field in Part A of EZ site

Fishing Boats at Part B (water body) of EZ Site

Boats in Kushiyara River

Figure 54: Photographs Showing Agriculture Fields and Aquaculture Ponds

5.9.2. Cropping Pattern and Intensity

Main cropping pattern of the study area is Fallow - T Aman - Boro. This cropping pattern covers study area majorly. Another cropping pattern is T Aus - T Aman – Fallow. In Kharif-I season T. Aus (HYV) is grown in the study area. Aus like BR-20, BR-21 and BR-27 are practiced in most of the lands.

In Kharif-II season farmers mainly cultivate T. Aman (Local). Some of the farmers grow high yielding variety T. Aman rice. Among the high yielding varieties of T. Aman are Br-6, Br-11, Br-22 are mostly practiced. Jute is also grown in the area. In Rabi season, high yielding variety of Boro is grown in the study area. In some places vegetables and other Rabi crops are also grown. Cropping pattern of the study area is given in table 36 below.

In the project site main cropping pattern is Fallow - T. Aman – Boro. Another cropping pattern followed at site is Fallow - T. Aman – winter vegetables. In the project area, the Kharif-1 season remains fallow. In the Kharif-2 season, Local T. Aman is cultivated all over the cultivable land and in Rabi season, HYV Boro and vegetables are grown.

Table 36: Cropping Seasons in Area

S. No.	Cropping Season	Major Crops	Months
1.	Kharif-I	Local T Aman, Fallowm Jute & HYV T. Aus	March to June
2.	Kharif-II	Local T Aman, Jute & HYV T. Aman	July to October
3.	Rabi Season	HYV Boro, Fallow, HYV Boro & Winter vegetables	November to February

Source: FAO, Bangladesh

Crop Calendar

Deatailed crop calander for the area is given below in table 37 below. It is observed that the raising of seedlings generally starts in early July and end in early August and transplanting starts in mid August and continues up to September depending on rainfall. Sowing of transplanted Aus generally stats from late March and continues till late April. HYV Boro crops are transplanted during late December to late January. The seeds of water melon/Bangi are generally sown in December–January just after recession of water from the field. Local T. Aman crops are harvested during December to January whereas the harvesting of Aus rice generally done during Mid July to Mid August. Some vegetables are very sensitive to temperature. Therefore, the time of sowing and harvesting of vegetables also vary.

Table 37: Cropping Seasons in Area

Crop	Seedling		Transplanting/Sowing		Harvesting	
	Start	End	Start	End	Start	End
Local T Aman	Mid Jul	Mid Aug	Late Aug	Late Sep	Late Dec	Mid-Jan
HYV T. Aman	Early July	Early Aug	Early Aug	Mid Sep	Early Dec	Late Dec
T. Aus	-	-	Late March	Late Apr	Mid July	Mid Aug
HYV Boro	Mid-Nov	Mid Dec	Late Dec	Late Jan	Late Apr	Lae May
Rabi Vegetables	Early Nov	Dec	Nov	Dec	Jan	May
Jute	-	-	Late March	Apr	Late Jul	Mid Aug

Source: FAO, Bangladesh

5.9.3. Cropped Area

As per the land use land cover study of 10 km radius of the project site, approx. 77.9% of the study area is covered under agriculture land. Total site area is 143 ha. Site is divided into two parts, i.e. part A & part B. Part A is agricultural land which measures 88 ha. This agricultural land will be used for development of EZ. Whole of 88 ha of land is under agriculture with some settlements. Cropping pattern of the project site is discussed in section above.

5.9.4. Crop Production, Damage and Constraints of Crop Production

Major agricultural production of the study area comes from the rice crops. Major crops of the study area are Boro, T. Aman and T. Aus. Non rice crops in the study area is Jute and vegetables. Part B which is to be developed as economic zone is agricultural land. It measures 88 ha and whole of it will be converted into economic zone. Presently cultivation is taking place at the site. Crop damage is reported to occur in study area in case of low rains and attack of pathogens, insects & pests. Some of the insects which attach crops are stem, borer, rice hispa, brown plant hopper, leaf folder, rice stink bug etc.

However farmers use fertilizers to increase the fertility of soil and pesticides to control attack of pests. The major fertilizers used in this area are Urea, TSP and MP. Some of the pesticides used by farmers are Basudin, Dastban, Diazinon, Raison, Sobicron, Tilt etc.

5.10. Livestock and Poultry

Livestock and poultry, being an essential sector of integrated farming system, play an important role in the economy of the study area. Livestock provide significant draft power for cultivation, threshing and crushing of oil seeds. Cow dung is used as a source of manure and fuel. Meat, milk and eggs are used for human consumption and a ready source of funds. Most of the households raise poultry and livestock, a practice that significantly reduce the poverty by generating employment and income.

Figure 55: Photographs Showing Livestock & Polutry in the area

5.10.1. Feed and Fodder Shortage

The owners of the livestock population are facing problems in respect of availability of fodder and feeds during the month December to April due to dried up grazing land. Shortage of grazing area throughout the year aggravates the feed problem to the animal population. Poultry population at family level survives by scavenging and generally no feed supplements are provided. However, at times kitchen waste becomes feed to the poultry.

5.10.2. Livestock/Poultry Diseases

Productions of livestock and poultry are mainly constrained due to diseases and death of the population. Outbreak of disease is causing a considerable economic loss in livestock farming. Every year livestock population is affected by different diseases like feet and mouth disease (FMD), Anthrax, Diarrhoea, PPR, etc. The got/cyst in head is common disease of goat. Major poultry diseases are Duck Plague, Paralysis, New Castle, Fowl pox, and Dysentery etc. The most vulnerable period is between July to October (rainy season) month for spreading diseases to livestock and poultry populations. The duck plague generally occurs in summer. However, some diseases are found round the year. During monsoon season, the soggy condition of the animal shelter promotes various kinds of diseases to the bullocks and cows. Moreover, the unhygienic condition of the courtyards during this season may increase the diseases to the poultry birds.

5.11. Fisheries

5.11.1. Introduction

Fisheries resources of the study area are rich and diversified. Study area consists of rivers, aquaculture ponds, beels and Khals. Details of the fisheries of the study are is given in sections below

5.11.2. Habitat Description

Fish habitats of the area are creeks, Khal, rivers, aquaculture ponds, floodplains and beels. All the water bodies in the area are fresh water bodies. Major water bodies in the study area are River Kushiyara, River Monu, River Gong (Part B of EZ site), Bagber beel, Kunwar beel, Mathak beel, Kantbri beel, Kery beel and Hauka beel. Commercial fish culture is also practised in the study area. Fish habitats observed in the study area during site visits are shown below in figure 56 Fishermen of village Sherpur & Iyanpur practise fishing in the River Gong.

Part B of Site (River Gong)

Kushiyara River

Bagber Beel

Figure 56: Photographs Showing Fish Habitats in Study Area

5.11.3. Fish Biodiversity, Production & Effort

Large varieties of indigenous fishes including carps and many smaller species are available in the district. Fish is an essential staple and plays a very important role in the economy of the area particularly of the haor area. In the fresh water the popular species are rui (*labeo rohita*), katal (*Catla catla*), mrigel (*Cirrhinus mrigala*), kalabous (*Labeo calbasu*), airh (*Mystur aor*), ghania (*Labeo gonius*), snail (*Channa stinsus*), boal (*wallagonia attu*), gajar (*Channa marulius*), gulsha (*Mystus bleekeri*), koi (*Anabas testudineus*), shing (*Heteropneustes fossilis*) and magur (Clarias batrachus) etc.

Fish production recorded in year 2010-2011 in the Maulvibazar Sadar Upzila is 2973 MT. Fishing is practised by fishermen in the area for meeting their daily requirement and for commercial purpose. Fishing is practised by Fishermen of village Sherpur & Iyanpur within the project site in Part B of the EZ site. Fishermen use various types of gears viz. seine net, cast net, lift net, push net, pull net, gillnet, etc for catching fish.

Major riverine species in the study area are Rui (*Labeo rohita*), Kalibaus (*Labeo calbasu*), Ghonia (*Labeo gonius),* Bhangon bata (*Labeo bata*), Tatkini (*Cirrhinus reba*), Pabda (*Ompok spp.*), Tit punti (*P. ticto*), Rani (*Botia Dario*), Tara baim (*Macrognothus aculeatus*), Boro baim (*Mastacembelus armatus*), Batasi (*Pseudeutropius atherinodes*), Golsha (*Mystus cavasius*), Narkali chela (*Salmostoma bacaila*), Kaski (*Corica soborna*), Shilong (*Silonia silonia*), Chapila (*Gudusia chapra*), Tengra (*Mystus tengara*), Boal (*Wallago attu*), Ayer (*Sperata aor*), Kajoli (*Ailia punctata*), Ghero (*Clupisoma garua*), Rita (*Rita rita*), Chital (*Notopterus chitala*), Kaikya (*Xenontedon cancila*), Chanda (*Chanda nama*), Bele (*Glossogobius giuris*), Golda chingri (*Macrobrachium rosenbergii*), Gura chingri (*Leander styliferus*), etc.

The main floodplain and beel fish species include: Meni (*Nandus nandus*), Shol (*Channa striatus*), Taki (*C. punctatus*), Punti (*Puntius spp.*), Shingi (*Heteropneustes fossilis*), Magur (*Clarias batrachus*), Bujuri tengra (*Mystus vitatus*), Foli (*Notopterus notopterus*), Guchi baim (*Mastacembelus pancalus*), Kolisha/chopra (*Colisa fasciatus*), Boicha (*C. lalia*), Boal (*Wallago attu*), Koi (*Anabas testudineus*), Rui (*L. rohita*), Katol (*Catla catla*), Gura chingri (*Leander styliferus*), etc.

Pond fish species include: Rui (*Labeo rohita*), Kalibaus (*Labeo calbasu*), Mrigel (*Cirrhina mrigala*), Silver carp (*Hypophthalmichthyes molitrix*), Grass carp (*Ctenopharyngodon idela*), Common carp (*Cyprinus carpio*), Thai pangus (*Pangasius sutchi*), Tilapia (*Tilapia mossambicus*), Nilotica (*Tilapia nilotica*), Sharpunti (*Puntius sarana*), etc.

Rarely available fish species of the study area include: Rani, Tara baim, Baghayer, Shilong, Potka, Kanpona, Cheka, Sisor (Chenua), Chebli, Kajoli, Napitkoi, Nephtani, Chital, etc.

5.11.4. Fish Migration

Rivers of the study area such as Kushiyara, Barak, Buri, etc function as longitudinal fish migration for a number of fish species of which dominants are Rui, Katol, Mrigel, Kalibaus, Golda chingri, Baghayeer, Boal, Ghonia, etc. A number of khals, mostly seasonal in nature, connects the floodplains and beels to the rivers act as major arteries of lateral fish migration of river and beel breeders into the study area. The fish species (Punti, Tengra, Boal, Rui, etc.) migrate through open khals and channels (such as Mathakhai, etc.) between beels and rivers (Kushiyara, Buri and Manu) during the period of late May to August. Perennial beels such as Beri beel, Kery beel, Kantari beel, Chepti beel, Haila beel, Chamua beel, Kumra beel, Hijli beel, Pharwadda beel, etc are used as feeding and nursing ground of most of the open water fishes during dry season. Many fish species migrate horizontally to these water bodies as part of their life cycle. Fish migration is usually restored during pre-monsoon to some extent and largely during peak monsoon. Overall fish migration status is moderate in the study area.

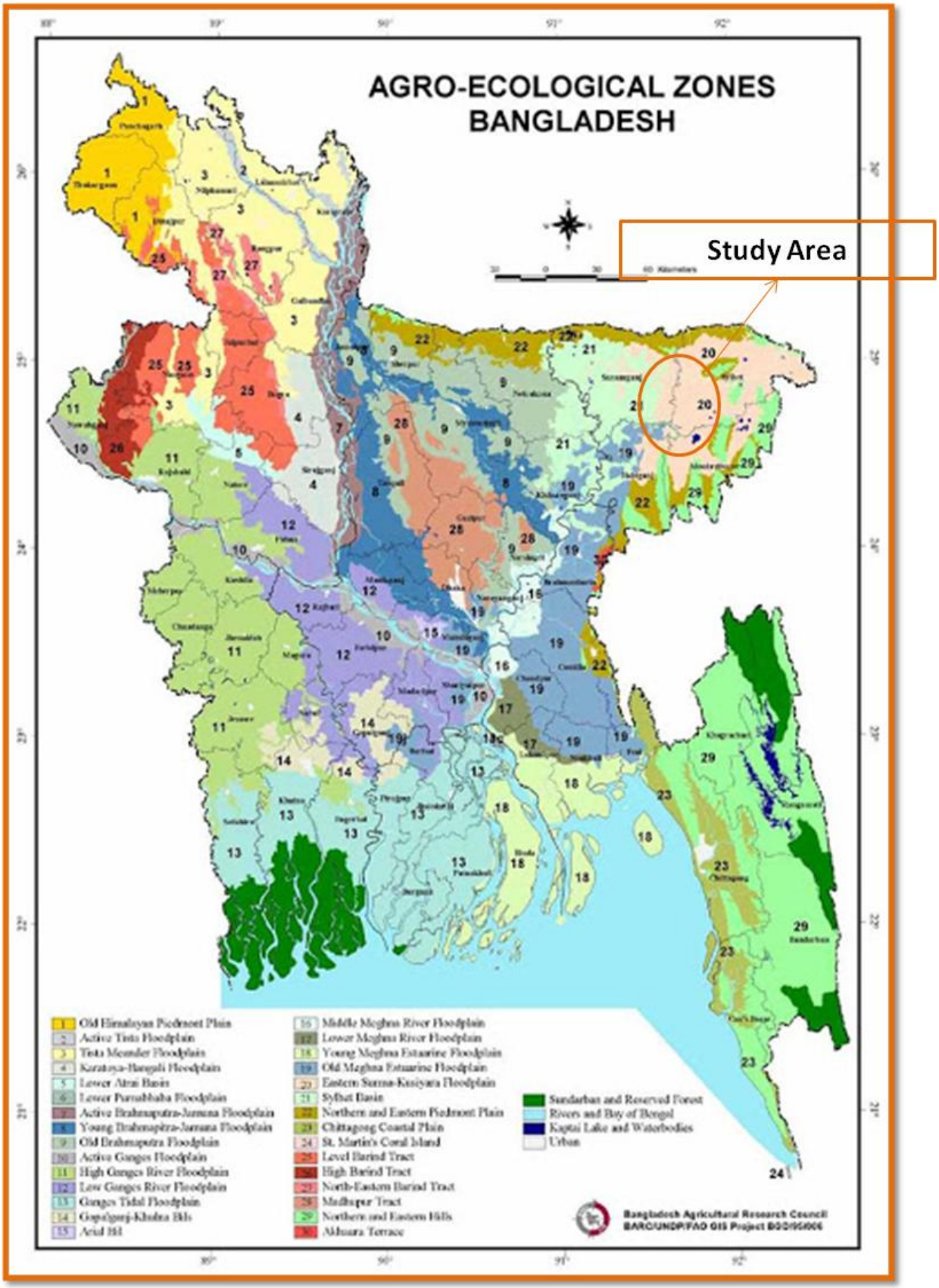
5.11.5. Fisheries Management, Problem and Issues

The project development will not hamper the fishing activity in the study area. Part B of the EZ site which is a water body will be retained in its existing state. Fishermen of village Sherpur & Iyanpur will continue to practice fishing in these water bodies. Consultation is carried out with fishermen regarding development of EZ. They do not have any objection with the project, if the water body is retained.

5.12. Ecological Resources

5.12.1. Bio-ecological zone

As per BARC (Bangladesh Agriculture Research Council), study area falls in Surma Kishiyara Floodplain & Sylhet Basin. Map showing the bio-ecological zones of Bangladesh is given below in figure 57.



Source: BARC

Figure 57: Bio-Ecological Zones of Bangladesh

5.12.2. Core Zone –Ecological assessment

Flora & Fauna of Economic zone site:

The ecosystem of the EZ site is both terrestrial and aquatic. EZ site is divided into two parts, i.e. Part A & Part B. Part A is agricultural land. Part A is covered under agriculture, settlements and plantation. Part B is water body. Part B is covered by water hyacinth. Details of flora & Fauna observed are given below

Part A of the EZ site is majorly agriculture land with few settlements and plantation area. Majorly irrigated crop in the EZ site is rice. T. Aman & T. Boro are grown majorly at the EZ site. Various trees planted in the EZ site are coconuts, banana, papaya, castor, palm, bamboo, hibiscus, Rongi, Rain tree, Aam, Supari, Sisoo, Mahagony, Sirish, Badd etc. Details of nos and type of trees to be cut for development of Sreehata EZ zone are given in Table 38.

Table 38 : Details of Trees & Plants to Cut

Types of Tree	Small	Medium	Large
Fruit bearing	**0**	**1146**	**1409**
Non fruit bearing	**0**	**615**	**1254**

Settlements in the study area had poultry and cattle. Cattle and poultry in the study area observed were hen, cow, goats, ducks etc. People also tame pigeons & doves. Birds observed during the visit on the site are black drongo, king fisher, parrots, egret, Bagula, Paani kaui, crows, gauraiya, dove, pigeons, pond hiron

Part B of the project site is water body (River Gong). Water body was majorly covered by water hyacinth. Major fishes found in the study are Rui, Catla, Cheetal, Vaal, Kangla, Karfu, Mirka, Mrigal, Safila, Mokha, Tengada, Aaiyr, Seeng, Magur, Pabda, Pooti, Shoyal etc. as per discussion with fishermen of nearby villages. Photographs of flora & fauna observed at site is given in figure 58 below. Fishermen of Sherpur village earn 2000-5000 BDT per week by selling fishes caught from this water body

Water Hyacinth on Water Body at Part B of EZ site






Flora in Part B of EZ Site




Fauna within EZ site

Figure 58: Photographs Showing Flora & Fauna at EZ Site

5.12.3. Buffer Zone: Ecological Assessment

Terrestrial flora & fauna of Study Area

Study area is majorly agricultural land followed by vegetation and open land. There is no ecologically critical area within the study area. Major crops in the study area are Rice, vegetables & fruits. Fruits grown in area are mango, pineapples, black berry, jack fruits, banana, papaya, cocnut, orange, dates, lichi, water melon, guava, bel, palmyra palm etc. Major trees in the study area are *Legerstroemia speciosa, Inamonum glauduliforum, Sida acuta, Dysoxyhni bineectrariferum, Cerdrela toona, Bombax ceiba, Mangifera indica* etc.

Populations of mammals are low and no wild fauna is observed in the study area. Small mammals such as fishing cat (*Falis viverrina*), Jungle cat (*Falis chaus*), Bengal fox (*Vulp bengalensis*), Common mongoose (*Herpestes edwardsi*) and bats are major species. The common lizards found within the project include the common skunk (*Mabuya carinata*) and the garden lizard (*Calotes versicolor*)

Birds found in the study area are Asian pied starling *(Sturnus contra)*, Common Mynah *(Acridotheres tristis)*, Bank myna *(Acridotheres Iginginianus)*, Black Drongo *(Dicrurus macrocercus)*, Asian Kukoo *(Eudynamys scolopacca)*, Red-vented Bulbul *(Pycnonotus cafer)*, Spotted Dove *(Streptopelia chinensis)*, Jungle Babbler *(Tordoides striatus)*, Oriental Magpie Robin *(Copsychus saularis)*, House sparrow *(Passer domesticus)*, Black-hooded Oriole *(Oriolus xanthornus)*, House Crow (Corvus splendens), etc.

Aquatic Flora & Fauna of Study Area

No major flora was observed along the bank of River Kushiyara. Herb found along the bank of River Kushiyara is *Rumex maritimus*. Birds found along the river banks are Bhraminy kite & Pied Kingfisher. Some of the hydrophytes found in beels are water hyacinth, water lettuce, water fern, Enhydra etc. Water birds like pond heron & little cormorant are found in the river.

5.12.4. Ecosystem Service and Function

Project is proposed to be developed on 143 ha of the land out of which 88 ha is private agricultural land and remaining is a water body locally called as Gong. No notified ecological critical area is present within the study area. Thus due to project development no eco-sensitive zone will be disturbed. There is no major development at the project site but development of economic zone will bring the paved and sealed area. Development of economic zone which will lead to coming up of industries and then inturn pollution level of the area may increase. However environment management plan is proposed for the project which will control the pollution levels in the study area.

To prevent the ecosystem of the waterbody, i.e.part B of the EZ site, it is proposed to restore the water body in its existing condition and will not disturb the hydrology of the water body and drainage of the area which drains in this water body. Ecosystem services of the water body, i.e. habitat to its resident aquatic life, livelihood to dependant fishermen, and drainage of storm water from upstream area and prevention of flooding will be continued like existing conditions and will not be hampered.

Agricultural land is mostly cultivated and have few trees planted on it. Ecosystem services of the agricultural land are the crops, fruits, vegetables, ground water recharge, habitat to birds & insects etc. This land will be converted into industrial area thereby changing the land use of the site, increasing run-off generation, loss of livelihood of dependant population and loss of habitat of avifauna, small mammals and insects residing in the area. However large area of land in surrounding area is agricultural land thus change of 88 ha of land will not be significant impact and the area required industrial development development of the people living in the area. Development of project will modify the services of the area as industrial area and will generate the employment, will attract infrastructural developments in nearby area and will thus help in improving the quality of life of the people residing in the area.

But industries like ceramics, integrated textile, pharmaceuticals, food processing & paint are proposed to be come up in the proposed economic zone by JDI on basis of pre-feasibility study carried out for the project and have potential to harm environment in one or other way. Raw material requirement of these industries will exert pressure on existing resources of the area thus disturbing the ecosystem of the area. However an intensive environment management and monitoring plan is proposed for the project which will help in checking the pollution levels and harm to the environment will be minimal. Development of project will provide employment to the people. Large population of affected villages and nearby area is unemployed or marginally employed. Development of industries will attract infrastructural development in the area and other ancillary developments. These developments will again generate employment indirectly. Also the infrastructural development may include development of good roads, water supply system, drainage system, power supply system, gas pipelines etc which will be beneficial for the society. Also a thick green belt is proposed to be developed all around the project site of minimum width 10 m which will help in improving the ecology and aesthetic of area by attracting avifauna, small insects and mammals and providing them habitat. This green belt will act as noise buffer, settling surface for dust which may generate in the EZ and absorber of the other pollutant gases. This green belt will thus help in abating the negating impacts of the EZ and improving the environment and minimizing impact on ecosystem.

5.13. Socio Economic

5.13.1. Socio Economic Condition

Shreehatta Economic Zone covers the total area of 143 ha out of which 88 ha is agricultural land (Part A) and 55 ha (Part B) is water body called as River Gong by locals. The site is located in Sherpur & Bamongaon Mouza of Maulvibazar District, Bangladesh. Site is along the Dhaka Sylhet Highway. At present only part A will be developed and water body in part B will be retained. EZ site falls in the four villages namely Bamongaon, Iyanpur, Sherpur and Muzlishpur. Other surrounding villages of the EZ site are Bhawanipur, Rudrapur and Aujirpur.

Study area of 10 km radius around the EZ site covers the Upzilas Nabiganj of District Habiganj, Rajnagar, & Maulvibazar Sadar of Maulvibazar upazila, District Maulvibazar, Jagannathpur of District Sunamganj and Balaganj of District Sylhet. A detailed Socio-economic impact assessment study of the EZ site and study area is carried out to understand the socio-economy and impact of the project on the socio-economy component.

5.13.2. Demographic Profile

Project site falls under the Maulvibazar sadar upazila of District Maulvibazar. Demographic profile of the Maulvibazar sadar upazila and District Maulvibazar is discussed in this section. As per the Census, 2011, population of Maulvibazar sadar Upzila is 3,42468, out of which 1,71,678 are male and 1,70,790 are female. Population of Maulvibazar during Census 2001 was 2,81,593 and during 1991 was 2,39,378. Increase in population from 1991 to 2011 is observed, which may be due to the agriculture and fisheries production and less prone to natural disasters occur in Bangladesh. Density of the Maulvibazar sadar upzila is 995 person/sq km. Average household size of the Maulvibazar sadar Upzila is 5.41 as per 2011 census. Sex ratio in the area is 101 which shows that male and female population is almost equivalent. Demographic profile of Maulvibazar sadar Upzila & Maulvibazar District is given in table 39 below.

Table 39: Demographic profile of Maulvibazar Upazila & Maulvibazar District

Items	Zila		Upazila	
	2011	2001	2011	2001
Population (Enumerated)				
Both Sex	19,19,062	16,12,374	3,42,468	2,81,593
Male	9,44,728	8,20,686	1,71,678	1,45,151
Female	9,74,334	7,91,688	1,70,790	1,36,442
Urban	1,44,843	94,525	56,537	40,107
Other Urban	63,236	50,776	0	0
Rural	17,10,983	14,67,073	2,85,931	2,41,486
Annual growth rate	1.73	1.59	1.95	1.64
Sex Ratio				
Total	97	104	101	106
Urban	105	117	110	124
Other Urban	98	106	0	0
Rural	96	103	99	104
Households (HH)				
Total	3,61,177	2,92,889	62,881	49,832
Urban	28,151	18,314	10,840	7,522
Other Urban	12,104	9,217	0	0
Rural	3,20,922	2,65,358	52,041	42,310
Average HH Size				
Total	5.30	5.51	5.41	5.65
Urban	5.07	5.15	5.11	5.33
Other Urban	5.21	5.53	0	0
Rural	5.32	5.53	5.47	5.7
Area sq. km	2799.38	2799.37	344.32	344.32
Area sq. mile	1080.84	1080.85	132.94	132.94
Density per sq. km	686	576	995	818
Density per sq. mile	1776	1492	2576	2118
Urbanization (%)	10.84	9.01	16.51	14.24
Literacy (%)				
Both Sex	51.1	42.1	54.9	48.6
Male	52.7	45.6	56.4	51
Female	49.5	38.4	53.5	46.1
School Attendance (5 to 24 years) (%)				
Both Sex	50.0	37.3	49.5	38.3
Male	50.1	38.1	50.1	39.1
Female	49.9	36.5	48.9	37.5
Population (Adjusted)				
Both Sex	19,94,252	16,86,366	3,56,303	2,94,887
Male	9,81,783	8,58,382	1,78,632	1,52,023
Female	10,12,469	8,27,984	1,77,671	1,42,864
Geographic Unit				
Upazila/Thana	7	6	-	-
Union	67	66	12	12
Mauza	899	876	196	192
Village	2,015	2,018	429	434
Paurashava	5	4	1	1
Paura Ward	45	36	9	9
Paura Mahalla	151	122	48	47

5.13.3. Ethnicity and Religion

According to census 2011, of the total population of Maulvibazar Upazila, i.e. 289017 are Muslim, 52955 are Hindu, 275 are Christian, 50 are Buddhist and 171 people belong to other religion. There are 780 mosques, 79 Eid-Gah, 38 temples & 1 Church in Maulvibazar Sadar Upzila.

Direct project affected villages are Sherpur, Iyanpur, Bamangaon and Mujlishpur. Religion data of the affected villages is given in the table 40 below.

Table 40: Religious structures of direct project affected villages

S. No.	Villages	No. of HH	Hindu	Muslim	Others	No. of temple	No. of Mosque
1.	Sherpur	15	100%	-	-	-	1
2.	Iyanpur	100	97%	3%	-	5-temple & 3 ashram	1
3.	Bamongaon	700	99%	-	1%	8	2
4.	Mujlishpur	50	100%	-	-	1	-

Three ethnic minorities (indigenous groups/tribes) of the district are Manipuri, Khasia. Tripura, Manipuri, Khasia, Tripura, Halam of this group have their own languages are the main ethnic groups found in this district.

5.13.4. Quality of life Indicators

Quality of life of the people at any location can be defined by few parameters and are given below.

Occupation, Employment Opportunity and Availability of Manpower

Major occupation of the people in the study area and at the EZ site is agriculture, fishing, small business and driver. Large nos. of people in the study area are unemployed. Employed people are working on an average 4-5 hours a day. Female are largely unemployed and are involved in household works.

Education

Educational status of the Maulvibazar Sadar Upzila

Literacy rate of the Maulvibazar Sadar Upzila is 54.9% which is relatively low. Huge nos. of student quit after completing their primary education as the high and secondary schools are located at far-off locations in unions, towns and cities. School attendance in Maulvibazar Sadar Upzila is 49%.

Educational institutions in Maulvi Bazar Upzila

The total numbers of educational institutions are Government Primary school (class I-V) 166, Registered Primary school 22, Kindergarten school 61, NGOs school 36 Government Secondary school 2, Non Government Secondary School 24, School and colleges operating jointly 1, Government College 2, Non Government College 1, Madrasa 14, Kawmi Madrasah 14, Ebtedayee madrasah 4, and Technical and vocational institution 1.

Educational status of the project affected villages

Literacy rate of the affected villages is low due to poverty. People in the study area are educated majorly to the primary levels. Students quit the education after primary levels due to location of the higher schools at distant locations. There is one primary school in Sherpur and one primary school in Iyanpur village. One NGO BRAC school and 1 Madrsa is located in the Muzlishpur villages. No educational institution is there in Bamongaon village.

Industries

There are only rice mills in the Maulvibazar Sadar. There are 87 rice mills in the upazila. No industries are located within the project affected villages. Apart from this there are 68 husking crafts mill and 10 pottery in the Upzila. Nos. of bamboo and cane industries in the Upzila are 32. Nos. of flour mills in the Upzila are 3.

Population Migration

Large no of seasonal migrations are observed in the study area. During public consultation, it was noted that due to poverty, lack of employment, lack of facilities and infrastructure people prefer to migrate to cities. However permanent migrations are not common in the study area.

Vulnerability to Natural Disaster

The area being located away from the coast, no threats of cyclones is anticipated in the area. However the Rivers in the study area, i.e. Kushiyara and Manu floods annually during the monsoon season. Flash floods are experienced in the area. During floods the agricultural fields and habitation area gets flooded worsening the habitable situation in the area and also lead to outbreak of epidemics in the area.

5.13.5. Income & Poverty

Poverty rate in the area is high due to illiteracy and unemployment majorly. People migrate seasonally to other areas for employment and earning livings. Majority of population is engaged in agriculture and fishing activities. Agriculture is based on old techniques and irrigation is majorly rain based. Annual floods further aggravate the problem destroying their household and working areas.

5.13.6. Gender and Women

Population of the male and female in the study area and in the Upzila is almost equal. Sex ratio in the rural areas of Upzila is 99 and in urban areas is 110. Males in the study area and Upzila migrate to other areas seasonally for employment reasons. Women are largely unemployed and are engaged in household works only. Very few are involved in agriculture activities. The project will involve development of industries, thereby generating employment for the people. Women may also get the employment in the upcoming industries as large no of skilled, unskilled and semiskilled manpower will be required for the project.

5.13.7. Infrastructure

Households

All households existing in the study are katchha. No pakka house exists in the project affected villages.

Drinking Water Source

Source of drinking water in the affected villages is Part B water body and ground water.

Sanitation

People in the study area defecate in open majorly. Few households have the covered toilet and bathing facility.

Electricity

Majority of households in the study are electrified.

Communication & Transportation

Affected villages are located along the Dhaka Sylhet Highway. Study area is well connected by roads. Total 361.46 kms of metalled roads, 15.79 of semi-metalled roads and 385.66 km of kachha road exits in the Maulvibazar Sadar Upzila. All the people in the study area use mobile phones and the towers are available in the study area.

5.13.8. Common Property Resources

Common property resources like temple and the mosques exist in the study area which may be required to be relocated to alternate location. Details of existence of these structures is discussed in detail in the SIA report prepared for the project

5.13.9. Conflict of Interest and Law and Order Situation

No conflict of interest is associated with the EZ site or development of any other off-site facility.

5.13.10. Historical, Cultural and Archaeological sites

There are various archaeological structures located in the District as discussed in section 5.8.1. However no archaeological resource present within 300 m radius of the EZ site.

5.13.11. Details of Affected Structures Due to Development of project

Part A of EZ site which is to be developed at present is private agricultural land, it is required to acquire the land for development of EZ. This involves the resettlement and rehabilitation of the people residing and working in the site. Identified structures to be removed for development of EZ in Part A of EZ site are listed below in table 41. However detailed analysis is given in the SIA report prepared for the project.

Table 41: Details of Affected Structures in Part A of EZ Site

S. No.	Structure Affected	Nos. of Structures Affected
1.	Households	11
2.	Developed land	5
3.	Incomplete building	3
4.	Pond	2
5.	Plantations	2
6.	Mobile tower	1
7.	Boundary wall	2
Total		26

6. Identification and Analysis of Key Environmental Issues

6.1. Environmental Sensitivity Investigation

Environmental impact assessment has been carried out considering the impacts of proposed interventions with associated activities on important components of the environment and society. Firstly, all of the environmental components sensitive to proposed activities were identified during reconnaissance field visit based on expert observation, local people's perception and worldwide practice of EIA. The scoping process, followed to identify the environment and social sensitive features included professional judgments of the multi-disciplinary EIA team members and public consultation. The preliminarily identified environmental and social sensitive components are listed in sections below.

6.2. Environmental Asset

Environmental assets identified in the study area are listed below:

1. Air Quality of the area
2. Noise level of the area
3. Transportation system of the area
4. Fisheries of the study area
5. Ecosystem of study area
    a. River Khushiyara
    b. Part B-water body called Gong
    c. Agriculture land and Aquaculture pond

Identified environmental assets of the project are likely to be impacted due to development of the off-site facilities at all the pre-construction, construction and operation stages of the project. Project activities which may have an impact on the environmental assets and the associated impacts are listed in table 42 below**.** The detailed impact identification and mitigation measures are given at Chapter 7.

Table 42: Environmental Assets of the project area

S. No.	Environmental Assets	Impact	Related Project Activity
Pre-Construction & Construction Phase			
1	Air Quality of Study Area	Degradation	Site clearance/ preparation Construction activities Excavation Exhaust from construction vehicles/machinery
2	Noise Level of Study Area	Increase in Noise levels	Construction activities Movement of construction vehicles/machinery
3	Transportation System	Traffic congestion on Dhaka Sythet highway & Maulvibazar road, Project road)	Increased nos. of vehicles carrying construction raw material and construction debris

S. No.	Environmental Assets	Impact	Related Project Activity
4	Fisheries of Study Area	Increased sedimentation of water bodies in study area	Increase in run-off from construction/excavated site.
5	Eco-system of Study area: River Khushiara, Part B of EZ (water body called Gong) and other water bodies	Increased sedimentation of water body	Increase in run-off from construction/excavated site
6	Eco-system of Study area: Agriculture and Aquaculture activity	Loss of agriculture & aquaculture land	Part A of the EZ site is entirely a agricultural land and Part B is water body which is collection point of storm water of nearby area and finally drains in River Kushiyara. Part A of the EZ site will be converted into EZ resulting in loss of agricultural land and loss of livelihood of farmer. However Part B will be retained thereby not affecting the drainage, fisheries and livelihood of the water body dependant population.
Operation Phase			
1	Air Quality of Study Area	Air pollution	Industrial emissions and movement of vehicular access
2	Noise Level of Study Area	Increase in Noise levels	Increased traffic movement and industrial operations
3	Transportation System	Traffic congestion	Increased nos. of vehicles carrying industrial raw materials, products and workers on the Dhaka Sylhet highway and Maulvibazar Sylhet Highway
4	Fisheries of Study Area	Improvement Entry of pollutant into the Gong & other water bodies from upcoming industries in EZ zone may impact the aquatic life. Restricted fishing activity in Part B within EZ site after development of EZ.	Retaining the Part B of EZ site and carrying out no construction and operation phase activity at the Part B of the EZ site. Managing the run-off from the EZ site and implementation of the environment management plan to maintain the quality of run-off to prevent surface water pollution. Setting up of aquaculture based industries may improve the Fisheries activities in the area. Provision of guidance & improved fishing aids to the fishermen to enhance the fish production.

S. No.	Environmental Assets	Impact	Related Project Activity
5	Drainage of the Study Area	Drainage may get affected due to development of paved surfaces	Part A is agricultural land, Run-off from the site is minimal. Construction of paved surfaces after development of EZ will enhance the run-off and the load in the water bodies also reducing the ground water recharge. Part B is an important drainage structure receiving the run-off from nearby parts including the part A of the site. So Part B shall be retained to maintain the drainage pattern of the study area. Rain wa6ter harvesting system shall be provided in Part A of the EZ site to regulate the increased run-off from the site due to construction of paved surfaces.
6	Eco-system of Study area: Part B 'Gong River', river Kushiyara, Beels, Khad, ponds etc	Degradation of Water Quality & Aquatic life	Discharge of effluents from the industries which are proposed to be located in economic zone may pollute the water bodies in the study area
7	Eco-system of Study area: Agriculture and Aquaculture	Loss of agricultural land. Improvement of agriculture and aquaculture production	Provision of alternate livelihood to the farmers. Setting up of agriculture & aquaculture based industries may improve the agriculture and aquaculture activities in the region

6.3. Environmental Hotspot

EZ site and site for proposed off-site facilities lies in Sherpur & Bamongaon Mauza of Maulvibazar District& Sylhet Division. EZ site does not lie within Eco-sensitive/Ecological critical area as per ECA, 1995 & ECR, 1997.

However the Part B of the EZ site is water body which receives the storm water run-off from the study area. Filling or destruction of this water body may impact the drainage pattern of the whole area leading to increased local flooding during rains. Thus Part B is environmentally sensitive location and shall be retained in its original position. Part B water body also supports the large variety of fishes and other aquatic life which will be disturbed if any modification or change is done to this water body.

Proposed environment management plan shall necessarily be implemented in all the project development stages so as no or minimal environmental pollution occurs due to development of project. Industrial effluents, sewage, industrial waste & municipal waste to be generated from the EZ site should be managed as per the EMP to prevent degradation of environmental quality of the study area. To

prevent the pollution it is also recommended that only less or non-polluting industries shall be installed in the study area.

6.4. Likely Beneficial Impacts

The project involves development of the Shreehatta Economic Zone. Development of the economic zone and the associated off-site facilities will lead to development of the area. Development of industries will generate the employment opportunities in the area thereby improving the quality of life of people. Development of power, water, sewage etc facilities for the project will also be beneficial for the area. Development of EZ will lead to migration of population in the project area and will initiate the necessity of development of infrastructure facility in the area. Following benefits are anticipated due to project development

1. Rapid Economic development (including enhancement and diversification of Industries, Enhancement of investments)
2. Large scale direct and indirect employment generation- improved quality of life
3. Development of infrastructure facilities
4. Technological enhancement for management of environmental management (like roads, water treatment, waste management, power supply, green belt, environmental monitoring)

6.5. Community Recommendations

Resettlement & rehabilitation is involved in land development for EZ zone which is described in detail in the SIA report. Resettlement and rehabilitation shall be carried out as per the law of land of the Country. Land owners expect the appropriate compensation for their land and also assistance of the Government to find alternate livelihood as they are carrying out agriculture for ages. They expect jobs in the EZ during construction and operation phase. They also demanded to provide skill development trainings to them so as they can be employed in the EZ.

As per the focused group discussions carried out with people, it was learned that people are in favour of development of EZ. They are expecting development in their due to development of EZ. Also they expect large scale employment will be generated in the area for both male and females which will enhance their standard of living.

Some of them also shared that they expect development of infrastructure facilities like power supply, roads, water supply, educational facilities, and hospitals in the area which will further enhance standard of living. People suggested that only non polluting industries should come up in the region and all industries should take pollution control measures so that EZ development does not have negative impact on environment and their health. Also they demanded that local people should be considered for provision of employment preferably. People also suggested that agro based and aquaculture industries should come up in this region so as it could be beneficial for people engaged in aquaculture activity.

Focused group discussions were carried out with the villagers of Sherpur village, Iyanpur Village, Muzlishpur village and Bamon gaon village. Other than this consultation was conducted with BWDB, Jalalabad Gas Company and PGCB. Consultations helped to obtain their view on the project development, the benefits and the negative impact of the project on their life and their expectations from the project.

6.6. Alternate Analysis

Various sites have been identified by BEZA or development of economic zone. Pre-feasibility study for various sites has been carried out to analyze suitability of site for EZ development by BEZA. As per pre-feasibility study it was found that Shreehata is one of the most potential & suitable zone for development of EZ. Strength and weakness of the site are well discussed in Chapter 4. Sites considered for development of the economic zone other than Shreehata are listed below:

- Area of app. 205 acres in Mongla Upzila, Bagerhat District
- Area of app. 1390 acres in Anwara, Chittagong
- Area of 500 acres in Mirersheroi, Chittagong

These sites are analyzed on basis of location, accessibility, potential for industrial growth, availability of raw material, infrastructural development, availability of man-power, vulnerability to natural and man-made disasters, availability of the basic amenities (such as power, fuel, water supply etc.) and utilities for industrial development. After analysis ranking has been done for these sites. As per ranking it is found that Shreehata has potential to be developed as EZ site due to its strategic location on Sylhet Dhaka Highway. Mongla & Mirersheroi EZ sites has already being approved for development of EZ. Factors responsible for selection of Shreehata as site for development of economic zone are given below:

1. Located outside city Corporation, Municipality and Cantonment Board Area
2. Located Near to Osmaina International Airport, Sylhet (app. 55 km)
3. The site lies close to River terminal at Ashuganj on River Meghna, i.e at distance of app. 108 kms from the EZ site
4. Site is well connected by road as it abuts Sylhet Dhaka Highway and Sylhet Maulvi Bazar Highway
5. Railway station close by Sylhet railway station 35 km, Sreemangal railway station 43 km.
6. Project site does not lies within any eco-sensitive zone or ecological critical area
7. Availability of large nos. of un-skilled and semi-skilled labour
8. Availability of power (Bibiyana thermal power plant), gas (Bibiyan gas field) and fresh water in the area.

For development of EZ at Sherpur, it was proposed to acquire 88 ha of private agricultural land and 55 ha of Government land. 95% of area of government land is water body which is locally called as River Gong. This water body is app 15 feet deep and is formed due to water logging. The larger water body in which this drains is enchroached for agriculture purpose by people so water gets logged here. At present this water body is source of livelihood for 10 fishermen of Sherpur village, source of water for village sherpur, iyanpur & Muzlishpur and receives run-off from the nearby areas preventing inundation of other low lying areas during rains. Aquatic fauna of the water body includes fishes and carps, water birds etc. The water body has great importance in terms of ecology and have defined ecosystem services.

After carrying out the baseline study and impact assessment, it was decided to drop idea of filling the water body and development of economic zone. Out of 144 ha, at present only 88 ha of land will be developed as EZ and the water body will be retained in its existing condition.

Also alternative options are considered for selection of construction material and technologies of construction. Options considered are for construction of compound wall and administrative building as given below:

The soil investigation report necessitates minimum 30 m depth of pile foundation for administration building and minimum 8 m depth of pile foundation for compound wall. Considering the soil conditions, the nature of utilization, and the following alternate technology has been suggested for successful ground modification / improvement which will be determined depending upon the difficult soils, liquefaction potential, slope stability, bearing capacity and settlement, and seepage instability. The ground improvement include loading conditions and allowable deformations for the facility, as well as an assessment of the impacts of natural hazards, such as floods, earthquakes or hurricanes, and the performance required during these events.

- Unsliced Lime slurry filling on the pile bore before casting pile concrete for a depth of 2m instead of providing pile for a depth of minimum 6 m for compound wall
- Soil stabilization through lime injection at the bottom of the foundation for administration building.
- The above measures have brought down the project cost substantially apart from reduction in wastes of natural resources for the heavier foundation structure.

7. Environmental and Social Impacts

7.1. Introduction

Environmental impacts assessment was carried out considering present environmental setting of the project area, and nature and extent of the proposed activities. Proposed project involves development of EZ and off-site facilities for upcoming Economic Zone at Sherpur. Potential environmental impacts associated with EZ and each of the proposed off-site facility is classified as: (i) impacts during design and construction phase and ii) impacts during operation phase/Post-construction phase. Sensitive environmental and social components were identified during the site visits and qualitative and quantitative techniques have been applied for direct and indirect assessment of impacts on the identified environmental and social sensitive components. Impacts are classified as being insignificant, minor, moderate and major.

Some of the important impacts associated with the proposed EZ and off-site facilities for economic zone will be associated with land use (diversion of land use), land stability (soil erosion), soil compaction and contamination, water availability, water quality of river/stream/pond, ground water contamination, waste and wastewater disposal, ambient air quality, ambient noise levels, vegetation, tree cutting (by Forest Department), fauna (terrestrial and aquatic), drainage pattern, hydrology, socio economic, places of social/cultural importance (religious structures, community structure), construction material sourcing and occupational health and safety. Adequate mitigation measures are devised to mitigate/minimise all likely environmental impacts and the same have been presented along with the impacts.

During the field study, consultations were also held within study area including local people and Govt. authorities like Electricity Board, Bangladesh Water Development Board, etc. Outcome of these consultations were used in impact assessment and devising mitigation measures.

7.2. Impact Identification

During the site visit, various environment and socially sensitive features were identified which may potentially be impacted by the project at various stages. Identified impacts of the project activities on the environment and social components are given below in table 43 along with the activities associated.

Table 43: Impact Matrix for Proposed Shreehatta Economic Zone

S. No.	Activities	Impacts	Negative Impact		Positive Impact		Not Applicable
			Short Term	Long Term	Short Term	Long Term	
A	**Pre-Construction Phase**						
i	Site Preparation (conversion of agricultural land for EZ development & removal of vegetation)	• Change in land cover and development of EZ zone		√			
		• Increased Run-off in surface water bodies		√			
		• Cutting the trees and clearing the vegetation		√			
		• Loss of floral and faunal diversity of the area		√			
		• Impact on Aesthetic aspects		√			
ii	Displacement of People	• Acquisition of land		√			
		• Loss of livelihood		√			
		• Resettlement &		√			

S. No.	Activities	Impacts	Negative Impact		Positive Impact		Not Applicable
			Short Term	Long Term	Short Term	Long Term	
		Rehabilitation					
B	**Construction Phase**						
i	Development of EZ and Off-site facilities	Loss of Top soil		√			
		Soil contamination due to spillage of material	√				
		Surface water contamination	√				
		Air pollution	√				
		Noise pollution	√				
		Increase in traffic	√				
		Un pleasant view	√				
		Impact on Health & safety	√				
		Social impact	√			√	
		Felling of Trees		√			
		Dredging	√				
C	**Operational Phase**						
i	Operation of Industries	• Air pollution		√			
		• Noise pollution		√			
		• Surface water quality		√			
		• Ground water depletion		√			
		• Rain water harvesting				√	
		• Health & Safety				√	
		• Employment Generation				√	
		• Potential for land contamination from industrial waste disposal		√			
ii	Green Buffer development around EZ site and each industrial plot	• Improved Ecology				√	
		• Air Quality Improvement				√	
		• Aesthetics				√	

7.3. Impact on Air Environment

7.3.1. Pre-construction Phase

Pre-construction phase will involve site clearance, leveling & filling activities and vegetation removal for development of EZ. Clearance of site will involve removal of vegetation, land leveling & filling activities. These activities will lead to dust generation. But these emissions will be limited to the EZ site only and have impact for short duration only during clearance activity. To minimize the dust generation, water should be sprinkled regularly at the site and low sulphur diesel should be used in land leveling equipments to control the SO_2 emissions.

7.3.2. Construction Phase

The proposed project involves construction activities like site development, civil construction, construction material handling and stocking, and construction vehicle movement will generate fugitive

dust and vehicular emissions. However, these ground sourced generation will be limited to the construction site and the impact will be short duration that too during construction activities only. The likely emission from construction vehicle, machinery, and generators is likely to be insignificant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting following mitigation measures.

Mitigation Measures

- Sprinkling of water at construction site and haul roads
- Covering the scaffolding (in case of administration building) to reduce the dust emission in outside environment
- Provision of face mask to workers to minimize inhalation of dust particles
- Construction vehicles and machinery should be regularly serviced and check for pollution control
- Low sulphur diesel should be used for running construction equipment, dredgers and vehicles
- Adequate parking space should be provided for the construction vehicles so as to prevent idling of the vehicles and the emissions generating from them
- Vehicles carrying construction material and debris should be covered with tarpaulin cover
- Raw materials, excavated soil and other debris should be stored under covered sheds
- Green buffer should be developed all along the EZ boundary
- Plantation should be carried out along the both side of internal roads

7.3.3. Operation Phase

Post development of the economic zone & setting up of industries, there could be some impacts on the air quality of the area. Industrial development will involve generation of emissions, and increased vehicular movements. These altogether may have overall negative impact on the air quality of the site and the nearby areas. The industries proposed as per the pre-feasibility study are ceramic, food processing, pharmaceuticals, paint and textile industries.

These industries may generate the air emissions which have potential to pollute the environment. Pollutants from various industries are discussed below:

Ceramics:

The processing of clays and other ceramic raw materials inevitably leads to dust formation – especially in the case of dry materials. Drying, (including spray drying), comminution (grinding, milling), screening, mixing and conveying can all result in a release of fine dust. Some dust also forms during the decorating and firing of the ware, and during the machining or finishing operations on the fired ware. Dust emissions are not only derived from the raw materials as described above, but also the fuels contribute to these emissions to air. The gaseous compounds released during drying and firing are mainly derived from the raw materials, but fuels also contribute gaseous pollutants. In particular these are SO_x, NO_X, HF, HCl, VOC and heavy metals.

Food Processing:

Air emissions from food processing industry will contain some volatile organic compounds but do not contain any hazardous compounds. These industries emit low process-air emissions. Most processes uses electrical power and rarely emit harmful compounds to environment. But air emissions from water treatment plant of these industries are a major concern. Mal odour from these water detoriate the air quality and disturbs the living condition in the area.

Pharmaceutical:

Air emission from pharmaceutical industry will include CO, NO2, SO2, PM10 & VOCs

Textile:

Air emissions from textile industry include oil & acid mist, solvent vapour, odour & dust.

Paint Industry:

Air emissions from paint industry include VOCs & pigment dust.

Mitigation Measures

Provision shall be made for peripheral green belt all along the EZ boundary. No development zone of 10 m width & retaining wall will be developed all along the EZ zone. Green buffer will be developed in this no development zone. Green belt shall have minimum of three rows of local variety of tree with pyramidal shape. Tree species shall be selected such that first inside row is of smaller height, middle row of tree are tall and last row of tree is of medium height so that green belt formed appears like a canopy.

- Development of thick green belt (10 m) and organized greens within each industrial plot
- Power Generators should be provided with stacks of adequate height (higher than nearest building) to allow enough dispersion of emission.
- Process emission shall be control with the installation of adequate air pollution control systems
- All industries should obtain clearance from DoE, Bangladesh as applicable. Air pollution control measures shall be adopted by respective industries in line with DOE permission
- NOC from DoE shall be renewed time to time and all industries shall follow the conditions as prescribed in the NOC issued
- Air pollution prevention equipment shall be installed by the industries as per requirement to meet the emission standards prescribed by DoE.
- Air pollution monitoring should be carried out quarterly by all industries to check the air pollution level.
- Preference of usage of clean fuel like gas should be considered
- Energy conservation should be adopted by opting the alternate energy options like solar power.
- Odour should be managed at the site using odour suppressant and planting fragnant flowering trees.

7.4. Impact on Noise Environment

7.4.1. Pre-construction and Construction Phase

Pre-construction phase will involve site clearance activity for development of EZ and off-site facilities. Clearance of site will involve removal of vegetation and land leveling activities. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of rural category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement). Also

dredging will be carried out in River Kushiyara for extracgting sand for filling purpose. Noise levels of app. 90 dB(A) are generated from dredging activities. Dredgers are already operating in the River to extract sand and to make river navigable. Thus the noise generation alone due to the project will not have significant impact. No habitation is there in 200 m of distance from Kishiyara River in which dredging will be carried out. Noise levels reduc to 70 dB(A) t distance of 100 m and to 59 dB(A) at 200 m.Thus noise impact on the residents is anticipated to be insignificant.

Mitigation Measures:

- Machinery to be used should comply with the noise standards prescribed by DoE.
- DG set shall be acoustic treated
- Workers shall be given PPE (ear plugs), if working in high noise area
- No noise generating activity shall be carried out in the night.
- No construction activities to be undertaken during night hours to prevent any disturbance to nearby residents and labours in labour camps.
- Acoustic enclosures should be provided with DG sets and machinery to control the noise levels at construction site.
- Temporary noise barriers should be provided near the high noise generating areas
- Dredgers should be provided with the noise supressors/mufflers to reduce the noise levels at source. Dredgers should be properly serviced and maintained to minimize the nosie due to wear & tear and friction.

7.4.2. Operation Phase

After development of economic zone, traffic in the area will increase which will increase the noise level of the area. Industrial operations may also generate the noise and increase the noise level in the area. Operating DG sets will also generate the significant noise. Following mitigation measures should be taken to prevent noise pollution during operation phase

Mitigation Measures

- Avenue plantation should be developed along both the side of internal roads which will act as noise buffer
- Green buffer of 10 m should be developed all along the project boundary. Green buffer should compose of the 2-3 rows of plants of variable height and thick canopy so as to form continuous barrier. This will help in reducing the noise level significantly.
- All industries should obtain clearance from DoEB before establishing industrial unit and should comply with all the conditions mentioned in th-e letter of environment clearance
- All industries should install the new machinery of modern make which complies with the noise standards prescribed by DoEB in ECA, 1995.
- Acoustic treatment and temporary noise barrier should be provided in area generating higher noise levels
- Job rotations should be practiced for workers in industry to prevent prolonged exposure to high noise level as it may lead to deafness, fatigue, head ache, nausea and drowsiness
- Honking should be prohibited within the economic zone

7.5. Impacts on Water Resources

7.5.1. Pre-Construction and Construction Phase

Impacts on Ground & Surface Water Resources:

Significant quantity of water will be required for various construction activities & domestic purpose. Source of water for these activities will be Kushiyara River, temporary constructed storm water ponds by

contractor or ground water. Permission shall be taken from concerned authorities prior abstraction of water. Excess withdrawal of ground water may lead to depletion of aquifers. Measures should be taken to minimize the water extraction by reducing water consumption and wastage. Mitigation measures are given below. Due to the nature of strata area has very high potential for ground water recharge. Potential recharge varies from 1001-2500 mm.

Mitigation Measures

- Best management practices for conservation of water will be required to be adopted to minimize water wastage and water loss. Best management practices to be adopted are given below:
- Temporary storm water drains and rain water harvesting ponds should be constructed so as to store rain water for construction activities.
- Water for curing can be saved by carrying out curing in early morning or late evening and covering structures with gunny bag so as the moisture can be restored for longer time.
- Regular inspections at site to monitor leakages in water storage tanks
- Creating awareness among construction workers about the importance of water conservation
- Adoption of the advance technologies and machinery which helps in minimizing water requirement for construction
- Storing the curing run-off and waste from other construction activity and using the same for sprinkling.
- Covering the water storage tanks at site to prevent evaporation losses.

Impact on Surface Water Quality

Run-off from the construction site may carry the higher quantity of sediments and oil which may pollute the surface water sources (i.e. Kushiyara River & Part B of EZ site, which is a water body) and impact the aquatic life. Thus measures are required to be taken to minimize the surface water pollution. Dredging is proposed to be carry out in River Kushiyara to extract the sand for filling of the site. Kushiyara River contains high silt load. Dredging is carried out in River regularly to remove the silt. Dredging activity leads to suspension of the sediments for short time at the time of dredging but the particles settle in short time only.

Mitigation Measures

- To avoid excavation activities during rains
- To prevent piling up of excavated soil, raw material and construction debris at site by proper management and disposal
- Minimize run-off by using sprays for curing
- Maintaining appropriate flow of water sprinklers at site
- Construction of storm water drains along with sedimentation tanks with sand bags as partition as barrier for direct flow of run off to river.
- Collection & Reusing of curing over flow, tyre wash water etc within the site
- Construction of adequate nos. of toilets and proper sanitation system to prevent open defecation along the river banks/water supply lines
- Construction of soak pits/septic tanks to dispose-off the domestic waste water generated from labour camps to prevent disposal of sewage in surface water bodies
- Proper collection, management and disposal of construction and municipal waste from site to prevent mixing of the waste in run-off and entering the water bodies
- No debris/construction material should enter the aquaculture ponds and other water body in the area

Impacts on Ground Water Quality

Ground water is saline in shallow aquifers of the study area. No significant impacts are anticipated on the ground water quality due to development of the economic zone during pre-construction & operation phase.

Mitigation Measures

- No sewage or waste water should be accumulated in any unlined structure
- Timely disposal of the construction/chemical/haz. waste so as to prevent leaching of any pollutant to ground

Impacts on Drainage Pattern & Hydrology

EZ site is divided into two parts, i.e. part A which is agricultural land and part B which is a water body. It is planned to develop part A only and part B will be retained in its existing condition. Part A is agricultural land and it drains through a storm water drain into part B of the EZ site. No activities will be carried out in part B of the EZ site. Part B receives the storm water run-off from the nearby areas and will continue to receive the run-off as it will be retained in its existing condition, thus the drainage pattern will not be affected significantly.

Mitigation Measures

- Natural drainage pattern should be maintained. Run-off assessment shall be made of catchment area and peripheral/garland drains shall be constructed around EZ site based on the assessment of catchment area (frequency, and storage area).
- Storm water drain shall have the provision of di-siltation before discharge to river.

7.5.2. Operation Phase

Impacts on Ground & Surface Water Resources:

Some of the industries proposed are water intensive industries like textile and paint industries. It is estimated app. 59.011 MLD of water will be required during operation phase of economic zone at Sherpur. Water will be sourced from River Kushiyara. Water supply system will be developed by BWDB. Kushiyara River is source of water for various villages for domestic and agricultural purpose. Thus extraction of water for economic zone from Kushiyara River, may impact the population dependant on the River. Water supply system shall be developed by BWDB considering the factor of dependency of population on River and factory of water availability in the river. To reduce the fresh water demand, water conservation fixtures, water conservation measures and rain water harvesting should be undertaken at the economic zone. No ground water will be extracted during operation phase thus no impacts are anticipated on ground water resources during the operation phase.

Mitigation Measures

- Rain water harvesting system and storage should be developed to minimize ground water abstraction
- Adoption of best management practices to prevent water wastage and minimize water loss
- Usage of water conservation fixtures to minimize water consumption
- Installation of leakage detection system to minimize the water loss

Impacts on Surface Water Quality

The industries proposed in the zone are primarily integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries have potential to generate wastewater which can pollute the surface water quality, if discharged in river without treatment. Type of pollutants from the proposed industries is discussed below.

Integrated Textile:

The textile industry uses high volumes of water throughout its operations, from the washing of fibres to bleaching, dyeing and washing of finished products. On average, approximately 200 litres of water are required to produce 1 kg of textiles. The large volumes of wastewater generated also contain a wide

variety of chemicals, used throughout processing. These can cause damage if not properly treated before being discharged into the environment. Of all the steps involved in textiles processing, wet processing creates the highest volume of wastewater. The sources of aquatic toxicity can include salt, surfactants, ionic metals and their metal complexes, toxic organic chemicals, biocides and toxic anions. Most textile dyes have low aquatic toxicity. On the other hand, surfactants and related compounds, such as detergents, emulsifiers and dispersants are used in almost each textile process and can be an important contributor to effluent aquatic toxicity, BOD and foaming.

Ceramics:

Process waste water from ceramic industry mainly contains mineral components (insoluble particulate matter) and also further inorganic materials, small quantities of numerous organic materials as well as some heavy metals. Process losses originating from the manufacture of ceramic products, mainly consist of different kinds of sludge, broken ware, used plaster moulds, used sorption agents, solid residues (dust, ashes) and packaging waste

Pharmaceuticals:

Wastewater from pharmaceutical industries may contain the chemicals used in the drugs. These chemicals may pollute the water quality if discharged untreated into the water body. Treated water also may contain some chemicals and if discharged in water body will impact the aquatic life.

Paint:

Wastewater from paint industries may contain organic and inorganic pigments, dyestuffs, extenders, cellulosic and non-cellulosic thickeners, latexes, emulsifying agents, anti foaming agents, preservatives, solvents and coalescing agents.

Wastewater is generated primarily due to cleaning operations of mixers, reactors, blenders, packing machines and floors. Then, and due to the varying degree of chemicals used, the wastewater contains appreciable concentrations of carbon (biological oxygen demand (BOD) or chemical oxygen demand (COD)), suspended solids, toxic compounds and colour. The discharge of such wastewater into the environment impedes light penetration, damages the quality of the receiving streams and may be toxic to treatment processes, to food chain organisms and to aquatic life. Paint wastewaters have also adverse effects on human health occupants. The paint wastewater must be needed to discharge after treatment only for prevention of degradation of water quality.

As discussed above, wastewater generated from the above mentioned industries contains significant pollutants and will degrade the surface water quality. Thus following measures shall be taken to prevent the degradation of surface water quality

Mitigation Measures

- Each industry should obtain consent of DoE Bangladesh before construction and operation and should comply to the conditions laid by them
- Each industry should treat the effluent and sewage generated by them so as to achieve zero discharge and no untreated effluent should be discharged into any water body
- Provision shall be made for Common Effluent Treatment Plant (CETP) if required.
- Common STP (in modules) should be constructed within the EZ to treat sewage from residential and commercial areas
- Proper management of waste should be done to prevent any contact between the waste and storm water
- Common waste disposal sites should also be developed within EZ site as per the standards and prior permission of DoE should be taken before development.
- Each industry should practice rain water harvesting to minimize the water consumption and reduce run-off from the site
- Storm water drains should be lined separate from effluent drains
- Storm water system should be inspected & cleaned before monsoon every year
- Peripheral drain shall also be lined and shall not be connected to internal storm water drainage system.

- The top soil shall be preserved and used for covering the sand layer at EZ site. Vegetation turffing shall be made at the side slops of the EZ areas to prevent erosion and siltation in the river.
- River water quality shall be monitored periodically.

Impacts on Ground Water Quality

Contamination of ground water with the waste and wastewater generated by industries and sewage at the EZ site may lead to ground water pollution. Following measures should be taken to minimize the ground water pollution.

Mitigation Measures

- Each industry should treat the effluents and sewage and should not discharge into ground.
- No leachate, waste water and waste material should be stored in pervious unlined area/pond.
- Ground water quality shall be monitored periodically.

7.6. Impacts on Land resources

7.6.1. Pre-construction and Construction Phase

Impact on Land Use

EZ will be developed on part A of the project site and part B will be retained in original condition. Development of EZ will change the land use from agriculture to industrial. Land cover also will be changed from soft and green area to the paved surfaces. Following measures can be taken to minimize the impacts,

Mitigation Measures

- Planning should be done in a way to minimize the tree cutting.
- If any tree cutting is undertaken then compensatory plantation should be done in minimum ratio of 1:2

Impact on Topography & Geology

Part A of the site which is to be developed into EZ is flat land. Site will be filled to height of 0.75 m and will be leveled. No significant impacts on topography are estimated due to development of EZ.

Impact on Top Soil and Soil Quality

Movement of construction vehicle and equipment will affect the soil profile of the area by compaction of the soil. Top soil of the site will be disturbed due to filling of the site to a level of 0.75 m. Storage of construction material and construction waste may contaminate the soil quality of the area. Following measures shall be taken to mitigate the impacts of the project development on top soil & soil quality.

Mitigation Measures

- No piling of raw material at site
- Raw material will be stored under covered sheds and paved surface
- Fuel storage area should be paved
- Adoption of best management practices to prevent any spillage of raw materials
- Construction debris should be stored under covered sheds and paved surface and should be disposed off regularly to designated sites
- Waste from labour camps can be segregated at site. Food waste/wet waste should be composted in pits within the camp site. Recyclable waste should be sold to the authorized dealers and the remaining should be disposed off at designated sites through local agencies responsible for waste management in the area.

Impact on landscape and scenic beauty

Construction activities, site clearance activities, piled construction materials; machinery and camp establishment etc. on site may impact the scenic beauty and disturbs the aesthetics of the area. Nevertheless, the impact is for a short duration, and reversible as the project plan includes landscape planning, green belt development as well.

7.6.2. Operation Phase

Impact on Soil Quality

After development of economic zone, disposal of industrial, domestic and process waste may contaminate land and soil quality of the area. The impact can be significant and long term in case of uncontrolled discharges. Improper disposal of waste (hazardous and non-hazardous waste) may degrade soil, water, noise, air quality and ecology of the area. As per the preliminary planning, it is planned that industries like textile, ceramics, pharmaceuticals, paints and food processing will come up in the EZ zone. These industries are not heavily polluting like tanneries, distilleries etc but generate significant waste both hazardous and non-hazardous in nature, which can pollute the environment if not managed properly. Nature of the waste, which can be generated from these industries are discussed below.

Textile

Waste to be generated from the textile industries can be solid and liquid in nature. The residual waste may include monomers, oligomers, metals, degradation products, solvents and coagulants. Other sources of residual waste include cleanup absorbents, spent activated carbon, laboratory wastes, and air pollution control residues. Solid waste will include packaging waste, metal pieces, damaged electrodes, ends of coils, wires and spools, flux cored electrodes, greased clothes/cotton, damaged rods, burnt rods, scrap flux, slag (residue from flux reaction and composed of metal and non-metal oxides), Dross (oxidized metal expelled during thermal cutting and gouging operations), metal dust, dust collected in filter ventilation systems/air pollution control devices, floor sweepings, coal ash (if coal used as fuel), solid waste recovered from treatment of wastewater like sludge etc.

Food Processing Industries

Solid waste from the food processing industries includes both organic and packaging waste. Organic waste, that is, the rinds, seeds, skin, and bones from raw materials, results from processing operations. Inorganic wastes typically include excessive packaging items that are, plastic, glass, and metal. Solid waste from textiles majorly composed of resins, fabric, apparel, dye, discarded machinery and fibres. These waste required to be collected and disposed off periodically. Lub oil/waste oil is generated from the machineries as hazardous waste. Mitigation measures are required to be adopted to prevent soil pollution of the area.

Paint

Solid waste from paint industries includes paint sludge from cleaning operations, off-specification and obsolete paints, empty raw material packages, bags and containers, pigment dusts from air pollution control equipment, paint filter bags & cartridges and accident spills and discharges. These wastes, if allowed to mix with soil, may contaminate the soil quality in the area. Mitigation measures are required to be taken to minimize the impacts on air quality.

Mitigation Measures

- Provision shall be made for proper storage and disposal of industrial waste by receptive industries.
- Common waste storage areas shall be designated for industrial domestic waste.
- Waste should be segregated at source into hazardous and non hazardous waste. Further the waste should be segregated into recyclable and rejected waste. Recyclable waste should be sent to authorize vendors for recycling and rejected waste should be disposed off as per the norms specified by DoEB for the particular waste.

- Industrial waste generated should be stored on sealed surfaces and should be disposed off as per guidelines of DoE, Bangladesh.
- No chemical/hazardous raw material should be allowed to spill over the land and should be operated in covered systems
- Excessive packaging should be reduced and recyclable products such as aluminum, glass, and high-density polyethylene (HDPE) are being used where applicable.
- Organic waste should be resold to value addition industries or can be fed to live stock.
- Advanced wastewater treatment should be adopted by industries
- Use of advanced techniques to control specific portions of the manufacturing process to reduce wastes and increase productivity.
- Use of radiation to kill pathogenic microorganisms.
- Reduction or total elimination of effluent from the manufacturing process
- At present no common hazardous waste handling and disposal unit exists in Bangladesh. Industries thus have to install the incinerators in the unit to dispose hazardous waste. The incinerator further should use the clean fuel and required air quality management measures should be adopted.
- A site for disposal of hazardous waste can be identified within the EZ and it should be developed as per the norms of DoEB and upcoming Hazardous Waste Management rules of Bangladesh.

Impact on Land Use

No impact due to off-site developments is anticipated on land use of the study area during operation phase. Development of economic zone will attract more infrastructural development around the project site to facilitate industrial growth which may alter the land use of area. Some of the developments will include, construction of roads, housing facilitiy, commercial areas including hotels, hospital, restaurants, schools etc, small scale industries etc. This will help in development of the area significantly.

7.7. Impacts on Agriculture resources

7.7.1. Pre-construction and construction Phase

Part A of the EZ is agricultural land and it measures 88 ha. This land will be developed into Economic zone thus development of economic zone will lead to loss of 88 ha of the land. 88 ha of agricultural land will be converted into industrial area. Farmers losing the land shall be given the adequate compensation so as they can purchase other piece of land and can practise agriculture. Construction material, equipment, machinery etc shall not be stored or kept in agricultural fields near to the site. No raw material or debris shall be disposed off in the agricultural fields in nearby areas.

7.7.2. Operation phase

No impact on agriculture resources is anticipated from off-site infrastructure during operation phase. Since the EZ is surrounded by agricultural land, thus it would be recommended to install agro based industries in the zone. Farmers shall be given the advanced equipment, advanced farming traing etc at subsidized price so as to obtain maximum yield.

7.8. Impacts on Fisheries

7.8.1. Pre-construction and construction phase

Spillage or disposal of waste or wastewater in the river may significantly impact the aquatic life of the river. Thus adequate measures should be taken to prevent any impact on fisheries which are listed below. Dredging is proposed to be carry out in Kushiyara River to obtain the sand which may have impact on aquatic flora and fisheries. Dredging generates high underwater noise and sediments which are harful

for aquatic organims. However this stretch of Kushiyara river is regularly dredged as Kushiyara contains high silt load which is to be removed every year to prevent flooding and siltation of river.

Mitigation Measures

- Proper disposal and management of construction waste
- No waste should be dumped in water bodies during construction
- Wastewater from labour camp and construction site should not be disposed off in the water bodies
- Septic tank/soak pits should be provided to dispose off the wastewater from construction camp
- Site should be kept clean so as no pollutant from site should enter the water bodies along with run-off
- Excavation activities should not be undertaken during monsoon season
- Piling of raw material at construction site should be avoided
- Raw material, debris and fuel should be stored on paved surfaces under covered areas
- Dredging should not be carried out during spawning and breeding season
- Efficient dredgers should be used so as to minimze the loss of sediments during dredging
- Transpotaton pipelines of dredged material should be regularly monitored so as to minimize leakage of dredged sediments during transportation

7.8.2. Operation Phase

If any waste or wastewater is discharged into the River Kushiyara, River Gong or any other water body, it will impact the aquatic life of that water body.

Also if aquaculture based industries are installed in the EZ then the aquaculture activities in the area will boost. People should be encouraged to carry out the aquaculture activities and should be provided training for the advanced technologies to get the maximum yields.

Mitigation Measures

- Adoption of adequate wastewater and industrial effluent management technology so no untreated sewage is discharged into surface water body
- Industrial, municipal and hazardous waste should be managed such that no waste is dumped or disposed in surface water body

7.9. Impacts on Eco-system

7.9.1. Pre-construction and construction Phase

Project site is an agricultural land and involves tree cutting also. Cutting of trees will impact the ecosystem of the area. No wild fauna exist at site as no forest exists nearby. Domesticated animals like cow, goats, poultry etc. exist at the site. Various birds were also observed during the site visit at EZ site. Site will be cleared and levelled for development of economic zone thereby disturbing the habitat of these organisms and ecosystem of the area.

Run-off from construction site may get contaminated with the construction material, debris, fuel etc material stored at site. Contaminated run-off from site may affect the aquatic life of the water bodies in the study area. Following mitigation measures shall be taken to prevent the impact on eco-systems of the are given below.

Mitigation Measures:

- Twice the nos. of trees to be fell should be planted as compensatory plantation in affected areas to minimize the impact on the eco-system.

- No waste or wastewater shall be discharged in water bodies
- Construction material and debris shall be stored on paved surfaces
- No excavation shall be carried out at project site
- Pilling of raw material shall be avoided at project site
- Fuel shall be stored at paved surface only

7.9.2. Operation Phase

Green buffer of 10 m all around the project site will include most of the native plant species, which will significantly improve the ecology of the area. This green buffer will provide habitat for the avifauna, reptiles and small mammals and will enhance ecology of the area. Twice the number of trees fell, if any should be planted.

Post development of the economic zone & setting up of industries, there could be some impacts on the ecosystem of the area. Industrial development will involve generation of emissions, effluents and increased vehicular movements. These altogether may have overall negative impact on the eco-system of the site and the nearby areas as the air pollutant will impact the existing vegetation and avifauna in the area. But the industries proposed as per the pre-feasibility study are integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries are not heavily polluting. If appropriate measures for preventing air, water, soil and noise pollution are taken there will be no significant impact on the eco-system of the area.

Mitigation Measures:

- Green belt shall be maintained properly and survival rate of trees shall be monitored and to be maintained to minimum 70%
- Periodic monitoring shall be carried out as per the monitoring plan for air, water, noise and soil and ensure that no impact
- No waste or wastewater shall be discharged in water bodies or on land.
- Native species should only be planted in the region
- Minimum twice the no. of tree fell (if any) should be planted

7.10. Impacts on Socio-Economy

7.10.1. Pre-construction and construction Phase

Loss of Livelihood & Displacement of Families

Project development involves acquisition of land and displacement of people. 88 Ha of private agricultural land will be acquired. Large nos. of people will be displaced and will lose their livelihood. However part of EZ site which is a water body will be retained in its existing condition. Various fishermen are dependent on this water body for their livelihood. This water body is source of water for various villagers. Thus the retention of water body has prevented the impact on socio-economic environment.

Impact on Health, Aesthetics and Hygiene

Construction activities lead to generation of dust, unpleasant view, obstruction in access of public properties due to excavation etc which may impact the society significantly. Adequate waste management plan, air, soil, noise and water pollution controls are required to be adopted to prevent any impact on society. Also various health hazards are associated with construction activity which may significantly impact the workers if not taken care.

Impact on Infrastructure & Utilities

88 ha of agricultural land will be acquired for project development. This land is majorly agricultural with few katchha households, temple, mosque etc. These structures are to be removed prior to development of the project.

Impact on Demographic structure

Few HH exists at the part A of EZ site. This population will be displaced for development of project. There will be shift of population from EZ site to nearby areas. Labour is available in plenty in nearby area. Thus labour for construction will be employed from nearby areas majorly.

Generation of Employment

Employment opportunities will be ensured through three channels (i) direct employment for unskilled labour, (ii) indirect employment to the local community; and (iii) employment of women workers. Direct employment includes site clearance, excavation, loading and offloading of materials and deliveries, mason and construction works. Further, the construction labour force will be requiring food and other items, which is expected to be supplied by the local eateries, retail shops and the local community. The local community members can take advantage of these opportunities. Employment generation benefits improve the quality of life of the labourers and enhance their productivity and living standards. Employment generation, both direct and indirect, through Shreehata EZ will have a tremendous impact on human development and poverty reduction in the Sherpur area.

Mitigation measures are required to be taken to minimize the impact of projects on the society and they are given below:

Mitigation Measures

- Provision of proper training to all workers for handling the construction equipment
- Provision of cautionary and guiding signage in local and English language indicating the hazard associated with the site
- Employment should be provided preferable to local & affected people
- Entry to the fuel storage area and construction equipment rooms should be restricted and should be allowed for trained personnel
- Wastewater from the toilet should be disposed off in septic tanks and soak pits and should not be allowed to accumulate at labour camp site or construction site
- Dustbins should be provided at labour camps for collection of waste and waste should be regularly disposed off through the concerned agency
- Temporary storm water drainage system should also be provided at camp site so as to drain the storm water and prevent accumulation of storm water at site and thus breeding of mosquitoes/flies
- Arrangement of fire-fighting should be made at site and workers should be trained to use the system in case of fire
- Provision of personal protective equipment like safety jackets, helmets, gumboots, gloves, face mask, ear buds, goggles, safety shoes etc as per requirement and nature of job in which they are involved
- Job rotation should be carried out for workers exposed to high noise and dust areas
- Provision of First aid facility at the site and the labour camp
- Labour camps should be located at neat and clean location with no water logging issues
- Proper sanitation facility including toilets, bathing facility and washing facility should be provided at site and at labour camps for workers
- Clean drinking water supply should be provided to labour

- Crèche facility should be provided for kids if female workers are employed
- Regular inspection for hygiene and safety in labour camps should be done
- Compensation should be given to the people as per the policy for the planted tress
- Construction debris should not be allowed to enter into aquaculture ponds located along the road
- Entrance to any road/structure should not be blocked for construction of EZ
- A major segment of the population on the area is unemployed. Construction activity will provide employment to huge nos. of people including skilled, unskilled and non-skilled workers. This will improve the quality of life of people.

7.10.2. Operation Phase

Skill Enhancement of Local people

As the both skilled and un-skilled labour will be required during operation phase of the EZ, but nearby area lack the skilled labour due to low literacy rate. However unskilled labour is available in plenty. BEZA should provide the skill enhancement training to locals to carry out specific tasks and enhance the skill of local people so that they can be given employment.

Employment Generation

Furthermore, as an enhancement measure, it is recommended that equal employment opportunities should be given to women in the EZ, especially those who are now unemployed or are working in the service sector as daily wage workers. These recommendations should be included as a requirement in the contract to be prepared by BEZA for the construction works related to the proposed EZ. EZs further create an important avenue for young women to become part of the formal economy at better wages compared to agriculture and domestic services. Employment opportunities within the EZ will increase their employability and position in the household. In addition, Shreehata EZ is expected to assist women in changing their occupation pattern and accessing better job opportunities and wages. But the child labour should not be encouraged in the area. Thus BEZA should make strict rules for industries and contractor for not employing child labour and there should be imposition of heavy fine, if anybody is found guilty.

Impact on Health

Post development of the economic zone & setting up of industries, there could be some impacts on the Socio-economic conditions of the area. Industrial development will involve generation of emissions, effluents, waste and increased vehicular movements. These altogether may have overall negative impact on the health of the people and aesthetics of area. But the industries proposed as per the pre-feasibility study are integrated textile, ceramics, pharmaceuticals, food processing & paint. These industries are not heavily polluting. If appropriate measures for preventing air, water, soil and noise pollution are taken there will be no significant impact on the society.

Poverty alleviation and diversification in livelihood

Vast employment opportunities potentially created by the EZ will reduce poverty via increased income through various livelihood options. By means of industrialization and related trades, diversification of livelihood will occur for all strata of people. Diverse livelihood options for the locals and better wages for the employees of the industrial zone will reduce poverty for many poor households and will contribute to reducing the poverty level in the locality. So, this will enormously benefit cross section of population and both gender.

The investments required in the commissioning of Shreehata EZ will directly enhance the local economy of the area by increasing cash flow which in turn will increase the purchasing power of the local

population. Increased cash flow will create more employment opportunities for the local communities in Shreehata EZ.

Employment opportunities are expected to increase throughout the region during the commissioning phas. This will provide employment to high unemployed population of the area.

Education for children including Girls' Education

Due to the establishment of the EZ and better economic changes in the locality, the child education rate is likely to increase leading to a reduction in children's informal or agriculture-based labour. Due to development of area, there is high probability that new schools may come up in area and also the literacy rate, especially of females will increase in the area.

Women's empowerment

Women are mostly in household work category. Thus, employment opportunities for women created by the proposed EZ directly or indirectly are expected to provide them better socioeconomic status. Through employment women will be empowered economically by being self-reliant and may become more socially aware. This could lead to their having more decision making power in their respective families and communities. This will also encourage the parents to send their children to schools and withdraw them from wage earning activities. At the same time girl's education due to parents' better economic condition and awareness will prevent early and child marriage as girls' education will automatically retain them in school and will make social awareness and pressure of not marrying them off at early age and drop out for that.

Access to civic amenities and communication

Villages in nearby locations of proposed EZ area will access better civic amenities. However, due to the EZ construction overall traffic may be congested over the years. But industrialization will ensure better livelihood and increase ability to access better civic facilities.

Social mobility

With improved employment opportunities and higher and secured income, impoverished people will be able to move up the social ladder.

8. Public Consultation and Disclosure

8.1. Introduction

Public consultation is one of the key components of the environmental assessment. The EA team conducted public consultations in project and study area. The approach involved a mix of conventional as well as participatory/ rapid rural appraisal (PRA/ RRA), focus group discussions (FGD) and one-to-one interviews. Accordingly, as first step, the literature and secondary data was reviewed. Local people and concerned Govt. officials were consulted. Public consultations were held during the site visit in May, 2015.

The public consultations were conducted with the following objectives: (i) to intrude awareness of the stakeholders about the project and to collect their opinion, suggestions for planning and designing of the project (ii) to identify the need and concern of the public, (iii) to assess cultural patterns and behavior of local communities. Stakeholder consultation was targeted at people/communities who may – directly or indirectly, positively or negatively- be affected by the outcomes of a project. The consultations were conducted at two different tiers of stakeholders: local people and Government Officials. Stakeholders concerns are summarized in the following two parts: (i) consultations with Government officials and (ii) consultation with local people

8.2. Approach and Methodology of Pubic Consultation and Disclosure Meeting

Consultations were conducted on informal and interview based. No questionnaire/ brochures were supplied to the participants. The discussions were primarily focused on receiving maximum inputs from the participants regarding their acceptability and environmental concerns arising out of the project. Consultation was started with the short description of the upcoming EZ projects and proposed off-site developments for EZ project. The objectives, proposed developments and the possible impacts of the project and the connectivity links of the study area with the project were also explained. The study team recorded their perceptions, demands and recommendations, about the project.

8.3. Location of Public Consultation Meetings

Locations where focused group discussion and consultations were taken up are given in table 44 below.

Table 44: Location of Stakeholder Consultation

Location	Proposed Development	Remarks	Date
Sherpur	Economic Zone and Off-Site Development	Village within EZ site	20.03.2015
Iyanpur		Village within EZ site	21.03.2015
Bamangaon		Village within EZ site	21.03.2015
Muzlishpur		Village within EZ site	21.03.2015
BWDB		Will develop Water Supply System for EZ	22.04.2015
Jalalabad Gas Company, Sherpur		Will develop Gas Supply System for EZ	22.04.2015
PGCB, Sherpur		Will develop Power Supply System for EZ	22.04.2015

8.4. Pubic Consultation and Disclosure Meetings

Discussions carried out during public consultation meeting, response of local people and government officials and conclusions are given below in table 45. Photographs of public consultation are also presented in this report in figure 59. Attendance sheet of the participants of Public consultation held at villages Sherpur, Iyanpur, Bamongaon & Muzlishpur are attached as Annexure II.

Table 45: Proceedings of Public Consultation and Disclosure Meetings

S. No.	Village	Villagers comment	Conclusion
1	Sherpur	10 Fishermen livelihood is fishing in the water body, i.e. part B of project site at Sherpur. They earn 2000-5000 Rs. per week from this. They do not have any other livelihood. All fisher men are Hindu and are minority. They agreed if Govt can provide them jobs and trainings then they can quit fishing.	After considering the impact of conversion of water body, i.e. Part B of the EZ site into EZ, idea of conversion is dropped and it is decided to retain the water body in its original condition. So as livelihood, ecosystem and drainage of the area will not be impacted. Fishermen will continue to carry out fishing activity in water and can withdraw water for domestic use.
2	Iyanpur	**Auronodi Banaya:** We use water for bathing. GW has high iron content and thus cannot be used. We purify water using alum (fitkari) and use it for domestic purpose **Ashirani Sutrodhar:** She also commented same as above and added this is ony source of water for cooking and cattle washing. **Joyatirani Sutrodhar:** She commented that we are located so close to proposed EZ and we will be directly impacted by pollution from industries. So measures should be taken to prevent that. **Drishti Sutrodhar:** After development of the project, more people will migrate in the area and this may lead govt. to develop more facilities for this area. Also employment option will increase fo us. But preferably local people should be given employment **Amulodabnath: (Businessman)** As per him depth of waterbody has decreased. It was more deep about 40 years ago. They catch fish for daily consumption from the water body. As per him, pollution will increase due to this industrial area. He also showed his concern on drainage. As per him, if water body will be closed where rain water	It was told to them appropriate mitigation measures will be taken to prevent any impact due to pollution from industries. Also it was told to them that peripheral drainage system will be provided for the industrial area which will have sufficient capacity to support drainage from near-by villages. After considering the impact of conversion of water body, i.e. Part B of the EZ site into EZ, idea of conversion is dropped and it is decided to retain the water body in its original condition. So as livelihood, ecosystem and drainage of the area will not be impacted

S. No.	Village	Villagers comment	Conclusion
		from that area will be drained **Jitendra Sutrodhar: (Community Leader & small business man)** As per him about 40-45 years ago this area was part of the river. He said that if low pollution industries like garment industry come they are ok but if high polluting industries will be there then they will oppose. He was in support of project but demanded that local people should preferably get the job.	
3	Bamangaon	**Moni Miya** He is practicing agriculture on this land for years (app 60 years). He does not own land but works on this land and share 50% of paddy with land owner. He and his son are earning livelihood for the family from this land. He does not have any other option. He insist his son (22 yrs) should get some job to earn livelihood for the family Villagers suggested that they are located close to the industrial area and will be directly impacted due the project so appropriate mitigation measures should be taken. They brought in notice that TPP located nearby was also not working well initially. They made several complaints against it and now they do not have any pollution problem from that TPP. They insisted graveyards located along the road should not be touched else they will oppose. Only few houses from the community are proposed to be displaced due to which they will face problem. Their land should not be included in the project. They also commented that similar consultations were conducted before establishment of TPP. About 400 people lost their lands but none of them got the job. Only outsiders are given job in TPP. He said only meetings and promises are done and no actual implementation are carried out.	Assurance was given to people that environment management shall be undertaken during both operation and construction phase of the project. Locals will be considered for providing employment in EZ. Adequate compensation shall be provided to land holders and land owners shall be given assistance to find alternate livelihood. It will be taken care that displaced people will be relocated near to the existing communities.
4	Muzlishpur	**Habil Rahman- Community Leader** He organized the public consultation. **Mahmud Alam:** This water body is source of water for villagers. They use both tube well and	Assurance was given to villagers for implementation of environment management plan for prevention of environmental pollution. To prevent the impacts

S. No.	Village	Villagers comment	Conclusion
		water body water. They have also laid pipeline from water body to use this water. They cannot use tube well water completely as it is costly for them. Our area is at lower elevation. If water body will be closed, our village will be water logged **Abdulla Muhim:** He said less polluting industries like garment industries should be proposed. High dust and pollution generating industries should be avoided. Appropriate measures should be taken. **Mohmmad Asik Miya:** He added they are giving land for development of country, if appropriate pollution control and prevention measures not taken up they will feel cheated He said that Government should provide jobs to the people who are losing land. Govt. should maintain database for the people and their family losing land and should maintain it. He added Govt should provide different compensation for different piece of land. More should be given to land located near road. Also compensation they will be given will not be sufficient for them to buy new land as land price will increase after project development. If air polluting industries will come up this will have significant impact on environment and health. They will oppose these type of industries He added water is used for domestic purpose. They do not have other cost effective source of water. He also requested, as we are giving land for country's development, can we get some gas supply from nearby gas field.	on drainage and nearby areas it was decided to retain the water body (Part B of EZ site) in its original condition.
5	Bangladesh Water Development Board	**Mr. Faizal Rob, Executive Engineer, BWDB** **Md. Atiqul Islam, Sub Assistant Engineer, BWDB** **Md. Umar Faruq, Revenue Surveyor, BWDB** • BWDB was contacted to discuss the possibility for withdrawing water from River and the impact of project on river quality and water resources of the area	Environment management plan will be implemented to prevent the degradation of water quality both during construction and operation phase of the project.

S. No.	Village	Villagers comment	Conclusion
		• BWDB agreed to develop water supply system for EZ on provision of request and the funds • BWDB told that Kushiyara River is fresh water river and is perennial river but carries low flow during lean season • River is being used for navigation, agriculture, fishing, drinking purpose, industrial purpose etc. • Requirement for EZ can be met through the River water as water is available • No endangered species exists in the River • Ceramics, textile and paint industries proposed to be planned in the EZ may impact the river quality, if effluent dumped in river • Care should be taken that no sewage and effluent shall be discharged in the River.	
5	Jalalabad Gas Company	**Mr Fazlul Haq, Manager, Jalalabd Gas Company** **Er. Ali Hassan, Bibiyana Power & Gas** • Discussion was held with Jalalabad Gas Company for establishment of gas supply system for EZ • It was told by officials gas supply system can be developed by laying gas pipeline from Bibiyana TPP to EZ • Connection can be laid and developed on provision of request and funds • Gas supply line will be laid along the road and will not have significant impact on environment and road	It was assured to them request will be made by BEZA to Jalalabad Gas Supply for development of gas supply system
6	Power Supply	**Er. Ali Mohammad, PGCB & Md. Juber Rahman, S.D. Engineer, 400/230 KV Bibiyana Grid Substation** • Discussion was held with PGCB for development of power supply system from Bibiyana TPP to EZ site • Power supply system will be developed from Bibiyana TPP to EZ site by PGCB on provision of requisition and funds • Development of power connection will not have any major impact on the Environment and society • Development of EZ will lead to improvement of the area	It was assured to them request will be made by BEZA to Jalalabad Power Supply for development of gas supply system

Discussion With PGCB

Meeting with BWDB Officials

Discussion in Sherpur

Discussion in Bamongaon

Discussion in Village Iyanpur

Discussion in Village Muzlishpur

Figure 59: Photographs of Stakeholders Consultation

9. Environmental Management Plan and monitoring indicators

9.1. Introduction

The Environmental Management Plan (EMP) is the synthesis of all proposed mitigation and monitoring actions, set to a time frame with specific responsibility assigned and follow-up actions defined. EMP is a plan of actions for avoidance, mitigation and management of the negative impacts of the project. Environmental enhancement is also an important component of EMP. A detailed set of mitigation measures have been compiled in view of the likely impacts associated with the proposed off-site development in Shreehata EZ.

9.2. The Environmental Management Plan

The EMP consists of a set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation (post-construction) stages of the project. The EMP has been designed keeping in view the regulatory and other requirements to ensure the following:

- Identifying the pollution causing activities at different project development stage
- Identification of source of pollution in study area through baseline study
- Identification of sensitive locations/features in the study area having potential to get impacted due to project development
- Identification of the type of impacts on environmental and social components due to various project activities at different development stage of project
- Proposing the mitigation measures for identified impacts

9.3. Mitigation Plan

The proposed EZ development & operation may have some impacts on the environment and society such as change in land use, removal of vegetation, increased dust emissions etc. Health & Safety Plan along with the EMP has been prepared considering the baseline conditions of study area, nature of the activities proposed and anticipated impacts. Environment Management Plan consists of the environment management plan, environment monitoring plan and environment management budget. Details of Environment Management Plan are given below.

9.3.1. Mitigation Plan for Site Development & Administration Building

Site development works includes land filling & leveling and construction of boundary wall. Site will be filled with sand upto depth of 0.75 m and source of sand is River Kushiyara. River Kushiyara carries large amount of sediment load and sand can be obtained through dredging the River. Dredging can have impact on aquatic life and air quality of the area. But dredging activity is common in the area and is done regularly on the River. This dredged soil is to be transported from the River to EZ site. Distance between the dredging point and EZ site is app. 1.5 km.

Boundary wall is proposed to be constructed all along the EZ site. Length of boundary wall is 4.0 kms. Administration building will be developed within the EZ and will cover an area of 3600 sq m. It is anticipated that the development of the site and administration building will not have significant impact on the environment. Environment Management Plan has been prepared for the pre construction, construction and operation phase of the project and is given in table 46.

Table 46: Environmental Impacts and Mitigation Plan for Site Development & Construction of Administration Building

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
Removal of Vegetation	• Vegetation which has been identified & approved to be removed shall only be removed for site clearance • No tree should be cut without taking prior permission of Forest Department	Pre-construction phase	Contractor	BEZA/PMC
Setting up of construction camps/labour camps	• The construction camps should be at least 500 m distance from habitations from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community. • Location for stockyards for construction materials will be identified at least 1 km from water sources • The living accommodation and ancillary facilities for labour shall be erected and maintained to standards and scales approved by the resident engineer • All sites used for camps will be adequately drained. They will not be subject to periodic flooding, nor located within 300 feet of pools, sink holes or other surface collections of water unless such water surface can be subjected to mosquito control measures • The camps will be located such that the drainage from and through the camps will not endanger any domestic or public water supply • All sites will be graded, ditched and rendered free from depressions such that water may get stagnant and become a nuisance • Construction camps shall be provided with sanitary latrines (1 per 25 pax), bathing facility and urinals. • Sanitary latrines shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings • Adequate and suitable	Pre-construction phase	Contractor	BEZA/PMC

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	facilities for washing clothes and utensils shall be provided and maintained for the use of contract labour employed therein. • Sewerage drains will be provided for the flow of used water outside the camp. • Drains and ditches will be treated with bleaching powder on a regular basis. • The sewage system for the camp will be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. • Clean potable drinking water facility should be provided at the site and the water quality should be monitored regularly • Crèche facility should be provided for children if female workers are employed • First aid facilities should be made available at construction camp. First aid box should contain small, medium and large sized sterilized dressings, sterilized burns dressings, 2 % alcoholic solution of iodine, bottle containing salvolatile, snakebite lancet, , bottle of potassium permanganate crystals, scissors, Ointment for burns & surgical antiseptic solution • 1 first aid box should be available per 50 labour • A person trained in first-aid treatment shall be made in charge who shall always be readily available during the working hours at the work place • A suitable motor transport shall be kept readily available to carry injured or ill person to the nearest hospital.			
Identification of dumping sites for debris	• The dumping sites shall not be located within designated Forest/protected areas • Residential facility or sensitive facilities like hospitals, schools etc shall not	During Construction	Contractor	BEZA/PMC

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	be located in downwind direction of the identified dumping sites • Dumping shall not impact natural drainage courses • Dumping sites should be located at least 1 km from sensitive locations • Permission from concerned local body should be taken before finalizing the location • Agriculture lands should be avoided & waste lands should be preferred • Selected site should not support significant vegetation • The area should be sprinkled with water to suppress the dust emissions • Plant species suitable to grow in that conditions should be planted at the time of closure			
Soil Erosion and Sedimentation control	• To avoid soil compaction along the transportation routes, only identified haul roads would be used for transportation. • Sedimentation tanks should be provided in line with storm water drains to trap the sediments from run-off. Sand bags can be used to trap sediments more effectively	During Construction	Contractor	BEZA/PMC
Disposal of Debris and any waste generated	• Waste from construction camp should be segregated at site. Food/wet waste should be composted in pit at the site, recyclable should be send to authorized recyclers and rejected waste should be disposed regularly through responsible agency in the area • Dustbins should be provided at the site and construction camps to prevent littering of waste • Storage area of minimum 2 days should be provided at construction camp for storage of the waste generated from labour camps • Construction debris should also be segregated at the site. This debris should be used for filling to the extent possible. • Rejected waste should be	During Construction	Contractor	BEZA/PMC

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	disposed off at the designated sites by local authority • All arrangement for transportation during construction including provision, maintenance, dismantling and clearing debris, where necessary will be considered incidental. • Construction debris should be stored under covered sheds on paved surfaces to prevent leaching • Any hazardous waste generated during construction activity shall be stored at suitable place and then disposed off in consultation with the guidelines. • Contaminated runoff from storage areas shall be captured in ditches with an oil trap at the outlet. • Utmost care shall be taken to ensure that the Municipal Corporation norms are met for the safe collection, transport and disposal of construction waste and debris.			
Dust Generation	• Vehicles delivering materials should be covered to reduce spills and dust blowing off the load. • Compaction of prepared site to re-strain the fugitive emissions. • Water should be sprayed in the cement and earth mixing sites as well as after compaction. • In high dust areas, workers should be provided and encouraged to use masks. • Regular maintenance, servicing of the vehicles and periodic emission check for equipment and machinery would be carried out in conformity with the Central Motor Vehicles Rules, 1989. • Water will be sprayed on the haul road. • All the vehicles entering the project site will be checked for Pollution-Under-Control	During Construction	Contractor	BEZA/PMC

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	Certificates. • Air quality monitoring to be carried out during construction phase to check the pollutants level in the air			
Contamination of surface & ground water	• Material mixing, material storing, washing of equipment and vehicles and other activities close to water bodies shall be avoided • Car washing / workshops near water bodies will be avoided. • Avoid excavation during monsoon season • Loosened soil will be stabilized by Contractor through landscaping and developing vegetation, wherever possible, once construction activity is completed at any site. • Sanitation facility with septic tank followed by soak pit will be developed. Common toilets will be constructed on site during construction phase and the waste water would be channelized to the septic tanks and soak pits in order to prevent waste water to enter into the water bodies. • Provision of oil & grease traps upstream of storm water drains • Surface run off due to construction activity will not be discharged in open without treatment.	During Construction	Contractor	BEZA/PMC
Noise from Vehicles, Plants and Equipment	• Construction activities would be carried out in the daytime only. • The construction equipment would be provided with adequate noise control measures and should comply with the noise standards as prescribed by DoE • Regular maintenance of vehicles and equipment would be carried out and corrective action taken in case of any deviation. • Ear muff/ear plug shall be given to the workers working around or operating plant and machinery emitting high	Throughout construction		

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	noise levels. • DG sets if installed should be provided with acoustic enclosures • Labour working in noise prone area should be provided with ear plugs and job rotation should be practiced to prevent the prolonged exposure of any workers to high noise levels			
Accidents	• Safety officer should be appointed at site to ensure all the safety guidelines are being followed at site • Cautionary guidance should be provided at site to aware people about the associated risk with the area. Entry to the fuel storage room or machinery operation room should be restricted only to authorized trainer personnel • All Accidents shall be reported immediately and incident analysis, preventive measures shall be implemented.	During Construction	Contractor	BEZA/PMC
Clearing of Construction of Camps & Restoration	• Contractors shall prepare site restoration plans. The plans shall be implemented prior to demobilization. • On completion of works, all temporary structures shall be cleared, all rubbish burnt, excreta or other disposal pits or trenches filled in and sealed and the site left clean and tidy,.	Post Construction	Contractor	BEZA/PMC
Occupational Health & Safety Plan	• All construction worker should wear a safety jacket and other protective equipment like helmet, gloves, gum boots, ear plugs, mask while working at the site • Workers should be made aware about the health issues related with open defecation • Training to workers should be provided for handling the construction equipment and machinery • Training to the workers should be provided to handle the emergency situations like fire, floods etc. • First aid facility and sufficient	During Construction	Contractor	BEZA/PMC

Activity/Impact	Mitigation Measures	Time Frame	Implentation of Mitigation Measures	Supervision & Monitoring
	nos. of trained personnel should be available at all the time at construction camp • Cautionary signage and notice should be displayed in local language and English at the required places like fuel storage area so that hazards can be avoided. A security guard should be deputed in these areas and entry should be restricted			
Disaster Management	All reasonable precaution will be taken to prevent danger of the workers and the public from fire, flood, drowning, etc. All necessary steps will be taken for prompt first aid treatment of all injuries likely to be sustained during the course of work.	During Construction	Contractor	BEZA/PMC

9.3.2. *Mitogation Plan for Dredging in Kushiyara River*

Dredging in the river will be carried out by the contractors to be hired by BEZA. Dredged sand will be used for filling the site as mentioned in Chapter 4 of the report. Management Plan for the Dredging is given in Table 47 below.

Table 47: Management Plan for Dredging

Impacted Environmental Component	Mitigation Measures During Construction Phase
Impact on Water Quality	• Dredging should be carrie out only by licensed dredgers of Inland Water Authority of Bangladesh • Dredging should be carried out in streches identified by BWDB • Dredged material extracted should be tested for toxicity & contamination • Usage of silt or air bubble screens/curtains should be explored to minimize the sediment release during dredging operations. • Dredger should be selected as per the strata to be dredged
Aquatic Ecology	• Dredging should not be carried out during breeding & spawning season of fishes • Measures like provision of bubble curtains or creation of agitation in water should be carried out prior carrying out dredging operations so as to provide avoidance time and let the species move away from drudging point and to prevent any injury/mortality. Dredging operations should be halted in case of sighting of RET species, if any • Contractors should submit SOPs and action time chart with risk management plan prior to any dredging work. Dredging sub-contractor should follow the defined safety procedures to avoid accidents and spills, and BEZA should ensure that other vessel users are provided with adequate information and instruction to avoid conflict with the dredgers.

Impacted Environmental Component	Mitigation Measures During Construction Phase
Socio-economy	• Dredging operations should be restricted to day time only, i.e. 6:00 Am-10:00 Pm only to minimize noise impacts on the residents of nearby settlements. Dredgers should be equipped with the noise reduction/masking equipment to reduce the noise generation • Dredgers should be placed in consultation with the fishermen so as to minimize the impact on their equipment/gears and their fishing activities • Log book should be maintained for recording the accidents at site/mortality of the any aquatic mammal should be maintained. Analysis shall be carried out to assess the reason for the accident/mortality and measures should be taken to prevent repetition of the event. • Contractors having experience of dredging and well trained staff should only be allowed to carry out dredging. This will help in prevention of spillage of dredged material or any accidents during the dredging operations • Dredging plan should be prepared by contractor and submitted to BEZA for approval prior to carrying out dredging operations. • Contractors should submit method statement & risk assessment plan prior to carrying out any dredging work. Dredger should follow the defined safety procedures to avoid accidents and spills, and BEZA should ensure that other vessel users are provided with adequate information and instruction to avoid conflict with the dredgers.

9.3.3. *Mitigation Plan for EZ*

The detailed plan shall be prepared by prospective developers. However industries should obtain environment clearance individually from DoEB prior to establishment and commencement. Measures that should be taken by developer and individual industrial owners during development and operation phase is tabulated in table 48 & 49 below

Table 48: Mitigation Measures Suggested for Developer

Impact	Mitigation Measures During Construction Phase
Identification of Site for Disposal of construction Debris, construction labour camp and plant site	• Site identified should be 1.0 km away from settlement, sensitive locations, like school, hospital, religious structures, reseve forest and any other eco-sensitive zone etc. • Site identified should be approved by BEZA and PMC • Site should be located in downwind direction from settlement area • Fertile agricultural land and community land should be avoided for setting of these facilities
Air Pollution	• Sprinkling of water during construction phase on all unpaved roads, site and haul roads • Avoiding excess pilling of raw material and debris at site • Storage & transportation of raw material and debris in covered conditions • Cutting of only identified trees after obtaining permission of forest department • Regular cleaning of site • Provision of adequate parking space at site so as to prevent idling of vehicles during construction phase • Upkeeping and maintenance of all the construction vehicles,

Impact	Mitigation Measures During Construction Phase
	machinery and equipment used for construction purpose • All vehicles entering the EZ site should carry PUC • Guiding signage should be provided at the site for vehicles entering the site to minimize the movement of vehicle within the site • Timings of the construction material vehicles should be fixed and should be during non-peak hours to prevent traffic congestion and traffic jams • Speed limits should be restricted within the site for all the construction vehicles • Usage of low energy intensive building material like fly ash mix cement and bricks • Usage of low sulphur diesel for running DG sets, construction vehicles and equipments • Obtaining temporary electricity connection during construction phase and operating DG sets only during power failure • Provision of wheel washing facility at exit point of site • Adequate air pollution control measures like provision of bag filters, stacks of adequate height should be provided with WMM, hot mix plant, batching plant etc. • Open burning of wood or any other material should be prohibited at site and all the workers should be made aware about the same • Zonation of EZ should be carried out such that high polluting industries should be located in downwind direction
Water Pollution & water Conservation	• Minimizing the run-off from the site by construction of sediment basins for collection of storm run-off and re-using that water for curing purpose and wheel washing • Curing of structures to be done by spraying and during early morning and evening hours only to minimize the water requirement • Maintaining the flow of water sprinklers so as to avoid wastage of water • No debris should be thrown or disposed off in any water body like river, pond, canal etc or ground water source like functional or abandoned well • Excavation should not be carried out during monsoon • Provision of temporary storm water drainage system during construction phase to drain the storm water and should be connected to nearest surface water body • Excavated pits should be provided with garland drains to prevent entrance of water inside the pit • Provision of oil & grease traps wih the storm water drains draining the parking and fuel storage area • Provision of septic tanks and soak pits at the site & labour camps for disposal of sewage generated by construction labour • Waste generated by construction camps should be disposed off regularly at the identified site for debris disposal • Provision of cross drainage structures like balancing for maintaining the drainage pattern • Stone & bricks should be purchased only from licenced vendors • Keeping provision of land for development of CSTP and CETP in future • Provision of rain water harvesting should be made at EZ site and rain water shall be used during operation phase to minimize fresh water requirement • Rain water harvesting tank should be developed at the site so as

Impact	Mitigation Measures During Construction Phase
	that water can be used for meeting daily water demand • Tank alarms should be installed so as to prevent overflow of water • Leakage detection should be carried out quarterly so as to detect any leakages in the water supply pipeline • Provision of land for CSTP an CETP should be made atleast 30 m away from the water pipeline, water storage tank and rain water storage tank
Soil Quality	• Top soil, if excavated from the project site should be stored in covered condition and should be used later for landscaping purpose • Storage of raw materials, debris and fuel on paved surfaces • Training the workers to handle the material so as to minimize spillage of material on soil • Provision of cross drainage structures to prevent water logging and soil erosion • Stone pitching with grass turfing should be done for the high embankment close to water body • Disposal of construction debris, municipal waste from labour camps and hazardous waste from site should be disposed off at the identified site • Construction debris should also be segregated at the site. This debris should be used for filling to the extent possible. Recyclable waste should be sent to recycler. Rejected waste should be disposed off at the designated sites by local authority • Keeping provision of land for development of soild waste management facility within the EZ site • No open area should be left without the vegetation to protect the soil. • Mulching of soil should be done regularly to prevent direct exposure of soil to wind and water
Noise Pollution	• Construction vehicles, machinery and equipment used for construction purpose should meet the standards prescribed by DoE • Upkeeping and regular maintenance of all the construction vehicles, machinery and equipment used for construction purpose • Speed limits should be restricted for all construction vehicles and equipment • Honking should be prohibited at the site • Provision of acoustic enclosures, noise mufflers, silencers etc with the DG sets and any noise generating machinery • Provision of temporary noise shield/barrier in areas where more noise will be generated
Ecology	• Only identified trees (if any) should be fell down after obtaining permission from forest department • Compensatory plantation should be carried out in ratio of min 1:2 under guidance of forest department • Development of 10 m (minimum) thick green buffer all along the periphery of EZ • Boundary should be constructed around the EZ site to prevent trespassing of the animals • Native plant species requiring should be considered for plantation • Timber should be purchased only from authorized vendors • No water body should be filled outside the EZ site

Impact	Mitigation Measures During Construction Phase
Socio-economy and aesthetics	• All proposed air, water, noise and soil pollution control measures should be taken • Provision of employment opportunity during construction phase to local people • Provision of personal protective equipment to all the workers • Job rotation should be practiced for workers exposed to high noise levels • Site should be covered from all the site during construction phase • Drinking water facility, adequate nos. of toilet, septic tank/soak pit, bathing facility, lighting should be provided in labour camps • Storm water drainage system should also be provide in labour camps to prevent water ponding and breeding of mosquitoes • LPG should be provided as fuel in the labour camps • Provision of facility like guest house, community building, commercial area, ATM, Bank, hospital and parking should be made within the EZ site
Disaster and Risk Management	• Provision of first aid kit and first aid room and well trained first aid practioner at the site all the time • Ambulance facility should be provided at the site • Tie-ups with local hospital should be made to handly emergency case, if any • Availability of safety officers and supervisors at all the time on the site • Workers should be given training for handling construction vehicles, equipment and handling emergency situations like fire, floods, earthquake and cyclone • Cautionary signage should be provided in the areas associated with risks like storage of explosives, fuels, heavy construction material etc. Entry for only trained authorized personnel should be allowed in such areas with adequate safery measures • Emergency handling cell & room should be developed at the site and should be headed by project & safety manager • Contact no. of nearest fire-station and hospitals should be displayed within the emergency handling room

Table 49: Mitigation Measures Suggested for Individual Plot Owners

Impact	Mitigation Measures During Construction Phase	Mitigation Measures During Operation Phase
Air Pollution	• Sprinkling of water during construction phase on all unpaved roads, site and haul roads • Avoiding excess pilling of raw material and debris at site • Storage & transportation of raw material and debris in covered conditions • No trees should be fell down without permission of BEZA and forest department • Regular cleaning of site • Provision of adequate parking space at site so as to prevent idling of vehicles during construction phase	• Installation of air pollution control devices like Electro-static precipitator, bag filters, separators, cyclones, multi-level condensers & evaporators, scrubbers, quenchers, stacks of height as per DoE norms • Disposal of the waste material at the designated site for waste disposal in covered condition • All the roads within the plot should be paved & water sprinkling should be practiced to minimize dust generation. • Adequate stack height should be provided for dispersion of the

Impact	Mitigation Measures During Construction Phase	Mitigation Measures During Operation Phase
	• Upkeeping and maintenance of all the construction vehicles, machinery and equipment used for construction purpose • All vehicles entering the EZ site should carry PUC • Guiding signage should be provided at the site for vehicles entering the site to minimize the movement of vehicle within the site • Timings of the construction material vehicles should be fixed and should be during non-peak hours to prevent traffic congestion and traffic jams • Construction vehicles should follow the speed limits set up for EZ zone • Usage of low energy intensive building material like fly ash mix cement and bricks • Usage of low sulphur diesel for running DG sets, construction vehicles and equipments • Obtaining temporary electricity connection during construction phase from BEZA and operating DG sets only during power failure • Provision of wheel washing facility at exit point of site • Open burning of wood or any other material should be prohibited at site and all the workers should be made aware about the same	emissions • Chemicals having potential to release VOCs should be stored, handled and used in closed system • Quarterly monitoring should be carried out for testing ambient air quality • Development of thick green belt of 10 m all along the industrial plot periphery
Water Pollution & water Conservation	• Minimizing the run-off from the site by construction of temporary storm water drainage, sediment basins for collection of storm run-off and re-using that water for curing purpose and wheel washing • Curing of structures to be done by spraying and during early morning and evening hours only to minimize the water requirement • Maintaining the flow of water sprinklers so as to avoid wastage of water and ponding of water • No debris should be thrown or disposed off in any water body like river, pond, canal etc or ground water source like functional or abandoned well • Excavation should not be carried out during monsoon • Excavated pits should be provided with garland drains to prevent entrance of water inside the pit • Provision of septic tanks and soak pits at the site for disposal of sewage	• Provision of ETP & STP for treatment of sewage and industrial effluent • Provision of dual plumbing system so as treated water from STP can be re-used for flushing, horticulture and cooling purpose • Separation of the effluent streams depending on the nature of pollutants • Monitoring the quality of sewage, treated water, drinking water quality and ground water quality regularly • Tank alarms should be installed so as to prevent idle running of pumps • Provision of storm water drainage system at site and it should be connected to rain water harvesting system. Storm water drains should also be connected to the nearest surface water body to drain excess flow, if any • Provision of rain water harvesting system so that water can be collected and used to meet daily water

Impact	Mitigation Measures During Construction Phase	Mitigation Measures During Operation Phase
	generated by construction labour • Waste generated during construction should be disposed off regularly at the identified site for debris disposal • Stone & bricks should be purchased only from licensed vendors	demand. • Provision of oil & grease traps with the storm water drains draining the parking and fuel storage area • Leakage detection system should be provided and the water supply system should be regularly inspected to detect leakages • Distance of STP/ETP and RWH pits should be minimum 30 m to prevent contamination of collected storm water • Untreated effluent should not be discharged into surface water body or any abandoned ground water source or to ground. • No hazardous waste, municipal waste, industrial waste should be disposed off in the water bodies or in ground • Leachates, if any or untreated sewage should be stored only in lined ponds to prevent contamination of ground water
Soil Quality	• Top soil, if excavated from the project site should be stored in covered condition and should be used later for landscaping purpose • Storage of raw materials, debris and fuel on paved surfaces • Training the workers to handle the material so as to minimize spillage of material on soil • Disposal of construction debris, municipal waste and hazardous waste at designated sites • Construction debris should also be segregated at the site. This debris should be used for filling to the extent possible. Recyclable waste should be sent to recycler. Rejected waste should be disposed off at the designated sites by local authority	• All industries should use best technologies for optimal utilization of the raw material and re-use & recycling of waste material in the process to reduce waste generation as well as raw material demand for the project. • All industries should be responsible for management of the solid and hazardous waste generated from their plots. Industries should be liable to pay penalty in case of non compliance of conditions laid down by DoE • It should be mandatory for all industries to provide storages for different category waste, its processing and safe disposal. Options for composting of compostable waste, segregation and selling recyclable waste should be opted • Waste storage area should be paved surfaces and covered • No open area should be left without the vegetation to protect the soil.
Noise Pollution	• Construction vehicles, machinery and equipment used for construction purpose should meet the standards prescribed by DoE • Upkeeping and regular maintenance of all the construction vehicles, machinery and equipment used for construction purpose	• Usage of machineries of modern make and adoption of latest available technology which compiles to noise levels standards laid by DoE • Provision of personal protective equipment to workers exposed to noisy operations. Audiometric tests should be carried out for workers

Impact	Mitigation Measures During Construction Phase	Mitigation Measures During Operation Phase
	• Speed limits should be restricted for all construction vehicles and equipment • Honking should be prohibited at the site • Provision of acoustic enclosures, noise mufflers, silencers etc with the DG sets and any noise generating machinery • Provision of temporary noise shield/barrier in areas where more noise will be generated	exposed to high noise levels. Job rotation should be practiced to prevent continual exposure. • Noise levels in industries should be monitored regularly using noise meters. • Minimal usage of horns within industrial plot. Specification of speed limits on roads made by BEZA should be followed. Provision of speed breakers at regular intervals to regulate speed of vehicles • Regular maintenance of vehicles & construction machinery involved in industrial operation • Noisy operation should be taken up in covered conditions so that no disturbance due to noise is caused • Thick green belt should be developed within each industrial plot that will act as noise barrier..
Ecology	• Only identified trees should be fell down after obtaining permission from forest department • Compensatory plantation should be carried out in ratio of min 1:2 under guidance of forest department • Native plant species requiring should be considered for plantation • Timber should be purchased only from authorized vendors	• Green belt of 10 m thickness should be developed all along the periphery of the industrial plot • Native plant species requiring should be considered for plantation
Socio-economy and aesthetics	• All proposed air, water, noise and soil pollution control measures should be taken • Provision of employment opportunity during construction phase to local people • Provision of personal protective equipment to all the workers • Job rotation should be practiced for workers exposed to high noise levels • Site should be covered from all the site during construction phase • Drinking water facility, adequate nos. of toilet, septic tank/soak pit, bathing facility, lighting should be provided for construction labour • Storm water drainage system should also be provide at site to prevent water ponding and breeding of mosquitoes	• Social welfare activities shall be carried out by each industrial owners in nearby areas of EZ like development of cattle sheds, arranging trainings for villagers for best agriculture practices, providing skill generation training to locals so as they can be employed in industries • Providing employment to local people preferably • Adoption of all proposed air, noise, soil and water quality measures • Rain water harvesting should be carried out in EZ so as to minimize the water extraction from River.
Disaster and Risk Management	• Provision of first aid kit and first aid room and well trained first aid practioner at the site all the time • Ambulance facility should be provided at the site • Tie-ups with local hospital should be	• Provision of first aid kits at the site • Tie-ups with local hospital should be made to handling emergency case, if any • Regular medical check-ups of the employees

Impact	Mitigation Measures During Construction Phase	Mitigation Measures During Operation Phase
	made to handling emergency case, if any • Availability of safety officers and supervisors at all the time on the site • Workers should be given training for handling construction vehicles, equipment and handling emergency situations like fire, floods, earthquake and cyclone • Cautionary signage should be provided in the areas associated with risks like storage of explosives, fuels, heavy construction material etc. Entry for only trained authorized personnel should be allowed in such areas with adequate safery measures • Emergency handling cell & room should be developed at the site and should be headed by project & safety manager • Contact no. of nearest fire-station and hospitals should be displayed within the emergency handling room	• Training should be given to workers for handling the equipment and managing emergency situations • Material safety data sheets of chemicals to be used should be displayed on local languages at work station • Provision of personal protective equipment to the workers as per requirement • Cautionary signage should be provided in the areas associated with risks like storage of chemicals, explosives, fuels etc. Entry for only trained authorized personnel should be allowed in such areas with adequate safety measures

9.4. Enhancement Plan

The proposed project involves development of EZ and off-site facilities for the upcoming Shreehata EZ. Off-site facilities will be developed by BEZA. Development of these off-site infrastructure facilities will attract the investors and make the proposed site location more accessible for trading and business. Proximity of the proposed project site to the Dhaka Sylhet Highway and an already existing inland water transportation system further adds to the suitability of site for setting up the industries. As enhancement plan, it is proposed that BEZA should develop a thick green belt all around the EZ site, proper storm water drainage to prevent flooding and rain water harvesting system to harvest rain water and use it to meet daily water demand and reduce pressure on ground water resources. A no development zone will be developed along the water body in Part B. This zone will be site for migratory birds during winter season.

9.5. Contingency Plan

In order to be in a state of readiness to face adverse effects of accidents, a Contingency Plan is required to be prepared which includes on-site and off-site emergency plan by the individual industry and industrial estate. BEZA is committed to develop a Contingency Plan in consultation with district authorities and industry association.

The Contingency Plan will have the following minimal components:

- Accidents preventions procedures/ measures
- Fire prevention planning and measures
- Fire water storage and foam system
- Accident/emergency response planning procedure
- Communication
- Emergency control centre

- Emergency information system with role & responsibility and command structure
- Recovery procedure
- Assessment of damages and rectification
- Evaluation of functioning of disaster management plan
- Accident investigation
- Clean-up and restoration

9.6. Compensation Plan

Project development involves acquisition of land. Project development involves displacement and relocation of the project. Compensation will be given to land owners. Detailed SIA, land acquisition plan and resettlement & rehabilitation plan is prepared for the project. Compensation plan is also prepared for the project and is given in the SIA report

9.7. Monitoring Plan

The objective of environmental monitoring during the construction and operation phases is to compare the monitored data against the baseline condition collected during the study period to assess the effectiveness of the mitigation measures and the protection of the ambient environment based on national standards. A monitoring schedule has been sketched based on the environmental components that may be affected during the construction and operation of the project and is given below in table 50.

Table 50: Environmental Monitoring Plan

S. No.	Aspect	Source of Impact	Monitoring Methods and Parameters	Frequency	Executing Agency	Enforcement Agency
1.0	**Construction Phase**					
1.1	Local Manpower Absorption	Construction Works	Contractor's report No. of people working in the project	Monthly	Civil Contractor	BEZA & PMC
1.2	Soil Erosion	Excavation, disposal, cut & fill and land clearing activities for site leveling and internal roads, disposal	Survey & observation; Extent and degree of erosion; Structures for controlling soil erosion	During Rainy Season	Contractor	BEZA & PMC
1.3	Greenbelt Development	-	Survival rate of species planted; Density of vegetation	Half Yearly	Contractor/BEZA	BEZA & PMC
1.4	Air Quality	Transportation of construction materials, road construction, construction of utilities	Survey & observations; Levels of PM_{10}, $PM_{2.5}$, SO_2, NOx, CO	Once in each season for twice a week for two weeks at 3 locations		BEZA & PMC
1.5	Waste Management	Restoration of disposal sites and construction areas	Status of protection measures	Quarterly	Contractors	BEZA & PMC
1.6	Noise Level	Noise levels compliance with	Ambient Equivalent	Daily	Contractors	BEZA & PMC

S. No.	Aspect	Source of Impact	Monitoring Methods and Parameters	Frequency	Executing Agency	Enforcement Agency
		respect to industrial standards	continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations			
1,7	Drinking Water	Contamination	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
1.8	Surface Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
1.9	Ground Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Once in month	Contractor	BEZA & PMC
2.0	**Operation Phase**					
2.1	Noise Levels	Noise levels compliance with respect to industrial standards	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations	Once in every month		BEZA & PMC
			Plant periphery and near noise generation sources	Monthly	Individual Industrial Units	BEZA & PMC
2.2	Biological Environment	Horticulture/ Greenbelt Development	Survival rate of plants and shrubs	Quarterly	BEZA	BEZA & PMC
			Survival rate of plants and shrubs at individual unit	Quarterly	Individual unit	BEZA & PMC
2.3	Air Quality	Industrial activities	PM_{10}, $PM_{2.5}$, SO_2, NO_x	Quarterly	Individual unit	BEZA & PMC
2.4	Surface Water Quality	Effluents and run-off from Industries and EZ site	All physio-chemical & biological parameters	Quarterly	BEZA & Individual Units	BEZA & PMC
2.5	Ground Water Quality	Contaminated Run-off	All physio-chemical & biological parameters	Quarterly	BEZA & Individual Units	BEZA & PMC
2.6	Noise Level	Noise levels compliance with respect to industrial standards	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time at 6 to 8 locations	Quarterly	BEZA & Individual Units	BEZA & PMC

9.8. Monitoring Indicators

The physical, biological and social components which are of particular significance to the proposed project are listed below:

- Air quality
- Water quality
- Noise levels
- Solid & Hazardous Waste Management
- Re-plantation success / survival rate
- Soil Erosion

These indicators will evaluated periodically based on the monitoring results, baseline conditions, predicted impacts and mitigation measures.

9.9. Institutional Arrangement

BEZA has developed Environmental Management Framework with the help of World Bank. The institutional arrangement is aligned as per this framework. BEZA will have an Environmental and social cell which will coordinate with site engineers and PMC.

10. Cost Estimation for Environment Mitigation Measures and Monitoring

10.1. Environment Management Cost

Environment management cost includes the cost of mitigation measures as proposed under impact identification chapter. Most of the costs are part of construction costs. Detailed cost breakup for the project is given below in the table 51.

Table 51: Environment Management Cost of Project during Construction and Operation phase

S. No.	Environment Management Measure	Capital Cost	Recurring Cost	Responsible Institution
Construction Phase				
1.	Provision of Personal protective Equipment to all labour involved in construction of proposed off-site developments	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
2.	Construction of Labour camps	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
3.	Construction of Toilets & Septic Tanks/Soak Pits	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
4.	Construction of Temporary storm water drainage system	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
5.	Construction waste management and disposal	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
6.	Provision of clean drinking water supply	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
7.	Water sprinkling	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
8.	Environmental monitoring • Air quality • Noise level • Drinking water quality	-	0.20 Tk Mn per annum	Contractor, PMC & BEZA
9.	Safety & Quality inspections	Included in construction cost	Included in construction cost	Contractor, PMC & BEZA
10.	Environmental Training	-	0.2 Mn per annum	Contractor, PMC & BEZA
Operation Phase				
11.	Environmental monitoring • Air quality • Noise level • Ground Water Quality at Manik Nagar • Ground Water level at 4 locations (withdrawing stations & nearby area)	-	0.30 Tk Mn per annum	BEZA

11. Conclusion and Recommendation

11.1. Conclusions

EZ project has been proposed by Govt. of Bangladesh for rapid economic development in the area including the backward and undeveloped areas. BEZA, formed under EZ Act, 2010 is overall agency for implementation of EZ projects. EZ will be developed following PPP approach. This will make development less reliant on Government fiscal subsidies. BEZA will invest in land and related on-site infrastructure development so as to make zone accessible and resourceful. Thereafter economic zone development will be responsibility of private developers. Off-site facilities proposed to be developed by BEZA include development of administration building, boundary wall and site development for economic zone and development of economic zone.

The project subject to its nature of activities falls under Red category as per ECA, 1995 and requires prior environment clearance from DoE, Bangladesh. To obtain approval of DoEB, an Initial Environment Examination (IEE) Report for development of off-site facilities along with proposed Terms of Reference (ToR) was submitted vide letter dated 07.04.2015. Approved ToR was granted by DoE vide Memo No. DoE/Clearance/5342/2014/202 dated 14th May, 2015. EIA study has been carried out as per the approved ToR by DoE, World Bank guidelines and EMF of PSDSP.

Upcoming EZ lies in Sherpur Upzila. EZ site is divided into two parts, i.e. part A & part B. Part A is private agricultural land and part B is Government land which is water body. Site lies along the Dhaka Sylhet Highway connecting site to all major cities. River Kushiyara is app. 800 m distance from EZ site in North direction. Administration building will be constructed within EZ site at this stage. Other developments include construction of boundary wall and site filling & leveling. At present only above mentioned off-site facilities will be developed at EZ site. Remaining infrastructure and EZ development will be carried out in later stages by the developer. Water supply system, power supply system and gas supply system will be developed by BWDB, PGCB and Jalalabd Gas Company respectively.

Attempts were made to assess all the predicted environmental and social impacts with evaluating the nature, temporal and spatial extent, reversibility and likelihood of the predicted impacts. Finally, the predicted impacts were summarized in a qualitative scale of consequence. The assessment includes impacts on physical setting, impacts on air quality, impacts on water resources, impacts on land and agricultural resources, impacts on fisheries, impacts on ecosystem resources, and impacts on socio-economic environment. The project development involves land acquisition, loss of agricultural land, cutting of trees, river water quality and extraction of water from river. Thus the project will mainly impact the socio-economic, water resources and ecology of the area. Impacts on other environmental and social factors are not significant. However operation of industries may emit significant emissions which may pollute air, water & soil environment of the study area, if not managed properly. Management plan has been prepared to address the issues identified during impact assessment. Mitigation plan for the environmental and social issues is given in Chapter-9 of the report in detail. Environment management plan proposed shall be implemented to minimize the anticipated impacts and to enhance the project benefits during the pre-construction, construction and operation phase of the project.

11.2. Recommendations

Recommendations made for the project development on the basis of EIA study are given below:

- Proposed environment management plan should be implemented strictly both during operation and construction phase of the project
- Compensatory plantation should be carried out for trees to be fell (if any) in minimum ratio of 1:2

- Suggestions & requests made by public for providing employment to them shall be taken into consideration
- Proper training of maintaining environment, health and safety should be given to Project management unit in both construction an operation phase
- Provision of garland drain, thick green belt, CETP, STP, segregated storm water shall be adhered.
- Retaining the part B of EZ site (water body) in its existing condition
- Rain water harvesting should be carried out to reduce the pressure on surface and ground water resources.
- Construction activities for EZ & off-site facilities should only be started after obtaining environment clearance certificate from DoE, Bangladesh
- Environmental monitoring should be conducted as proposed in environment management plan

Annexures

Annexure-I-ToR Letter

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

Memo No: DoE/Clearance/5342/2014/ 202 Date: 14 /05/2015

Subject: Approval of Terms of Reference (TOR) for EIA of Sherpur Economic Zone at Moulvibazar Upazila under Moulvibazar District

Ref: Your Application dated 07/04/2015.

With reference to your application dated 07/04/2015 for the subject mentioned above, the Department of Environment hereby gives approval of the Terms of Reference (ToR) for Environmental Impact Assessment (EIA) Study of the proposed Sherpur Economic Zone at Moulvibazar Upazila under Moulvibazar District subject to fulfilling the following terms and conditions:

I. The project authority shall conduct a comprehensive Environmental Impact Assessment (EIA) study considering the overall activity of the said project in accordance with this ToR and following additional suggestions.

II. The EIA report should be prepared in accordance with following indicative outlines :

1. Executive summary
2. Introduction: (Background, brief description, rationale of the project, scope of study, methodology, limitation, EIA team, references)
3. Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)
4. Project Description
   - i. Introduction
   - ii. Project Objective
   - iii. Project Options
   - iv. Interventions under Selected Options
   - v. Project activities: A list of the main project activities to be undertaken during site clearing, construction as well as operation
   - vi. Project schedule: The phase and timing for development of the project
   - vii. Resources and utilities demand: Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project
   - viii. Map and survey information
     Location map, cadastral map showing land plots (project and adjacent area), geological map showing geological units, fault zone, and other natural features.
   - ix. Project Plan, Design, Standard, Specification, Quantification, etc.
5. Environmental and Social Baseline
   - 5.1 Meteorology
     - 5.1.1 Temperature
     - 5.1.2 Humidity

5.1.3 Rainfall
5.1.4 Evaporation
5.1.5 Wind Speed
5.1.6 Sun Shine Hours

5.2 Water Resources
5.2.1 Surface Water System
5.2.2 Tropical Cyclones and Tidal Flooding
5.2.3 Salinity
5.2.4 Drainage Congestion and Water Logging
5.2.5 Erosion and Sedimentation
5.2.6 River Morphology
5.2.7 Navigation
5.2.8 Ground Water System

5.3 Land Resources
5.3.1 Agroecological Regions
5.3.2 Land Types
5.3.3 Soil Texture
5.3.4 Land Use

5.4 Agriculture Resources
5.4.1 Farming Practice
5.4.2 Cropping Pattern and Intensity
5.4.3 Cropped Area
5.4.4 Crop Production
5.4.5 Crop Damage
5.4.6 Main Constraints of Crop Production

5.5 Livestock and Poultry
5.5.1 Feed and Fodder Shortage
5.5.2 Livestock/Poultry Diseases

5.6 Fisheries
5.6.1 Introduction
5.6.2 Problem and Issues
5.6.3 Habitat Description
5.6.4 Fish Production and Effort
5.6.5 Fish Migration
5.6.6 Fish Biodiversity
5.6.7 Fisheries Management

5.7 Ecological Resources
5.7.1 Bio-ecological Zone
5.7.2 Common Flora and Fauna
5.7.3 Ecosystem Services and Function

5.8 Socio Economic Condition
5.8.1 Socio Economic Condition
5.8.2 Quality of Life Indicators
5.8.3 Income and Poverty
5.8.4 Gender and Women
5.8.5 Common Property Resources
5.8.6 Conflict of Interest and Law and Order Situation
5.8.7 Historical, Cultural and Archaeological Sites

5.9 Ecological Resources
5.9.1 Bio-ecological Zone
5.9.2 Common Flora and Fauna
5.9.3 Ecosystem Services and Function

6. Identification and Analysis of Key Environmental Issues (Analysis shall be presented with Scenarios, Maps, Graphics, etc. for the Case of Anticipated Impacts on Baseline)
6.1 Environmental Sensitivity Investigation

III. Without obtaining approval of EIA report by the Department of Environment, the project authority shall not be allowed to conduct earth filling or any kind of physical intervention in the proposed project site and also not be able to start the physical activity of the project.
IV. This approval of the Terms of Reference (TOR) would not mean any acceptance or site clearance of the project.
V. The proposed EIA study would not establish any claim, right in favour of the proponent for getting site clearance or environmental clearance.
VI. Without obtaining Environmental Clearance, the project authority shall not be able to start the operation of the project.
VII. The project authority shall submit the EIA along with the No Objection Certificate (NOC) from the local authority, NOC from Forest Department (if it is required in case of cutting any forested plant, private or public), NOC from concerned authority for cutting/razing/dressing of hill or hilly land (if it is required), the applicable fee in a treasury chalan and NOC from other relevant agencies for operational activity etc. to the Sylhet Divisional Office of DOE in Sylhet with a copy to the Head Office of DOE in Dhaka.

14.05.2015

(Syed Nazmul Ahsan)
Director (Environment Clearance, c.c)
Phone # 02-8181778

Project Director
Sherpur Economic Zone
Support to Capacity Building of Bangladesh Economic Zones Authority Project
Bangladesh Economic Zones Authority (BEZA)
BDBL Bhaban, Level # 15
12, Kawran Bazar, Dhaka-1215.

Copy Forwarded to:

1) PS to Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Sylhet Divisional Office, Sylhet.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Annexure II-Attendance Sheets of PCM

ATTENDANCE SHEET Muzushpur-

S. No.	Name	Phone Number	Occupation	Signature
01	Habibun Rahman	01724603566	Community Leader.	
02	Mahmud Alam	01713812851	Private Firm	
03	Masud Alm	01711485121	Business	Masud Alam
04	Abdul Momin	01726483802	Farmer	
05	Shaik Jitu Mia	01819658985	Farmer.	
06	Mohammad Asik Mia	01726859026	Farmer.	
07	[illegible]		[illegible]	[illegible]
08	[illegible]		Farmer	[illegible]
09	[illegible]		[illegible]	[illegible]
10	[illegible]		[illegible]	[illegible]
11				

ATTENDANCE SHEET Village- Aiynpur

S. No.	Name	Phone Number	Occupation	Signature
১।	সুব্রত সূত্রধর	01819-098235	কৃষক	[illegible]
২।	অমূল্য দেবনাথ	01719-178470	কৃষক	অমূল্য দেবনাথ
৩।	সুমন সূত্রধর	01725-809058	কৃষক	
৪।	খোকন সূত্রধর	01762-158736	কৃষক	
৫।	রেখা রানী দেব		গৃহিনী	রেখা রানী দেব
৬।	দীপ্তি সূত্রধর		"	দীপ্তি সূত্রধর
৭।	সুষমা লতা সূত্রধর		"	সুষমা লতা সূত্রধর
৮।	জয়ন্তী সূত্রধর		"	জয়ন্তী সূত্রধর
৯।	অরবিন্দ বালা দেবনাথ		"	অরবিন্দ দেবনাথ
১০।	হাঁসী রানী সূত্রধর		"	হাসী রানী
১১।	মঞ্জুলা সূত্রধর		"	মঞ্জুলা রানী সূত্রধর
১২।	অর্চনা দেবনাথ		"	
১৩।	গৌরী দেবনাথ		"	গৌরী দেবনাথ
১৪।				

ATTENDANCE SHEET

S. No.	Name	Phone Number	Occupation	Signature
১	মনির মিয়া			মনির মিয়া
২	মিলন মিয়া			অমিলন মিয়া
৩	হেলাল আহমদ			[illegible]
৪	রময়ুল বেগম			
৫	আমিয়া বেগম			আমিয়া
৬	সেলিনা বেগম			[illegible]
৭	সুফিয়া বেগম			সুফিয়া
৮	সাহেদা বেগম			শামিলা [illegible]
৯	মল্লিকা বেগম			সাহেদা
১০	[illegible] মিয়া			
১১	আলিমা বেগম			আলেমা
১২	রহিমা বেগম			রহিমা
১৩	কল্পনা বেগম			কল্পনা
১৪	[illegible] বেগম			
১৫	হাসিনা বেগম			হাসিনা
১৬	[illegible]			
১৭	সেলিনা বেগম			
১৮	আফিয়া বেগম			
১৯	জাহানারা বেগম			জাহানারা
২০	নাজির মিয়া			
২১	সালাম মিয়া			
২২	জাহাঙ্গীর মিয়া			
২৩	তারেক মিয়া			তারেক
২৪	লুৎফর মিয়া			
২৫	আলমগীর			
২৬	নুরুল ইসলাম			[illegible]
২৭	সায়মিমা			সায়মিমা

বাংলাদেশ অর্থনৈতিক অবস্থা সর্বোচ্চ

মেহেরপুর অর্থনৈতিক অবস্থা

তাং, ২০/৩/২০১৫

হাজিরা সিট

ক্রমিক নং	নাম	পেশা	মোবাইল	স্বাক্ষর
১	শ্রীমতি সরকার পিং: মনোরঞ্জন সরকার	মৎস্যজীবী		
২	তারক সমাদ্দার, পিং- তারেক সমাদ্দার	"		তারক
৩	অমিত দাস পিং- গোবিন্দ দাস	"		রবীন্দ্র [illegible]
৪	রতন দাস পিং- গোপাল সরকার	"	01862 815832	রতন
৫	মাহিদুর সরকার পিং- মাহের সরকার	"	01751629110	মাহিদুর
৬	সুশীল সরকার পিং- সুরেশ সরকার	"		
৭	বলু সরকার - পি -	"		
৮	গোপাল দাস পিং- গানের দাস			
৯	সুনিল দাস, ঐ "	"		
১০	নন্দলাল দাস, ঐ ঐ নন্দের	"		নন্দলাল

Annexure II-Map of Source of site filling from Kushiyara River

Proposed site

N 207

Dhaka - Sylhet Hwy

Sylhet-MoulVibazar Rd

N207

Location for dredging

Fazilpur Rd

Image © 2016 CNES / Astrium
Image © 2016 DigitalGlobe
© 2016 Google

Google earth

2013

Imagery Date: 2/26/2014 24°36'42.30" N 91°41'25.29" E elev 11 m eye alt 9.21 km

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