



**Final Report**

**Environmental and Social Impact Assessment (ESIA)**

**City Edible Oil Captive Power Plant Ltd.**

**City Economic Zone, Rupganj, Narayanganj**

**Prepared By**

**Environmental Study & Research Division**

**Water Technology BD Limited**

**Website: [www.wtbl.com.bd](http://www.wtbl.com.bd)**

**May, 2021**

**Acknowledgment**

---

The report has been prepared by Water Technology BD Limited for the regulatory requirement of Department of Environment (DoE), Ministry of Environment Forests and Climate Change, The Government of People's Republic of Bangladesh. Water Technology BD Ltd. has undertaken a detailed environmental survey and has developed a comprehensive Environmental and Social Impact Assessment (ESIA) for the **City Edible Oil Captive Power Plant Limited**. Any third party should obtain prior consent of WTBL before copying or reproducing, in whole or in part, the contents of this report. WTBL disclaims any responsibility for any loss or damage suffered by any third party by taking reliance of this report. Furthermore, WTBL will not be bound to discuss, explain or reply to queries raised by any agency other than the intended recipients of this report. All information in the report is intellectual property of the **City Edible Oil Captive Power Plant Limited**.

Our assessment and review are based on the facts and details provided to us during our discussions specific to the Project and may not be similar across the organization/state. If any of these facts or details provided to us are not complete or accurate, the conclusions drawn from subsequent complete or accurate facts or details could cause us to change our opinion. The conclusions drawn and recommendations made are based on the information available at the time of writing this report.

WTBL does not accept any liability or responsibility for the accuracy, reasonableness or completeness of, or for any errors, omissions or misstatements, negligent or otherwise and does not make any representation or warranty, express or implied, with respect to the information contained in this document if the client failure to provide right information about the project. The information contained in this document is selective and is subject to updating, expansion, revision and amendment. It does not, and does not purport to, contain all the information that a recipient may require. Further this is not an audit report and no reliance should be based on this report for the purposes of audit.

## Table of Contents

---

1	Introduction .....	1
1.1	Overview.....	1
1.2	Purpose of the study .....	2
1.3	Scope of the ESIA study .....	2
1.4	Extent of the Study .....	3
1.5	ESIA Content.....	3
1.6	Approach & Methodology .....	4
1.6.1	Approach.....	4
1.6.2	Methodology.....	5
1.7	Limitation of the Study.....	10
1.7.1	ESIA Team.....	11
1.8	References.....	11
2	Legislative, Regulation and Policy consideration .....	14
2.1	Policy, Legal and Administrative Framework .....	14
2.2	Legal Enforcement Agencies .....	14
2.3	Regulatory Requirements for the Proposed Project .....	20
2.4	Asian Development Bank (ADB) Safeguard Principles and Policies .....	37
2.4.1	Safeguard Policy Statement (SPS), 2009.....	37
2.4.2	Social Protection Strategy, 2001 .....	39
2.4.3	Public Communications Policy 2011 .....	40
2.4.4	Categorization of Projects .....	41
2.5	Safeguard Requirements of Equator Principle Financial Institutions .....	41
2.5.1	Principle 1 (Review and Categorization).....	41
2.5.2	Principle 2 (Environmental and Social Assessment).....	42
2.5.3	Principle 3 (Applicable Environmental and Social Standards) .....	42
2.5.4	Principle 4 (Environmental and Social Management System and Equator Principles Action Plan).....	42
2.5.5	Principle 5 (Stakeholder Engagement) .....	43
2.5.6	Principle6 (Grievance Mechanism) .....	43
2.5.7	Principle7(Independent Review) .....	44
2.5.8	Principle 8 (Covenants) .....	44
2.5.9	Principle 9 (Independent Monitoring and Reporting).....	45

2.5.10 Principle10 (Reporting and Transparency): For all Category A and, as appropriate, Category B Projects .....	45
2.6 Triggering of World Bank Performance Standards .....	45
2.7 Applicable International Conventions.....	48
2.8 International and National Environment Standards/ Guidelines .....	49
2.9 Ambient Air quality standards .....	49
2.10 Water quality standards .....	51
2.11 Liquid Effluent Discharges .....	54
2.12 Ambient Noise Standards .....	56
<b>3 Description of the Project.....</b>	<b>58</b>
3.1 Project Definition.....	58
3.2 Location of the project.....	58
3.3 Basic Information of Project .....	59
3.4 Project components .....	60
3.5 Final Product:.....	61
3.6 List of Machinery: .....	61
3.7 Production process & Description for Power Plant & Co generation.....	62
3.7.1 Technical Data:.....	63
3.7.2 Exhaust gas data.....	63
3.7.3 Technical data of heat recovery .....	64
3.7.4 Double Steam Generator for 2x engines (natural gas):.....	66
3.7.5 Double Steam Boiler with 2 Economizers and 2 super heaters: .....	66
3.7.6 Steam Generator:.....	67
3.7.7 Safety Equipment:.....	68
3.7.8 Non-Electric Chiller:.....	68
3.7.9 Function .....	69
3.7.10 Application.....	69
3.7.11 Cooling capacity .....	69
3.7.12 Energy sources.....	69
3.7.13 The cooling principle .....	69
3.7.14 Energy Saving Comparison .....	70
3.7.15 Power consumption comparison: .....	71
3.7.16 Safety .....	71
3.8 Resources and Utility Demand .....	76

3.8.1	Fuel & Lubricant:.....	76
3.8.2	Water Demand:.....	76
3.9	Gas Distribution line .....	76
4	Environment Baseline Study.....	77
4.1	Introduction.....	77
4.2	Objective and Methodology .....	77
4.3	Study Area.....	79
4.4	Environment: Physical.....	80
4.4.1	Climate .....	80
4.4.2	Land Use .....	84
4.4.3	Geology .....	85
4.4.4	Topography .....	87
4.4.5	Water Quality Assessment .....	88
4.4.6	Air Quality Assessment .....	90
4.4.7	Ambient Noise Quality .....	93
4.5	Environment: Ecological .....	94
4.5.1	Introduction .....	94
4.5.2	Scope of work .....	94
4.5.3	Methodology.....	95
4.5.4	Collection of Terrestrial Plants Data .....	95
4.5.5	Collection of Terrestrial Fauna Data .....	95
4.5.6	Collection of fish data .....	96
4.5.7	Results .....	96
4.6	Natural Hazards.....	101
4.6.1	Seismicity.....	101
4.6.2	Cyclone .....	102
4.6.3	Flood .....	104
4.6.4	River Morphology .....	104
5	Description of The Social Conditions.....	107
5.1	Background .....	107
5.2	Economic Situation .....	107
5.3	Household Socio-Economic Study.....	108
5.3.1	Socio economic study .....	108
5.4	Socio-Demographic Characteristic of the Project Area .....	109

5.4.1	Household size and Sex-ratio .....	109
5.4.2	Age Distribution of the Population and Marital Status .....	110
5.5	Educational Status.....	111
5.6	Occupation and Employment.....	112
5.7	Religion status of the study area.....	114
5.8	Land Use pattern and Household Land Ownership: .....	114
5.9	Household Income, Expenditure and Distribution.....	114
5.10	Sources of Household Income.....	115
5.11	Transportation and Communication .....	116
5.12	Industry .....	117
5.13	Cultural and Social Resources: .....	117
6	Public Consultation and Disclosure .....	119
6.1	Introduction.....	119
6.2	Approach and Objectives of PCM and PD for ESIA .....	119
6.2.1	Approach of PCM and PD for ESIA .....	119
6.2.2	Objectives of PCM and PD for EIA .....	120
6.2.3	Stakeholder Engagement Plan .....	120
6.3	Public Consultation Meetings (PCMs) .....	121
6.4	Public Disclosure Meetings (PDMs) .....	123
7	Key Impacts identification .....	126
7.1	General Consideration .....	126
7.2	Scoping of Impacts .....	126
7.3	Checklist for identification of probable Environmental Impact.....	126
8	Evaluation of Predicated Adverse Impacts and Mitigation.....	128
8.1	Impact due to Pre-Construction .....	128
8.1.1	Overland Drainage and Impact on surface water .....	128
8.1.2	Change in Landscape.....	128
8.1.3	Loss of and Displacement from Agricultural land and House .....	128
8.1.4	Disruption of Earth Surface.....	129
8.1.5	Inadequacy of Buffer Zone.....	129
8.2	Impacts due to Construction.....	130
8.2.1	Air pollution .....	130
8.2.2	Noise Pollution and vibration affect.....	130
8.2.3	Spreading diseases.....	130

8.2.4	Accidents .....	131
8.2.5	Impacts on wildlife (i.e. loss of habitat, hindrance to wildlife movement) .....	131
8.2.6	Hazardous Materials .....	132
8.2.7	Environmental contamination due to spillage or accidental release of hazardous materials (i.e. fuels, lubricants, solvents) onsite .....	132
8.2.8	Influx of Temporary Laborers .....	133
8.2.9	Economic benefits to the people of Project area.....	133
8.3	Impact at Due to Operation of the Project.....	133
8.3.1	Impact on Water Environment .....	133
8.3.2	Impact Acoustic Environment (Green Belt & Eco System Development) .....	134
8.3.3	Impact due to Solid Waste Generation .....	136
8.3.4	Impact on Health and Safety.....	136
8.3.5	Natural, Accidental Hazard and Fire .....	137
8.3.6	Impact on Air Quality.....	137
8.3.7	Increase in vehicular traffic in the area.....	138
8.4	Anticipated positive impacts of the Project.....	139
8.4.1	Job opportunities .....	139
8.4.2	Infrastructure development.....	139
8.4.3	Revenue to Local Municipal Council .....	140
8.4.4	Gains to the Economy .....	140
9	Environmental & Social Management Plan.....	141
9.1	General Consideration .....	141
9.2	Purpose and objectives .....	141
9.3	Environmental Management System .....	142
9.4	Comprehensive Environmental Management and Mitigation Plan .....	142
9.4.1	Land use/land cover Environment.....	144
9.4.2	Air Quality .....	145
9.4.3	Noise Environment.....	147
9.4.4	Water Environment.....	149
9.4.5	Hazardous Waste.....	Error! Bookmark not defined.
9.4.6	Socio-Economic Environment .....	152
9.4.7	Monitoring and Evaluation .....	152
9.4.8	Environmental and Social Trainings .....	152
9.4.9	Grievance Redressal Mechanism.....	153

9.4.10	Occupational Health of the Workers .....	154
9.5	Environment Management Cell .....	154
9.6	Monitoring Plan.....	155
10	Occupational Health & Safety .....	157
10.1	Occupational Health .....	157
10.2	Emergency Responses.....	157
10.3	Health and Environmental Hygiene .....	158
11	Cost Estimation for Environmental Mitigation Measures and Monitoring .....	160
11.1	Overview.....	160
11.2	Budget Plan for Environmental Management .....	160
11.3	Budget Plan for Environmental Monitoring.....	160
12	Emergency Response and Disaster Management Plan.....	162
12.1	Disaster Impact Assessment .....	162
12.1.1	Introduction .....	162
12.1.2	Methodology of MCA Analysis .....	162
12.1.3	Past Accident Data Analysis .....	163
12.1.4	Hazard Identification.....	163
12.1.5	Fire and Explosion Index (FEI).....	164
12.1.6	MCA Analysis .....	164
12.1.7	Fire and Explosion Scenarios.....	164
12.1.8	Flash Fire .....	165
12.1.9	Natural Calamities .....	165
12.2	Disaster Management Plan (DMP) .....	165
12.2.1	Approach to Disaster Management Plan .....	165
12.2.2	Formulation of DMP and Emergency Services.....	166
12.2.3	Need for Disaster Management Plan.....	166
12.2.4	Objectives of Disaster Management Plan .....	167
12.2.5	Different Phases of Disaster .....	168
12.2.6	Basis of the Plan.....	168
12.2.7	Emergency Planning and Response Procedures .....	169
12.2.8	On-site Disaster Management Plan .....	169
12.2.9	Emergency Organization Structure.....	172
12.2.10	Role and Responsibilities .....	174
12.2.11	Off-site Disaster Management Plan .....	187

12.2.12	Mock Drills.....	192
12.2.13	Checklist for Capability Assessment .....	194
13	Conclusion & Recommendation.....	197
13.1	Conclusion.....	197
13.2	Recommendations .....	198

**List of Annexure**

---

1. Trade License
2. VAT Registration Certificate
3. TIN Certificate
4. Approval letter from BEZA
5. Project Location Map
6. Economic Zone Layout Plan of Project
7. Process Flow Diagram
8. Project layout plan
9. Environmental Clearance Certificate
10. Air Quality Test Report
11. Noise Quality Test Report
12. Surface Water & Ground Water Quality Test Report

**List of Table**


---

Table 1-1: ESIA Team .....	11
Table 1-2: Reference Used for ESIA Study .....	11
Table 2-1: Relevant legal enforcement agencies and their functions. ....	14
Table 2-2: National Acts.....	20
Table 2-3: Triggered WBG Performance Standard (PS) in the Project.....	45
Table 2-4: Applicable International Conventions .....	48
Table 2-5: Air quality Standards of Bangladesh.....	50
Table 2-6: Standards for Industrial water. ....	51
Table 2-7: Standards for Drinking water.....	51
Table 2-8: Standards for Liquid Effluent Discharge.....	54
Table 2-9: Ambient Noise Standards as per DoE.....	56
Table 3-1: Basic Information of <b>City Edible Oil Captive Power Plant Limited</b> .....	60
Table 3-2: Production List with Capacity of <b>City Edible Oil Captive Power Plant Limited</b> .....	61
Table 3-3:: List of Machinery, Equipment and Accessories (Imported) for Power Generation	61
Table 4-1: Existing Environmental Settings of <b>City Edible Oil Captive Power Plant</b> .....	78
Table 4-2: Details of Surface and Ground Water Sampling Locations.....	88
Table 4-3: Water quality (limited parameters) of Shitalakshya River.....	88
Table 4-4: Surface water quality of the project area .....	89
Table 4-5: Ground water quality of the project area. ....	89
Table 4-6: Air Quality Standard.....	91
Table 4-7: The following methods were used to analyze the indoor air quality parameters....	91
Table 4-8: The following measurement uncertainties were assigned to the respected parameters .....	92
Table 4-9: Ambient Air Quality Sampling Locations.....	92
Table 4-10: Test Results of Air Quality Analysis in the project premises .....	92
Table 4-11: Bangladesh Standard According to ECR-1997 .....	93
Table 4-12: Details of Ambient Noise Monitoring Locations.....	93
Table 4-13: List of plant species recorded from the surrounding area (10 km radius) of the Project, Narayanganj.....	96
Table 4-14: List of Amphibian species identified in the surrounding areas of the <b>project</b> , Narayanganj. .....	97
Table 4-15: List of Reptilian species identified in the impact zone of the <b>project</b> , Narayanganj. .....	98
Table 4-16: List of Mammals identified in the surrounding area of the PROJECT, Narayanganj .....	99
Table 4-17: List of Birds identified in the surrounding area of the <b>PROJECT</b> , Narayanganj....	99
Table 4-18: Fish species identified in the impact zone (10 km radius) of the <b>PROJECT</b> , Narayanganj. .....	100
Table 4-19: Seismic Zoning of Bangladesh.....	101
Table 5-1: Physical and cultural resources and the persons engaged by activity.....	108
Table 5-2: Sex Distribution of Household Members by Study Area .....	110
Table 5-3: Average Family Size and Sex Ratio of Household Members by Study Area.....	110
Table 5-4: Age Distribution of Household Members .....	110

Table 5-5: Marital Status of Household Members of Study Area .....	111
Table 5-6: Educational Status of Household Members of Study Area.....	112
Table 5-7: Percentage Distribution of Household Heads by Main Occupation.....	113
Table 5-8: Percentage Distribution of Household Heads by Secondary Occupation.....	113
Table 5-9: Percentage Distribution of Household Heads by Religion .....	114
Table 5-10: Percentage Distribution of Households Surveyed by Different Uses Pattern of Land .....	114
Table 5-11: Average Annual Income and Expenditure per Household by Study Area .....	114
Table 5-12: Percentage Distribution of Households by Source of Income .....	115
Table 5-13: Transportation and Communication system of Study area .....	116
Table 5-14: Number of selected industry in study area.....	117
Table 6-1: Stakeholder Engagement Plan.....	120
Table 7-1: Checklist for identification of probable Environmental Impact of <b>PROJECT</b> during Operation Phase .....	127
Table 9-1: Environmental Management Plan of Land Use / Land Cover .....	144
Table 9-2: Environmental Management Plan for Air Quality .....	145
Table 9-3: Environmental Management Plan for Noise Environment .....	147
Table 9-4: Environmental Management Plan for Surface & Ground Water Management. ....	149
Table 9-5: Environmental Management Plan for Surface & Ground Water Management. .. <b>Error!</b> <b>Bookmark not defined.</b>	
Table 9-6: Environmental Monitoring Plan.....	156
Table 11-1: Cost for Main Mitigation Measures.....	160
Table 11-2: Estimated Annual Costs for Monitoring in the Construction and Operation Phases .....	161
Table 11-3: Estimated Annual Cost for Manpower for Supervising Environmental Management and Monitoring Activities .....	161
Table 12-1: Work permit check list is described below:.....	195

## List of Figure

---

Figure 1-1: Flow diagram of methods of Environmental and Social Impact Assessment and parallel studies.....	7
Figure 1-2: Route Map of Environmental and Social Impact Assessment.....	8
Figure 3-1: Location Map of <b>City Edible Oil Captive Power Plant Limited.</b> .....	59
Figure 4-1: Temperature of the study area .....	81
Figure 4-2: Average Monthly Wind Speed over the Year at Project Site. ....	81
Figure 4-3: Wind Roses over the Year at Project Site.....	82
Figure 4-4: Average Rainfall amount and Rainy Day .....	83
Figure 4-5: Monthly Maximum, Minimum and Average Humidity at study area .....	84
Figure 4-6: 2km Land Use and Land Cover (LULC) Map of the Study Area .....	85
Figure 4-7: Geology of the project area.....	86
Figure 4-8: Contour Map of the study area.....	87
Figure 4-9: Images of Water quality sampling period.....	90
Figure 4-10: Air Quality Monitoring at Project Site .....	91
Figure 4-11: Noise Quality Sampling Images.....	94
Figure 4-12: Earthquake zoning map of Bangladesh.....	102
Figure 4-13: Cyclone Prone area Map of Bangladesh .....	103
Figure 4-14: Intensity of Flood during 1954-1999 .....	104
Figure 4-15: River Morphological study beside <b>City Edible Oil Limited.</b> .....	106
Figure 5-1: Field Enumerator at the Respondent Premises.....	109
Figure 5-2: Marital Status of Household Member .....	111
Figure 5-3: Educational Status of Household Members of Study Area.....	112
Figure 5-4: Percentage Distribution of Households by Source of Income .....	116
Figure 5-5: Major Archeological Site of Bangladesh and Project Location .....	118

**List of Abbreviation**


---

%	Percentage
°C	Degree Celsius
µg/m <sup>3</sup>	microgram per cubic meter
AEZ	Agro Economic Zone
As	Arsenic
AIDS	Acquired Immune Deficiency Syndrome
ANSI	American National Standard Institute
ASME	American Society of Mechanical Engineers
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BEPZA	Bangladesh Economic Processing Zone Authority
BEZA	Bangladesh Economic Zone Authority
BMD	Bangladesh Meteorological Department
BOD	Biochemical Oxygen Demand
BS	British Standard
BWDB	Bangladesh Water Development Board
CaCO <sub>s</sub>	Calcium Carbonate
Ca	Calcium
CCL	Cash Compensation under Law
CDSP	Char Development and Settlement Project
CETP	Common Effluent Treatment Plant
CEZ	City Economic Zone
cm	Centimetre
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
Cr	Chromium
CSR	Corporate Social Responsibility
Cum	Cubic meter
DC	Deputy Commissioner
DDM	Department of Disaster Management
DG	Diesel Generator
DMB	Disaster Management Bureau
DO	Dissolve Oxygen
DoEB	Department of Environment Bangladesh
DPHE	Department of Public Health and Engineering
DTA	Domestic Tariff Area
EC	Electrical Conductivity
ECA	Environment Conservation Act
ECC	Environment Clearance Certificate
ECR	Environment Conservation Rules
EIA	Environment Impact Assessment
ESIA	Environment & Social Impact Assessment
EMF	Environmental Management Framework

## List of Abbreviation

EMP	Environmental Management Plan
ESMP	Environmental & Social Management Plan
EPZ	Economic Processing Zone
ERP	Emergency Response Plan
ETP	Effluent Treatment Plant
EZ	Economic Zone
FAO	Food & Agriculture Organization
FDI	Foreign Direct Investment
FDIPP	Foreign Direct Investment Promotion Project
FGDs	Focus Group Discussions
Ft.	Feet
g	Gram
GDP	Gross Domestic Product
GHGs	Green House Gases
GIS	Geographic Information System
gm/cc	gram per cubic centimetre
GoB	Government of Bangladesh
GSB	Geological Survey of Bangladesh
Ha	Hectares
HHs	Households
HIV	Human immunodeficiency virus
HSMP	Health and Safety Management Plan
HYV	High Yielding Variety
ICT	Inland Container Terminal
EMP	Initial Environment Examination
IFC	International Finance Corporation
IRRI	International Rice Research Institute
IUCN	International Union for Conservation of Nature
Kg	Kilogram
Kg/day	Kilogram Per Day
KLD	Kilo Litres Per Day
Km	Kilometer
Km/h	Kilometer per Hour
KV	Kilo Volts
LAP	Land Acquisition Plan
LAO	Land Acquisition Officer
Leq	Equivalent Noise Level
LPG	Liquefied Petroleum Gas
LRP	Land Resettlement Plan
M	Meter
m/s	meter / second
m/yr	meter / year
max.	Maximum
mg/l	microgram per litre

## List of Abbreviation

min.	Minimum
mm	Millimetre
Mm/day	Millimetre per Day
Mm/hr	Millimetre per hour
MOL	Ministry of Lands
msl	Mean Sea Level
Mn	Manganese
MT	Million Tonnes
MVA	MVA
MW	Mega Watt
NAAQS	National Ambient Air Quality Standard
NaCl	Sodium Chloride
NEMAP	National Environmental Management Action Plan
NGO	Non-governmental organization
NOC	No Objection Certificate
NOx	Oxides of Nitrogen
No.	Number
O.P.	Operational Policy
OHS	Occupational Health and Safety
OSS	One-stop-services
PA	Protected area
PAHs	Project Affected Households
PAPs	Project Affected Persons
PBS	Polli Bidyut Shamity
PCMs	Public Consultation Meetings
PDMs	Public Disclosure Meetings
PF	Protected Forest
PH	Power House
PM2.5	Particulate matter less than 2.5 micron size
PMC	Project Management Consultant
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PVC	Polyvinyl chloride
RAP	Resettlement Action Plan
RC	Retention Canal
RP	Retention Pond
RMG	Readymade garments
PROJECT	<b>City Edible Oil Captive Power Plant Limited</b>
ROW	Right of Way
RV	Replacement Value
SE	Socio Economic
SES	Socio Economic Survey
SEP	Stakeholder Engagement Plan
STI	Sexually transmitted infections

STP	Sewage Treatment Plant
SIA	Social Impact Assessment
SO <sub>2</sub>	Sulphur Dioxide
SPC	Special Purpose Company
SRDI	Soil Resource Development Institute
Sq Ft	Square Feet
sq.km	Square kilometre
sq.m.	Square Meter
SQ	Soil Quality
SW	Surface Water
TDS	Total Dissolve Solid
ToR	Terms of Reference
TSS	Total Suspended Solids
UNDP	United Nations Development Programme
US\$	United States Dollars
WS	Wildlife Sanctuary
WTP	Water Treatment Plant

## Executive Summary

---

**City Edible Oil Captive Power Plant Limited.** is a 17.6 MW power generation company, is located on the eastern bank of Shitalakshya River, and to the east of Dhaka, and west of Narayanganj. The project is located in City Economic Zone, Uttar Rupshi, Rupganj, Narayanganj within Latitude 23°44'45.04" North and Longitude 90°30'55.59" East. The entire project is completely enclosed and is owned by the **City Group**. The project is also under the **City Economic Zone** which area is 77.96 Acres. **The project** is utilizing the standard as guideline to monitor and control all the activities related to Production, Quality Control and Quality Assurance with a clear focus on Customer Requirements & Satisfaction.

**City Edible Oil Captive Power Plant Limited** is a running project. and it continue its production since 2018. The proponent has taken NOC from BEZA, REB, Fire Service and Local Authority and Department of Environment. The proponent is now in the process of taking a loan from Asian Development Bank (ADB). The basic data of the project has been shown in the following Table.

Table: Basic Information of City Edible Oil Captive Power Plant Limited

Name of the project:	<b>City Edible Oil Captive Power Plant Limited</b>
Project Proponent:	Fazlur Rahman (Managing Director)
Project Location:	Block: B, Plot No: 17, at Uttar Rupshi, Rupgonj, Narayangonj.
Office Address:	City House, Plot # NW (J) 06, Road # 51, Gulshan - 02, Dhaka-1212, Bangladesh.
No. of Employees:	20 persons
Employees Engaged in Environmental Management	01
Total area of land of Economic Zone:	77.96 Acre
Project Area:	1780 m <sup>2</sup>
Type of Industry:	Red
Status of Operation	Running
Present use of land:	Covered with industrial activities.
Final Product (Name & Amount) :	Gas Engine Based Power
Production Capacity	17.6 MW
Power Plant Capacity & Co-Generation:	<b>Power Plant:</b> 4 x 4.4 MW GEJ Jenbacher Gas Engine Based Power Plant (Total: 17.6 MW) 4 Nos Gas Generator  <b>Additional:</b> 3 Exhaust Gas Boiler (APROVIS, Germany) as Co-Generation {(2 x 4) + (1 x 2)} = 10 Ton/Hour Steam @ 18bar (3 Nos Exhaust Gas Boiler)

	<b>Additional:</b> 2 Absorption Chiller (Broad, China) as Co-Generation ( $2 \times 466 = 932$ RT) 2 Nos Chiller
Boiler Plant:	3x 55 Ton/Hour (Total: 165 Ton Per Hour Net Steam @ 18 Bar Pressure) 3 Nos Water Tube Boiler
Daily Water Requirements:	500 m <sup>3</sup> /day
Source:	River & Deep Tube Well.
Power Requirements:	50 KW/H
Gas Requirements:	4400 m <sup>3</sup> /hr.
Possible Air Pollutants Escaped:	Through stack
Stack	4 nos.
Stack Height	39 m or 128 feet

### **Location of the project**

**The Project** is located at City Economic Zone, North Rupshi, Rupganj, Narayanganj and is easily accessible by all kinds of transports. The project site is about 1.78 km away from Rupshi Bus Stand, Narayanganj and just eastern bank of Shitalakha River.

Bangladesh Edible Oil, Navana Health Care and Navana Pharmaceutical Ltd, Gazi Auto Tires Factory, Rony Knit Composite, Mir Cement etc. project are surrounding 2 km project from the project area. Location map of the project has been shown in Figure 3-1 in chapter-3.

### **Environment & Social Study:**

Baseline data on environment is important to understand physical, biological, cultural, economic and social environmental characteristics of the project study area. This information forms the basis to analyze the probable impacts of the project activities. Details discussion about social and Environmental study of the project have been described in chapter-4 & 5.

### **Public Consultation and Disclosure**

A public consultation meeting was carried out during site visit, a team of local people and responsible person were present. face to face interview session was hold and a focus group discussion had been arranged by factory authority within factory area with some of them. In chapter -6 details of public consultation has described.

### **Identification and Analysis of Key Environmental Issues**

In chapter-7, a short and details key environmental issues are identified and describes some of them. In this chapter environmental sensitivity investigation was carried, also added environmental assets, likely benefit, community recommendation, alternative analysis, and end of the chapter some social and environmental impacts are identified by check list matrix.

### **Environmental & Social Management Plan**

Environmental & Social Management Plan (ESMP) for construction and operation phase is required to ensure that mitigation of adverse impacts and strengthening of positive impact resulting from the **project**. The objective of ESMP is to identify the project specific environmental actions that will need to be undertaken, not only to mitigate impacts but also improve environmental aesthetics for the proposed plant.

In chapter-9, a details environment and social management plan has given with proper monitoring and mitigation plan.

### **Cost Estimation for Environment Mitigation Measures and Monitoring**

Most of the mitigation measures require contractor's / project authorities to accept good practices, which should be part of the usual procedures, so the cost of compliance is unlikely to be high. Relaxation, which is the **Project's** and the contractor's responsibility, given as part of the management of the project. Chapter-11 contains the environmental monitoring and mitigation cost of the project.

### **Emergency Response plan**

The project authority has adopted an emergency response plan for their proposed project. In chapter-12 an emergency response plan for **project** has added.

### **Conclusion & Recommendation**

Pollution of water from production & domestic activities and noise pollution was predicted as major impacts. However, monitoring of water quality and noise quality was conducted at existing facility and it was found that the project is not creating any adverse impact to its surrounding environment. The CSTP & CETP facilities are sufficient to reduce environmental impact. In addition, by implementing all necessary protection and regulatory measures as suggested here in ESIA, the proposed plant is expected to meet the National Environmental Quality Standards.

## 1 Introduction

### 1.1 Overview

A captive power plant, also called auto producer or embedded generation, is an electricity generation facility used and managed by an industrial or commercial energy user for their own energy consumption. It is basically a facility that provides a localized source of power to an energy user.

These are typically industrial facilities, large offices or data centers. Captive power plants can operate off-grid or they can be connected to the electric grid to exchange excess generation.

Bangladesh is a developing country. Power generation in this country is not robust and poorly managed. Over the last decade, disastrous power crisis led large industries, commercial and urban residential zones to produce power independently in order to achieve uninterrupted, reliable and economic power supply. Now a day's independent power producers are encouraged because of the inefficiency of expired public sector power generation units and mismanagement of governing authority. Presently, around 4000 MW is generated in private sector including CPPs, Rental Power Plant (RPPs), Small Power Plant (SPPs), and Independent Power Plant (IPPs) in Bangladesh.

In CPPs, mostly latest open cycle gas turbine generators are installed using pipe line natural gas. The average heat rate is very high and more energy is required to produce electricity; which results in poor overall efficiency. Modern technology allows producing 1 Kilo-Watt hour (kWh) of electricity utilizing less than 7 cubic feet (CFT) of natural gas, but in CPPs, normally 10-16 CFT of natural gas is needed to produce 1kWh of power. As days passed by, the heat rate keeps on improving. New generation Combined Cycle Gas Turbine (CCGT) power plants are producing electricity at average heat rate of 6,600 kWh, where in these CPPs electricity is produced at heat rate always above 10,000kWh.

As of now, Bangladesh Power Development Board (BPDB) power plants of derated capacity of 4357 MW utilizes the energy of gas to produce electricity, that makes natural gas the primary energy source (78.26%) of Bangladesh. The forecasted peak demand of Bangladesh in fiscal year 2030 would be 33,708 MW, which is around four times to the current peak demand. This energy crisis paves the way of CPPs to flourish up.

On this backdrop **City Edible Oil Captive Power Plant Limited**, has been taken this initiative to established a Power Plant industry within City Economic Zone.

## **1.2 Purpose of the study**

The overall objective of this ESIA report is to identify major environmental impacts resulting from the implementation of the project and to recommend mitigation measures to avoid or reduce adverse environmental impacts and to enhance positive impacts.

The specific objectives include:

- To assess the existing environmental conditions of the project site and its adjacent areas in order to establish a baseline framework against which potential environmental impacts due to the implementation of the project would be compared.
- To identify and assess environmental impacts resulting from the project during its development or construction phase.
- To identify and assess environmental impacts resulting from the project during its operational phase.
- To develop a well-balanced environmental management plan with recommendations for mitigating adverse impacts and enhancing positive impacts and outlining environmental monitoring requirements both during construction and operational phase of the project.
- To identify issues that may require further studies.

## **1.3 Scope of the ESIA study**

This ESIA report has been prepared keeping in view the Term of Reference (ToR) as provided by the Client. The scope of the present ESIA report describes the following most important features:

- A review of the environmental legislative, regulatory and policy guidelines and considerations relating to the implementation of the project;
- A general description of the project and existing physical, biological and socio-economic conditions;
- Consultation with the locals/stakeholder involving concerned people in order to identify and act on any undocumented or perceived environmental issues;
- Identification and assessment of the potential impacts on the natural and human environment in the project area, from the construction of the AC mini-grid power plant;

- Identification of mitigation measures and monitoring actions in the form of an Environmental Management Plan (EMP); and
- Recommendations and conclusions in order to operate the project works in an environmentally safe and sound manner.

#### **1.4 Extent of the Study**

This ESIA is carried out based on proposed development. The influence of impact has been defined as 1 Km radius of the project location. Geographical Information System (GIS) techniques have also been used based on recent satellite imageries of the project area for above purposes. Assessment is carried out on the following environment components: terrestrial and aquatic ecology, soil, water, air, noise, and socio-economic aspects. The impacts on ecologically sensitive areas (e.g. wildlife sanctuaries, biosphere reserve, and protected places) within 1 Km of the project areas have also been assessed.

#### **1.5 ESIA Content**

The report fulfills the requirements of ESIA under ECR, 1997 and has been prepared in accordance with the TOR. This ESIA report is also consistent with the Government of Bangladesh guidelines, Equator Principles Financial institution ('EPFI') Guidelines for Confirmation of Environmental and Social Considerations, and World Bank OP 4.01 (Environmental Assessment) guidelines. The report contains twelve chapters and the chapter details are discussed below:

- **Chapter 1** describes the introduction containing background, purpose of the ESIA study, scope of the study, and approach methodology of ESIA study.
- **Chapter 2** is on policy, legal and administrative framework describing the relevant policy and legal frameworks for the ESIA process.
- **Chapter 3** contains detailed project description including all the aspects of the proposed project.
- **Chapter 4** describes environmental baseline condition with details on physical environment, land resources, agricultural resources, fisheries, ecosystem condition and social characteristics of the area.
- **Chapter 5** describes social baseline condition including socio-economic condition and social characteristics of the area.

- **Chapter 6** describes public consultation discussion with local stakeholders with their ideas, views about the project through knowledge sharing
- **Chapter 7** describes the key impacts of the project during pre-construction, construction and operation phase.
- **Chapter 8** presents the impacts of project during pre-construction; construction and post-construction phase and describes mitigations measures for minimizing the effect of the negative impacts and enhancement measures for increasing the benefits of the positive impacts.
- **Chapter 9** describes the Environmental and Social Management Plan (ESMP) and monitoring plan along with the costing of the mitigation measures and monitoring plan.
- **Chapter 10** describes the occupational and health safety policy has been taken for the proposed project.
- **Chapter 11** describes the costing of environmental and social management and monitoring purpose.
- **Chapter 12** describes the emergency response and disaster management plan of the proposed project.
- **Chapter 13** concluding the ESIA report along with the recommendations.

### 1.6 Approach & Methodology

#### 1.6.1 Approach

The study is based on both primary and secondary data and information. The primary data includes data collected from field observations and secondary data includes review of the Bangladesh statistical and relevant information from Government Departments. Discussions were held with stakeholders including community representatives and Land owner. The main purpose of this approach was to obtain a fair impression on the people's perceptions of the project and its environmental impacts. The study has been conducted in accordance with Environment Conservation Rules, 1997, Government of Bangladesh (GoB) EIA Guidelines, 1997, Safeguard Policy Statement (SPS), 2009 of ADB, Equator Principles Financial institution ('EPFI') Guidelines and World Bank OP 4.01 (Environmental Assessment) guidelines. The route map of this ESIA preparation is given in Figure 1.1.

### **1.6.2 Methodology**

The following methodology was adopted for carrying out the ESIA of the proposed project:

#### **a) Orientation**

Meetings and discussions were held among the members of the ESIA Team. This activity was aimed at achieving a common ground of understanding of various issues of the study.

#### **b) Data Collection Planning**

Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the ESIA Team. The plan included identification of specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and other supporting needs for the execution of the data acquisition plan.

#### **c) Data Collection**

In this step, primary and secondary data were collected through field observations, environmental monitoring in the field, concerned departments and published materials to establish baseline profile for physical, biological and socioeconomic environmental conditions. A map in Figure 1.2 presents the sampling locations of several environmental features in the project area. Following activities were performed for data collection:

- Site Reconnaissance
- Analysis of Maps and Plans
- Literature Review
- Desk Research
- Field Observations and Studies
- Public Consultations
- Laboratory Analysis

Information was collected on the existing physical environment, particularly as related to geology, topography, soils, hydrology and drainage, water quality, air quality and noise. The primary sample collection map for the environmental issues has been given Figure 1.2.

#### **Geology, Topography, Soils**

Data related to geology, topography and soil was collected to establish the baseline of the project area and further to find out the impacts of the Project during the construction and operational phases.

#### **Hydrology and Drainage**

Data related to hydrology and drainage was collected to identify the elements of the hydrological cycle that are likely to have impacts on the project and the possible impacts that the project could have on the hydrological regime. Field assessments included a determination and verification of all the existing inflows into the drain, assessment of drainage issues, interviews with local community members.

### **Air Quality**

Ambient air quality measurements are essential to provide a description of the existing conditions, to provide a baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed construction on air quality conditions. The following parameters are carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>), NOx, particulate matter (PM<sub>10</sub>), particulate matter (PM<sub>2.5</sub>), and suspended particulate matter (SPM) have been included for ambient air quality monitoring.

### **Noise**

The noise monitoring was performed by a trained specialist, using a calibrated Sound Level Meter set to A-weighting, fast response and statistical analysis settings. The Sound Level Meter (SLM) was mounted on a tripod at a height of approximately 1.5m, facing in the direction of the apparent predominant noise source. The SLM was programmed to record statistical noise levels for 15 minutes at each location and was calibrated before and after the survey; no significant drift was detected.

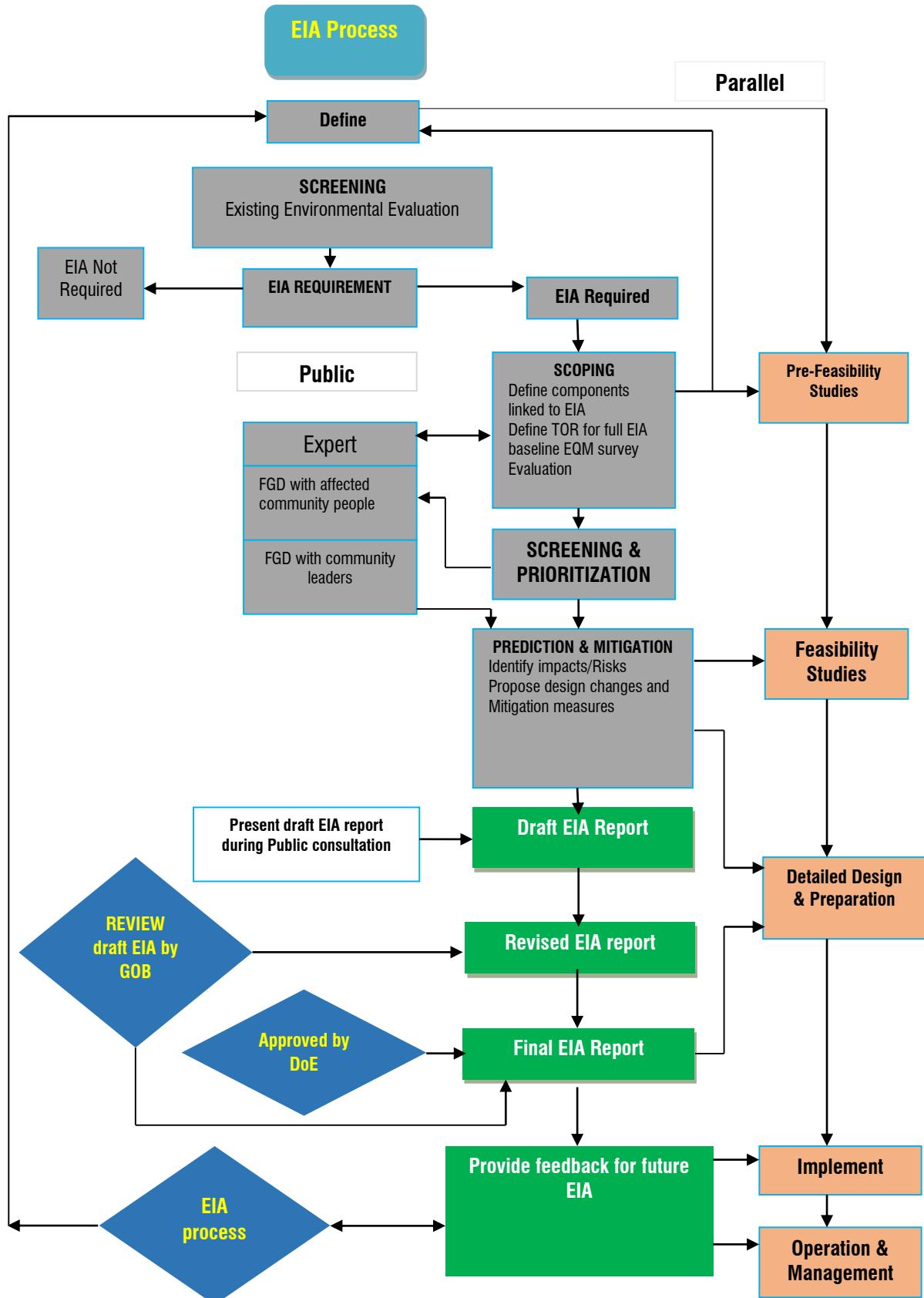


Figure 1-1: Flow diagram of methods of Environmental and Social Impact Assessment and parallel studies

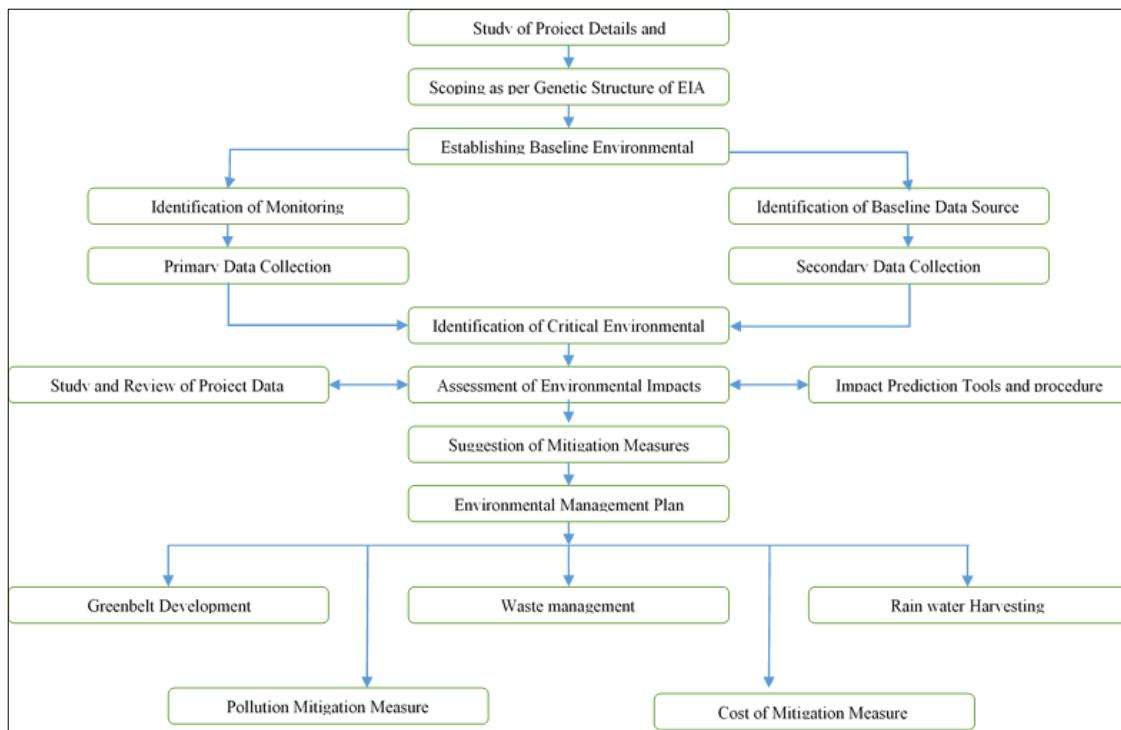


Figure 1-2: Route Map of Environmental and Social Impact Assessment

### Ground /Drinking Water Quality

Sampling and analysis of ground/drinking water has been carried for the following parameters: pH, Chloride ( $\text{Cl}^-$ ), Total Dissolved Solids (TDS), Iron (Fe), Arsenic (As), and Alkalinity.

### Surface Water Quality

Sampling and analysis of surface water quality has been carried out for the following parameters: pH, Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand ( $\text{BOD}_5$ ).

### Biological Environment

The status of the flora and fauna of the project area were determined by an ecological survey, review of literature relevant to the area, and an assessment of terrestrial environment.

#### Flora

Flora is the plant life occurring in a particular region or time, generally the naturally occurring or indigenous—native plant life. The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species, assessment of stage of growth (mature or sapling) and assessment of canopy cover.

## **Fauna**

Fauna is all of the animal life of any particular region or time. Information on fauna was gathered from existing literature on reported species as well as observations in the field.

## **Socio-Cultural Environment**

The Consultants utilized a combination of desk research, field investigations, census data, structured interviews, maps, reports to generate the data required for description of the existing social environment and assessment of the potential impacts due to the construction of the project. Data was collected on the following aspects given below:

- Land use
- Transportation and access Roads
- Demographics
- Livelihoods
- Education
- Health
- Community facilities
- Recreational activities
- Archaeological and cultural heritage

### **d) Public Consultation**

Public consultation is an important component of the ESIA preparation activities. Local knowledge about the ecosystem and problems associated with the project activities were carefully recorded and used in impact assessment and developing mitigation plan. Formal public consultation, in tandem with opportunistic informal ones involving local villagers, and people whose livelihood depends on these project areas, were executed. Detailed description of public consultation has been presented at **Chapter 7**.

### **e) Impact assessment and mitigation**

Impact Assessment and Mitigations were undertaken in accordance with the ESIA objectives presented earlier. The general process includes:

- **Impact assessment:** Identification and assessment of potential environmental and social impacts with reference to applicable country and international regulations, standards and guidelines. Impact assessment also includes identifying opportunities

to enhance beneficial impacts of the Project and to improve social development opportunities.

- **Mitigation measures:** Mitigation measures have been developed with consideration of baseline conditions; identified constraints; concerns and suggestions raised by the community; GoB, ADB, WB, IFC and other relevant requirements, and the level of design information available at the time of preparation of this ESIA. Mitigation may include:
  - Environmental controls (e.g. measures for minimizing harmful noise, air, water and waste emissions);
  - Design optimization (e.g. relocation of dam walls to avoid graveyard);
  - Procedural measures (e.g. setting up catchment management committee);
  - Avoidance/reduction (e.g. waste minimization process management to conserve water);
  - Compensatory measures (e.g. biodiversity offsets); and
  - Timing measures (e.g. no construction at night).
- **Risk assessment:** Risk assessment has been undertaken to gauge the level of 'Residual' impact after mitigation and acceptability against international criteria and sustainability principles. Further opportunities for reducing identified 'high' risk residual impacts are then canvassed.

## 1.7 Limitation of the Study

The study statement was made by analysis of data obtained by both primary (measuring parameters in the collected samples, public consultation and site observation through field visits) and secondary (data from Department of Public Health and Engineering (DPHE), Bangladesh Meteorological Department (BMD), Department of Environment (DoE) and published journals and books) sources for the study. The environmental and social assessment is based on the information collected from the various agencies, community consultations and observations. Professional judgment and subjective interpretation of facts and observations has been applied for the preparation of the EIA Report. Additionally, offsite facilities, sources and alignments are not fixed till date, thus assessment is made on the basis of preliminary information available from BEZA and for all the options which could be explored. The onsite (industrial area detailed planning will be carried out by prospective private developer) information availability is limited to feasibility assessment.

### 1.7.1 ESIA 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. were involved in carrying out ESIA study for this project. Details of the professionals are given in the following table.

Table 1-1: ESIA Team

SN	Name of Professional	Area of Expertise	Position Assigned
1.	Mr. Abdullah Al Mahmud MSc in Environment Science NSTU	Geo-spatial and Remote sensing	Environmental and Social specialist, GIS Expert
2.	Engr. Mr. Enamul Habib BSc in Chemical Engineering SUST	Waste and/or Wastewater Management	Environmental specialist and Waste Management Expert
3.	Engr. Mr. Kamrul Hasan BSc in Civil & Environment SUST	Land Use, Water Resource, production Process and Architecture	Urban Planner, Process Expert
4.	Mr. Sovel Ahsan Chowdhury MSc in Environment Science NSTU	Agriculture and Fisheries	Agro-Fisheries Expert
5.	Md Nazrul Islam Msc in Environmental Science NSTU	Soil, and water	Soil, water testing expert
6.	Md Zakaria Diploma in Environmental Engineering Bsc in Civil Engineering	Waste Water Treatment, Laboratory	ETP operation and Lab expert

### 1.8 References

List of secondary data used for carrying out ESIA study and preparation of ESIA report is given at the following table.

Table 1-2: Reference Used for ESIA Study

S. No.	Reference
Government Departments	
1.	Bangladesh Economic Zones Authority (BEZA)
2.	Department of Environment (DoE)
3.	Bangladesh Agriculture Research Council (BARC)
4.	Bangladesh Water Development Board (BWDB)
5.	Bangladesh Meteorological Department (BMD)
6.	Bangladesh Forest Department (DoF)
7.	Bangladesh Bureau of Statistics (BBS)
8.	Bangladesh Food & Agriculture Department (FAO, Bangladesh)
9.	Geological Survey of Bangladesh (GSB)

S. No.	Reference
10.	Disaster Management Bureau (DMB)
11.	Department of Disaster Management (DDM)
12.	Department of Agriculture Extension (DAE)
13.	Bangladesh Rice Research Institute (BRRI)
14.	Department of Fisheries (DOF)
15.	Power Grid Company of Bangladesh (PGCB)
16.	Land & Revenue Department, Munshigonj
Journals, Books& Existing Studies	
17.	Geological Settings Of The Areas Of Arsenic Safe Aquifers, Md. Munir Hussain And SKM Abdullah, Ground Water Task Force, October, 2001
18.	Hasan MA, Bhattacharya P, Sracek O, Ahmed KM, Bromssen M and Jacks G (2009). Geological controls on groundwater chemistry and arsenic mobilization: Hydrogeochemical study along an E-W transect in the Meghna basin. Bangladesh Journal of Hydrology 318(1-2): 105-118.
19.	Nuruzzaman M (2011). A Study of Co-operative Floodplain Aquaculture: Daudkandi Model. M.S thesis dissertation. Brac development institute, Brac University. pp. 1-174.
20.	Nishat A, Huq SMI, Barua SP, Khan AHM and Moniruzzaman AS (2002). Bio ecological zones of Bangladesh. IUCN, Bangladesh Country Office, Bangladesh, Dhaka, p.141.
21.	Ramasar Convention (1971). List of Wetlands of international importance. Ramasar, Iran.
22.	HIES (The Household income and expenditure survey) (2010). Bangladesh Bureau of Statistics, Ministry of Planning, Dhaka, Bangladesh.
23.	SRDI (Soil research development institute) (1999). Thana Instruction Guide, p. 54.
24.	SRDI (Soil research development institute) (1997). Agricultural land use of Bangladesh. Soil resources development institute, Dhaka
25.	Statistical Yearbook (2012-2013). Fisheries resources survey system (FRSS), Department of Fisheries, Bangladesh. Volume 29: p. 44.
26.	BBS (Bangladesh Bureau of Statistics) (2011). District statistics. Statistics and informatics division (SID) Ministry of planning, Government of the people's republic of Bangladesh, pp. 1-149.
27.	Banglapedia (2017). Agro-ecological zones of Bangladesh. Available online at: <a href="http://en.banglapedia.org/index.php?title=Agroecological_Zone">http://en.banglapedia.org/index.php?title=Agroecological_Zone</a>
28.	Banglapedia (2017). Flood plain of Bangladesh. Available online at: <a href="http://en.banglapedia.org/index.php?title=Floodplain">http://en.banglapedia.org/index.php?title=Floodplain</a>
29.	Wikipedia (2017). Inceptisols. Available online at: <a href="https://en.wikipedia.org/wiki/Inceptisol">https://en.wikipedia.org/wiki/Inceptisol</a>
30.	Ahmed A (2011). Agricultural adjustment in flood-prone areas in Comilla of Bangladesh: A geographical study. Journal of Development and Agricultural Economics Vol. 3(12): 602-609.
Website	
31.	Wikipedia
32.	Google maps
33.	<a href="http://www.bangladeshtourismdirectory.com/bangladesh-archaeological-sites-list.html">http://www.bangladeshtourismdirectory.com/bangladesh-archaeological-sites-list.html</a>

S. No.	Reference
34.	Google earth imageries
35.	<a href="http://www.saarc-sadkn.org/countries/bangladesh/disaster_mgt.aspx">http://www.saarc-sadkn.org/countries/bangladesh/disaster_mgt.aspx</a> (Bangladesh Disaster Knowledge Network)
36.	<a href="http://www.livingwiththejamuna.com/essayintroduction.html">http://www.livingwiththejamuna.com/essayintroduction.html</a>
37.	<a href="http://www.fao.org/docrep/field/003/AC360E/AC360E03.htm#anxA">http://www.fao.org/docrep/field/003/AC360E/AC360E03.htm#anxA</a>
Others	
38.	Site visits
39.	Feasibility Report of the Economic zone

## 2 Legislative, Regulation and Policy consideration

### 2.1 Policy, Legal and Administrative Framework

This chapter provides a description of the regulatory framework applicable for **City Edible Oil**

**Captive Power Plant Limited.** It highlights environmental, health & safety and social regulations with applicable permits and standards in association with the Project. It broadly focuses on the:

- Legal Enforcement Agencies at National Level;
- Applicable national and local Environmental and Social Laws, Regulations and Policies;
- Applicable ADB Guideline and Category
- Applicable Equator Principle Guideline
- International & National Environment Standards/ Guidelines; and

### 2.2 Legal Enforcement Agencies

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

Table 2-1: Relevant legal enforcement agencies and their functions.

S. No.	Agency	Functions
1.	<b>Ministry of Environment Forests, and Climate Change (MoEF)</b>	<p>The MoEF is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. It oversees all environmental matters in the country and is a permanent member of the Executive Committee of the National Economic Council.</p> <p>It plays a pivotal role as a participant of the United Nations</p>

<b>S. No.</b>	<b>Agency</b>	<b>Functions</b>
		<p>Environment Programme (UNEP). Its principal activities include:</p> <ul style="list-style-type: none"> <li>• Conservation &amp; survey of flora, fauna, forests and wildlife;</li> <li>• Prevention and control of pollution; and</li> <li>• Forestation &amp; regeneration of degraded areas and protection of environment in the frame work of legislations.</li> </ul>
2.	<b>Department of Environment (DoE)</b>	<p>An Environment Pollution Control Board was setup under the Environment Pollution Control Ordinance, 1977. It underwent a series of subsequent restructuring and was finally renamed as Department of Environment in 1989. It is headed by a Director General appointed by the Government.</p> <p>The DoE through its head, divisional and district level offices conducts the following principal activities:</p> <ul style="list-style-type: none"> <li>• Advising the Government to avoid such manufacturing processes, commodities and substances which are likely to cause environmental pollution;</li> <li>• Advisory and issuing directions to the concerned person regarding the environmentally sound use, storage, transportation, import and export of a hazardous substance or its components;</li> <li>• Conducting inquiries and research activities on conservation, improvement and pollution of the environment and rendering assistance to any other authority/organization regarding the same;</li> <li>• Collection and publication of information about environmental pollution;</li> <li>• Conducting programs for observation of drinking water quality and issuing directives if necessary for adherence to drinking water quality standards;</li> <li>• Formulation of environmental guidelines;</li> <li>• Prescribing and modifying environmental quality standards pertaining to air, water, noise, vehicular emissions etc.;</li> <li>• Issuing Location Clearance and Environmental Clearance Certificates to Projects; and</li> <li>• Implementation of provisions of ECA and rules made there</li> </ul>

<b>S. No.</b>	<b>Agency</b>	<b>Functions</b>
		under.
<b>3.</b>	<b>Bangladesh Forest Department (BFD)</b>	It was established under the MoEF and is responsible for identifying and declaring of certain areas as reserved or protected or private forest lands. It implements the provisions of Forest Act, 1927 and National Forestry Policy, 1994. It's also responsible for wildlife preservation and protection through implementation of Wildlife (Preservation & Security) Act, 2012.
<b>4.</b>	<b>Water Resources and Planning Organization (WARPO)</b>	<p>It was established under the Water Resources Planning Act, 1992. Its core functions include:</p> <ul style="list-style-type: none"> <li>• Monitoring the implementation of National Water Management Plan (NWMP);</li> <li>• Upkeep of water resource assessments;</li> <li>• Maintenance, updating and dissemination of the National Water Resources Database (NWRD) and MIS;</li> <li>• Secretariat to the National Water Resources Council (NWRC) and the Executive Committee of the National Water Resources Council (ECNWRC);</li> <li>• Responding to the NWRC/ECNWRC requests for information and advice;</li> <li>• Periodic update of the NWMP;</li> <li>• Assisting other agencies in planning, monitoring, studies and investigations;</li> <li>• Adhoc advice on policy, strategy, institutional and legal issues;</li> <li>• Laying down effluent discharge standards into river in consultation with DoE; and</li> <li>• Special studies and research as required.</li> </ul>
<b>5.</b>	<b>Ministry of Shipping (MOS)</b>	<p>The Ministry of Shipping encompasses within its fold shipping and port sectors which also oversee the safety and environmental matters and the regulatory aspects of maritime shipping. It is responsible for:</p> <ul style="list-style-type: none"> <li>• Development and maintenance of waterways, inland water transport, ports, ocean shipping, development and expansion of physical infrastructural facilities etc.</li> <li>• Managing and maintaining inland, island and inter island ferry-</li> </ul>

<b>S. No.</b>	<b>Agency</b>	<b>Functions</b>
		<p>boat and shipping services;</p> <ul style="list-style-type: none"> <li>• Formulation and implementation of act, rules and policies regarding the aforementioned issues.</li> </ul>
<b>6.</b>	<b>Bangladesh Inland Water Transport Authority (BIWTA)</b>	<p>It was setup in 1958 under the provisions of East Pakistan Inland Water Transport Authority Ordinance 1958. Its specific functions include:</p> <ul style="list-style-type: none"> <li>• Carry out river conservancy works;</li> <li>• Disseminate navigational and meteorological information including publication of river charts;</li> <li>• Draw up programmers of dredging requirements and priorities for efficient maintenance of existing navigable waterways and for resuscitation of dead or dying rivers, channels, or canals, including development of new channels and canals for navigation; and</li> <li>• Develop, maintain and operate inland river ports, landing/ferry ghats and terminal facilities in such ports or ghats.</li> </ul>
<b>7.</b>	<b>Ministry of Fisheries and Livestock (MOFL)</b>	<p>The main functions of the MOFL include:</p> <ul style="list-style-type: none"> <li>• Preservation of fisheries resources;</li> <li>• Fulfilling the requirement of animal protein through proper management and planned development;</li> <li>• Increasing socio-economic conditions of fishermen;</li> <li>• Creating employment opportunities for rural unemployed and landless people;</li> <li>• Expanding foreign exchange earnings by exporting fish and fishery products;</li> <li>• Developing innovative technologies through research for fisheries development and preservation; and</li> <li>• Protection of fishes through implementation of Protection and Conservation of Fish Act, 1950 as amended till date.</li> </ul>
<b>8.</b>	<b>Bangladesh Power Development Board (BPDB)</b>	<p>It is a statutory body created in May 1, 1972 and is responsible for major portion of generation and distribution of electricity mainly in urban areas except Dhaka and West Zone of the country.</p> <p>It has undertaken a massive capacity expansion plan to add about</p>

S. No.	Agency	Functions
		10500 MW generation capacities in next 5 years to achieve 24000 MW Capacity according to Power System Master Plan (PSMP) 2021.
9.	<b>Bangladesh Energy Regulatory Commission (BERC)</b>	<p>It was established under the Bangladesh Energy Regulatory Commission Act, 2003. Some of its key functions include:</p> <ul style="list-style-type: none"> <li>• Issue, cancel, amend and determine conditions of licenses, exemption of licenses and determine the conditions to be followed by such exempted persons;</li> <li>• Regulation of generation, storage, supply, and transmission of energy;</li> <li>• Determine tariff for electricity distribution etc.;</li> <li>• Ensure control of environmental standard of energy under existing laws;</li> <li>• Extend co-operation and advice to the Government, if necessary, regarding electricity generation, transmission, marketing, supply, distribution and storage of energy.</li> </ul>
10.	<b>Ministry of Labour and Employment (MOLE)</b>	<p>It was established with following objectives:</p> <ul style="list-style-type: none"> <li>• Creation of employment opportunity;</li> <li>• Creation of semi-skilled and skilled manpower;</li> <li>• Enhancement of productivity of factories by creating friendly working environment between workers &amp; employers;</li> <li>• Ensuring welfare of workers in different industrial areas;</li> <li>• Implementation of labour laws;</li> <li>• Fixing up minimum wages of labour; and</li> <li>• Ensuring justice through Labour Court.</li> </ul> <p>It has been divided into four departments, viz:</p> <ul style="list-style-type: none"> <li>• Directorate of Labour</li> <li>• Chief Inspector of Factory and Establishment</li> <li>• Minimum Wages Board</li> <li>• Labour Appeal Tribunal</li> </ul>
11.	<b>Ministry of Law and Parliamentary</b>	<p>This ministry is divided in to the Law and Justice Division and the Parliamentary Affairs Division for functional purposes.</p> <p>The Law and Justice Division of the Ministry of Law, Justice and</p>

S. No.	Agency	Functions
	<b>Affairs</b>	<p>Parliamentary Affairs has the responsibility of providing legal advisory services to other ministries, divisions, departments, and organizations of the Government.</p> <p>The parliamentary affairs division is assisted by the law commission and the human rights commission and its main function lies in formulating, scrutinizing and preparing legislations. When needed, it provides legal opinions and translations for other ministries.</p>
12.	<b>Ministry of Land</b>	<p>The ministry of land is in charge of land administration, management and development for the overall growth of the nation.</p> <p>The Ministry manages Government owned lands, vested properties and abandoned properties. It is responsible for the collection of land development tax, land surveying and record keeping and updating.</p> <p>Land Acquisition and requisition fall under the responsibilities of this ministry.</p>
13.	<b>Board of Investment (BOI), Bangladesh</b>	<p>The Board of Investment was established in 1989 by the Investment Board Act. The specific functions of board are:</p> <ul style="list-style-type: none"> <li>• Implementation of all provisions as lay down under The Investment Board Act, 1989.</li> <li>• To promote domestic and foreign investment as well to enhance international competitiveness of Bangladesh;</li> <li>• To identify the hindrance of investment and provide necessary facilities and assistance in the establishment of industries.</li> </ul>
14.	<b>Civil Aviation Authority (CAA), Bangladesh</b>	<p>The Government of the People's Republic of Bangladesh formed Civil Aviation Authority, Bangladesh in the year of 1985. The main functions of CAA are:</p> <ul style="list-style-type: none"> <li>• It is responsible for registration of aircrafts and issues license to each personnel responsible for flight operations.</li> <li>• To regulate air traffic and provides facilities and services for aeronautical telecommunications and air navigation;</li> <li>• The authority is responsible for construction, maintenance and</li> </ul>

S. No.	Agency	Functions
		development of airports and aerodromes.
15.	<b>Union Parishad</b>	<p>Union Parishad (UP) currently is the only elected statutory local government body for the rural Bangladesh. A UP consists of a chairman and twelve members. They are elected on the basis of adult franchise. Each UP has a full-time Secretary, appointed by the Deputy Commissioner (DC). The functions of UP are:</p> <ul style="list-style-type: none"> <li>• Maintenance of law and order and conduction of censuses of all kinds.</li> <li>• Registration of births, deaths, blind people, beggars and destitute.</li> <li>• Planning and implementation of development schemes in the field of agriculture, forestry, fisheries, livestock, education, health, small and micro enterprises, communications, irrigation and flood control.</li> <li>• Protection and maintenance of public property such as roads, bridges, canals, embankments, markets, telephones and electricity lines.</li> </ul>

### 2.3 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.

Table 2-2: National Acts.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<b>National Environment Policy, 1992 and Action Plan</b>  It sets out the framework for establishment of legislations related to 15 sectors including environment, water, agriculture, water resources development, forest &wildlife, fisheries etc. The key provisions of the policy are:	Ministry of Environment Forests, and Climate Change (MoEF)	The project should ensure that Project activities comply with the provisions made under the policy and the legislations made there under for implementing the same.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<ul style="list-style-type: none"> <li>• Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) of all new public and private sector industrial Projects is mandatory</li> <li>• Adoption of corrective measures by polluting industries in phases.</li> <li>• Prevention of land erosion, and environmentally sound management of newly accreted land.</li> <li>• Conservation of wildlife, bio-diversity, forest, fisheries and livestock.</li> </ul>	Department of Environment, Bangladesh	
<p><b>The Environment Conservation Act, 1995 as amended till October 5, 2010</b> (hereinafter referred as ECA)</p> <p><b>The Environment Conservation Rules, 1997 as amended till February 16, 2002</b> (hereinafter referred as ECR)</p> <p>The salient features of the Act are as follows:</p> <ul style="list-style-type: none"> <li>• A Department of Environment (DoE) to be established subsidiary to the MoEF to exercise the provisions of the Act.</li> <li>• The Government of Bangladesh (GoB) will declare Ecologically Critical Areas (ECA) and specify the activities or processes that cannot be initiated or continued in an ECA.</li> </ul>	Ministry of Environment Forests, and Climate Change (MoEF)  Department of Environment, Bangladesh	The proposed Project located within an Economic Zone which will facilitate falls under the Orange-B category according to ECR, 97. But the project has individual Captive power plant which capacity is 17.6 MW. So that the project turns into Red category as classified under Schedule- I of the ECR. And According of BEZA one stop service and DoE guideline, if any project falls under Orange-B and have Captive Power plant than the project authority should take their ECC through an EMP and Captive Power Plant license by an individual application.  <i>Reportedly, The Project</i>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<ul style="list-style-type: none"> <li>• An industrial unit/Project cannot be established without obtaining an Environmental Clearance Certificate (ECC) from the Director General of DoE.</li> <li>• Publication of environmental guidelines related to environmental pollution control and mitigation, conservation and improvement of the environment.</li> <li>• Prescription of rules for implementing the provisions of the Act.</li> </ul> <p>The provisions under the ECR are summarized as follows:</p> <p><input type="checkbox"/> The industries for the purpose of obtaining ECC have been classified into the following 4 categories based on their site and impact on the environment:</p> <ol style="list-style-type: none"> <li>i. Green</li> <li>ii. Orange –A</li> <li>iii. Orange – B</li> <li>iv. Red</li> </ol> <p><i>The list of industries falling under each category has been annexed in the Schedule – I to the ECR.</i></p> <ul style="list-style-type: none"> <li>• For proposed industries falling under the Orange A&amp;B and Red categories, a Location Clearance Certificate (LCC) needs to be obtained from DoE prior to the issuance of ECC.</li> </ul>		<p><b><i>Authority already received Environmental Clearance Certificate (ECC) from Department of Environment.</i></b></p> <p><b><i>The project authority also received the ECC of Captive Power Plant after getting ECC for Individual Project.</i></b></p> <p>The shall ensure that pollutant emissions/discharges from various sources etc. during Project activities are well within the standards prescribed in the Schedules 2-12 of the ECR 1997. Some of the standards have been revised by the DoE viz.</p> <ul style="list-style-type: none"> <li>• Ambient Air Quality standard</li> <li>• Vehicular Emission standards</li> <li>• Ambient Noise Standards</li> </ul> <p><b><i>The various applicable standards have been provided in subsequent sections. Compliance to such standards shall be ensured by the Project.</i></b></p>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<ul style="list-style-type: none"> <li>The Project entrepreneur shall apply for ECC in Form 3 along with prescribed documents and application fees.</li> <li>ECC (for Red category) will be valid for 1 year from the issuance date and shall be renewed at least 30 days prior to expiry.</li> <li>Various environmental quality standards pertaining to air, water, sound, odor etc. have been laid down in the schedules attached to the Act.</li> <li>Emissions and waste discharge standards have been laid down in Schedules 9-11.</li> </ul> <p>The person in charge of facility/unit shall notify the Director General, DoE in case of pollutant emission/ discharge in excess of prescribed standards or where there is a possibility of the same.</p>		
<p><b>National Industrial Policy, 2010</b></p> <p>The policy aims to ensure the industrialization process is compliant with internationally agreed environment, health, and safety and labour standards.</p> <p>The government will ensure assistance for creating alternative employment, keeping the socio-economic backdrop in mind, for any privatization proposal.</p>	Ministries of Industries	The Project shall ensure that the Project is registered as prescribed by the Act.
<b>Investment Board Act (1989)</b>	Board of	The Project shall ensure that the

<b>Summary of Applicable legislation/ Policy</b>	<b>Agency Responsible</b>	<b>Applicable Permit and Requirements</b>
<p>Board of Investment, established under this act, is the principal private investment promotion and facilitation agency of Bangladesh which is responsible for implementation of provisions of above said policy.</p> <p>Under the provision of this act as per Schedule 11, All industries established in non-governmental sectors licensed by the Board shall be registered in the prescribed manner.</p> <p>As per Schedule 15 of this act, any industrial undertaking licensed transgresses any provision of this Act or of any rule made there under or breaks any condition relating to the license, the Board may, in such manner as may be prescribed, cancel the license of the industrial undertaking.</p>	Investment (BOI), Bangladesh	proposed Project is registered as prescribed by the Act.
<p><b>National Water Management Plan, 2001</b> <b>(Approved in 2004)</b></p> <ul style="list-style-type: none"> <li>• The objectives of the Plan are listed below:</li> <li>• To operationalize directives given in National Water Policy and to do in accordance with the Government approved Development Strategy.</li> </ul>	Water Resource Planning Organization (WARPO)	The Project should ensure implementation of Flood Protection programme with provision of embankment of adjacent Shitalakshya River, proper maintenance of existing river dykes, drainage sluices, etc.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<ul style="list-style-type: none"> <li>• To address issues related to harnessing and development of all forms of surface and ground water and management of these resources in an efficient and equitable manner.</li> <li>• Consultation and participation with the direct beneficiaries in the hand over and development of water schemes.</li> </ul>		
<p><b>Bangladesh Water Act, 2013</b></p> <p>The key features of the Act are:</p> <ul style="list-style-type: none"> <li>• A National Water Resources Council (NWRC) to be established for implementing the provisions of the Act</li> <li>• A National Water Policy shall be adopted by the Council addressing the following issues:             <ol style="list-style-type: none"> <li>i. Purpose and sectors of water use</li> <li>ii. Affordability of water users</li> <li>iii. Actual cost of water abstraction and distribution</li> <li>iv. Financial ability and backwardness of water users of any group thereof</li> <li>v. Water demand and supply</li> <li>vi. Any other issues considered relevant by GoB</li> </ol> </li> <li>• An Executive Committee of the Council shall be established or ensuring efficient performance of the Council.</li> <li>• The GoB can declare certain areas as Water Stress Areas for the</li> </ul>	Water Resource Planning Organization (WARPO)	<p>This Act was implemented in 2013 and the NWRC and Executive Committee are yet to be formulated. Upon formation of the aforementioned bodies, water stress areas and related provisions may be prescribed.</p> <p><b><i>The Project shall ensure compliance with legal requirements under such provisions if applicable.</i></b></p>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>protection of water sources or aquifers.</p> <ul style="list-style-type: none"> <li>• Water zone demarcation (industrial, agricultural, brackish water aquaculture and hatchery water zones) through gazette notification and issuance of protection order for efficient water management in such zones</li> <li>• Declaration of flood control zone and its management.</li> <li>• Restriction on abstraction of total water from any water source.</li> </ul>		
<p><b>Ground Water Management Ordinance, 1985</b></p> <p>As per the provisions as per schedule 5 of this act, no tube well shall be installed in any place without a license granted by the Union Parishad.</p> <p>Also, no application shall be entertained by the Union Parishad unless it is accompanied by such fee as may be prescribed under the requirements of this ordinance.</p>	Ministry of Environment Forests, and Climate Change (MoEF)	<p>The project should ensure that no tube-well shall be installed in any place without a license granted by the Union Parishad.</p> <p>The should furnish the following information:</p> <ul style="list-style-type: none"> <li>• the aquifer condition of the soil where the tube-well is to be installed;</li> <li>• The distance of the nearest existing tube-well;</li> <li>• The area likely to be benefited by the tube-well;</li> <li>• The likely effect on the existing tube-wells including tube wells used for domestic purpose;</li> <li>• The suitability of the site for installation of the tube-well; and</li> <li>• The conditions on which a license, if any, may be granted.</li> </ul>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p><b>The National Fisheries Policy, 1999</b></p> <p>The objectives of the fisheries policy are:</p> <ul style="list-style-type: none"> <li>• Enhancement of the fisheries production;</li> <li>• Poverty alleviation through creation of self-employment and improvement of socio-economic conditions of the fishermen;</li> <li>• Fulfilling the demand for animal protein;</li> <li>• Achieve economic growth through earning foreign currency by exporting fish and fisheries products; and</li> <li>• Maintain ecological balance, conserve biodiversity, ensure public health and provide recreational facilities.</li> </ul> <p>The policy broadly aims at fisheries development, regulation of aquaculture, biodiversity conservation and formulation of laws to ban the disposal of any untreated industrial effluents into the water bodies.</p>	<p>Ministry of Fisheries and Livestock (MoFL)</p> <p>Department of Fisheries (DoF)</p>	<p>The Project shall ensure that during Project operation, no untreated effluent is disposed into the river. The treated effluent shall also meet the standards stipulated under the ECR.</p>
<p><b>Protection and Conservation of Fish Act, 1950 as amended through February 16, 1995</b></p> <p>This Act was promulgated for conservation of fish in Bangladesh and their protection against indiscriminate fishing, poisoning due to</p>	<p>Ministry of Environment Forests, and Climate Change (MoEF)</p> <p>Department of Fisheries</p>	<p>The Project shall ensure compliance with provisions mandated under this Act.</p>

<b>Summary of Applicable legislation/ Policy</b>	<b>Agency Responsible</b>	<b>Applicable Permit and Requirements</b>
industrial effluent disposal into the water, oil spills, etc.		
<p><b>Protection and Conservation of Fish Rules, 1985</b></p> <p>The Rules were prescribed under the provisions of Protection and Conservation of Fish Act. It provides the regulations for prohibition of fishing during certain periods, licenses for catching fishes, prevention of fish destruction due to explosives and industrial effluent disposal etc.</p>	Ministry of Environment Forests, and Climate Change (MoEF) Department of Fisheries	The Project shall ensure that untreated effluent is not disposed into the river. The treated effluent shall comply with the discharge standards stipulated under the ECR.
<p><b>The Building and Construction Act, 1952</b></p> <ul style="list-style-type: none"> <li>• As per Section 3A of this act, No owner or occupier of a building shall, without obtaining previous permission from the Authorized Officer or the Committee use the building for the purpose other than that mentioned in the sanction.</li> <li>• All the construction, re-construction works to be undertaken as per terms or conditions prescribed.</li> </ul>	Authorized Officer or Committee	The Project shall ensure that no building or tank shall be constructed without prior permission from the Authorized Officer or Committee of the area.
<p><b>The Vehicle Act, 1927</b></p> <ul style="list-style-type: none"> <li>• As per section 4 of this act, no owner or person in charge of a vehicle shall allow any person under the age of eighteen years to drive the same in any public place.</li> <li>• As per section 7, no person shall</li> </ul>	Bangladesh Road Transport Authority	The Project shall ensure that every vehicle possess a certification of registration as required under this act.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>drive a vehicle in a public place unless he is licensed in the prescribed manner.</p> <ul style="list-style-type: none"> <li>Every vehicle must possess a valid registration certificate as per section 11 of this act.</li> </ul>		
<p><b>The Motor Vehicle Ordinance Act, 1983 (as modified on November, 1990)</b></p> <ul style="list-style-type: none"> <li>As per section 3 of the ordinance, no person shall drive a motor vehicle in any public place unless he holds an effective driving license.</li> <li>No person under the age of eighteen years shall drive a motor vehicle in any public place.</li> </ul>	Bangladesh Road Transport Authority	The Project shall ensure that no person shall drive a motor vehicle in any public place unless he holds an effective driving license issued to himself authorizing him to drive the vehicle.
<p><b>Fatal Accidents Act, 1855</b></p> <p>This Act was promulgated to provide compensation to families for loss occasioned by the death of a person caused by actionable wrong. The company will be liable to pay compensation in case of death of any worker/employee or damages in case death has not ensued but such circumstances could have resulted in death.</p>	Ministry of Labour and Employment	The Project shall ensure compliance to the Rules.
<p><b>Bangladesh Labour Act, 2006 (as amended through July 22, 2013)</b></p>	Ministry of Labour and Employment	The Project shall ensure that all conditions provided in chapters V, VI, VII and VIII of the Act, pertaining to Health, hygiene

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>The provisions prescribed under chapters pertaining to occupational health and safety, and compensations due to accidents are entailed below.</p> <p><b>Chapter V: Health and Hygiene</b></p> <p>The chapter deals with provisions regarding cleanliness of the any facility, drinking water supply, ventilation, lighting, dust bean and spittoons, etc.</p> <p><b>Chapter VI: Safety</b></p> <p>This chapter addresses the issues regarding safety of building and machinery, precautions in case of fire, fencing of machinery, work on or near machinery in motion, hoists and lifts protection of eyes, explosive or inflammable dust/gas, etc.</p> <p><b>Chapter VII: Special Provisions related to Health, Hygiene and Safety</b></p> <p>This chapter deals with provisions to be taken in case of hazardous operations, notice to be given in accidents, notice of certain dangerous occurrences and diseases etc.</p> <p><b>Chapter VIII: Welfare</b></p> <p>This chapter prescribes the provisions to be facilitated in the facility regarding first-aid appliances, safety record books, washing facilities, canteens, shelters, rooms for children, etc.</p> <p>This Act consolidates and amends the</p>		<p>safety and welfare are met in accordance with the amended act.</p> <p>During the construction and operation phases of the proposed Project shall ensure the facilitation of the following provisions:</p> <ul style="list-style-type: none"> <li>• Management of workers under service rules as approved by the Chief Inspector.</li> <li>• Provision of Letter of Appointment and ID card (with photograph) for each and every worker.</li> <li>• Maintenance of Service Book with the requisite details.</li> <li>• Retrenchment Policy and conditions of re-employment of retrenched workers, termination of employment etc.</li> <li>• Provisions regarding gratuity, provident fund and other payments at the time of retirement of workers.</li> <li>• Any adolescent employed in any dangerous operation shall be in possession of Certificate of Fitness issued by a registered medical practitioner.</li> <li>• Maternity benefits shall be paid as stipulated in the Act.</li> <li>• Cleanliness of the facility</li> </ul>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>laws relating to employment of labour, relations between workers and employers, determination of minimum wages, payment of wages and compensation for injuries to workers, formation of trade unions, raising and settlement of industrial disputes, health, safety, welfare and working conditions of workers, apprenticeship and matters connected therewith.</p> <p>The provisions prescribed under chapters pertaining to labour benefits and entitlements are as follows:</p> <ul style="list-style-type: none"> <li>• Conditions of Service and Employment</li> <li>• Employment of Adolescent</li> <li>• Maternity Benefit</li> <li>• Working Hours and Leave</li> <li>• Wages and Payment</li> <li>• Workmen's Compensation for Injury by Accidents</li> <li>• Trade Unions and Industrial Relations</li> </ul> <p>Regulation of Employment and Safety of Dock Workers</p>		<p>through washing, painting and varnishing etc. for ensuring hygiene.</p> <ul style="list-style-type: none"> <li>• Ventilation and removal of dusts and fumes through adequate number of exhaust systems.</li> <li>• Adequate number of drinking water facilities equipped with cooling systems at convenient places in the unit. All such places shall be legibly marked 'Drinking water' in Bangla.</li> <li>• Separate and adequate number of latrines and urinals for men and women. They shall be maintained in a clean and sanitary condition at all times with suitable detergents and disinfectants.</li> <li>• Leave Policy stating the working hours and the number of leaves the workers are entitled to under the provisions of the Act.</li> <li>• Compensation/wages shall be stated in the Letter of Appointment given to the workers/employees.</li> <li>• Project shall ensure that there is no policy restricting the association of workers'/trade unions.</li> <li>• Workmen's Compensation Policy stating the compensation to be meted out in case of injury due to</li> </ul>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
		accidents. Safety of EZ workers engaged in loading and unloading of industries as per prescribed provisions.
<p><b>Bangladesh Factories Act, 1965</b></p> <p>As per section 6 of the Act, the occupier shall furnish some information to Chief Inspector at least fifteen days before he begins to occupy or use any premises as a factory.</p> <p>As per Section 8, the plans and specifications must be approved by Chief Inspector.</p> <p>Provisions for cleanliness, disposal of effluents, ventilation, lightning, latrines and urinals have been described in Chapter II of the Act.</p> <p>Chapter IV and V prescribe provisions for safety and welfare of the workers.</p>	Chief Inspector of the Area	<p>The Project shall ensure that approval for plan and specifications has been procured from Chief Inspector of area.</p> <p>The Project ensures that provisions as prescribed in chapters II, III and IV are complied with.</p>
<p><b>National Child Labor Elimination Policy, 2010</b></p> <p>The National Child Labor Elimination Policy 2010 has been adopted to provide a framework towards eradicating all forms of child labor by 2015. The policy defines and lays guidelines for underage workers,</p>	<p>Ministry of Labor and Employment</p> <p>Ministry of Women and</p>	During all stages concerning employment of labor, Project should take the policy as a guidance document for following ethical practices at workplace, in dealing with adolescent workers, if at all.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>regulation of their working hours, wages, nutrition needs, mental health, education and overall work environment.</p> <p>As per the policy, a child is a person under the age of 14. A person between the ages of 14 and 18 is an adolescent, and should be granted special amendments, if compelled to work due to poor economic status. The policy also entails that a child may not be employed as a regular employee, not be made to work in hazardous settings, provided breaks more frequent than those for regular employees and have enough time left for study.</p>	Child Welfare	
<p><b>Children's Act, 2013 (Act No. 24 of 2013).</b></p> <p>The Act implements the Nation's ratification to the UN Convention on the Rights of the Child (CRC), and replaces The Children's Act of 1974. The main components of the act are as follows:</p> <ul style="list-style-type: none"> <li>• The Act changes the legal definition of a child from being a person under the age of 14 to one under the age of 18.</li> <li>• It enforces the national authorities to establish Child Welfare Boards in each district, besides one at the national level.</li> <li>• It criminalizes any kind of cruelty</li> </ul>	Ministry of Law, Justice and Parliamentary Affairs.  District commissioner's Office.	The Project must ensure that at through all stages of construction and operation, no juvenile (children between ages 14 and 18) are engaged on site.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>inflicted on children while they are working in both the formal and informal sectors.</p> <ul style="list-style-type: none"> <li>The Act further prescribes stricter punishments for using or exploiting children in begging, in brothels, and in carrying drugs, arms, or other illegal commodities.</li> </ul>		
<p><b>The Acquisition and Requisition of Immovable Property Ordinance, 1982</b></p> <p>The ordinance consolidates and amends the laws relating to acquisition and requisition of immovable property by the government. It lays down the procedures and conditions for acquisition of land and other immovable properties such as common property resources (wells, places of worship, burial grounds, etc.).</p> <p>As per Section 8 of this ordinance, the amount of compensation to be determined taking into consideration market value and decision of Deputy Commissioner.</p>	Ministry of Land, Bangladesh	<p><b>City Edible Oil Limited</b> is located within <b>City Economic Zone</b> and The EZ authority purchase the land from proper owner of the land on a willing buyer – willing seller basis.</p> <p><b>City Economic Zone</b> authority have developed the land and received the final license from Bangladesh Economic Zone Authority (BEZA).</p> <p>The project authority has leased the land from b. So, no land acquisition is required to establish the project.</p>
<p><b>The Bangladesh Inland Water Transport Corporation Order, 1972 (President's Order)</b></p> <p>This ordinance has been established for the provision of a Corporation for the purpose of operation, promotion and development of coastal and inland</p>	Bangladesh Inland Water Transportation Authority (BITWA)	The project should ensure the compliance with provisions of the orders.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
shipping and water transport services.		
<p><b>The Civil Aviation Authority Ordinance, 1985</b></p> <p>As per section 11 of the ordinance, only Civil Aviation Authority have control over:</p> <ul style="list-style-type: none"> <li>• All the civil airports and aerodromes in Bangladesh including their planning, construction, operation and maintenance;</li> <li>• All air routes in Bangladesh;</li> <li>• Air space management of civil airports and aerodromes.</li> </ul>	Civil Aviation Authority, Bangladesh	The Project shall ensure compliance with rules made under this ordinance.
<p><b>Gas Safety Rules 1991 (amended 2003)</b></p> <p>S.R.O. No- 228/Law/2003- The Government, in exercise of the powers conferred by section 65 of the Bangladesh Energy Regulatory Commission Act, 2003, is pleased to publish the following English translation of the Act, to be called the Authentic English Text of the Act, and it shall be effective from the date on which the Act comes into force under sub-section (2) of section 1 of the Act.</p> <p>WHEREAS it is expedient to make provisions for the establishment of an independent and impartial regulatory commission to create an atmosphere conducive to private investment in the</p>	Applicable	<p>Project Authority Will use Gas and build a gas transportation line within factory area, they are going to produce power by using gas engine.</p> <p>The project authority is bound to obey this mentioned rules and they will strictly follow it.</p>

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
generation of electricity, and transmission, transportation and marketing of gas resources and petroleum products, to ensure transparency in the management, operation and tariff determination in these sectors; to protect consumers' interest and to promote the creation of a competitive market;		
<p><b>Bangladesh Gas Act 2010</b></p> <p>The entire territory of Bangladesh, territorial waters and its economic zone for the purpose of circulation, distribution, marketing, supply and storage of natural gas and its natural liquefied hydrocarbons, as well as to ensure their proper and fair use, etc. It is advisable and necessary to take measures for circulation , distribution, marketing, supply and storage of natural gas and its inherent liquid hydrocarbons in its economic zone and ensure their proper and fair use; And since it is advisable and necessary to provide for effective control over the sale of unaccounted gas, natural gas and its inherent liquid hydrocarbons, as well as ensure the timely collection of revenues from gas sales and the creation of a competitive market through the participation of the private sector and individuals.</p>	Applicable	The project will use Natural Gas to produce power.
<p><b>The Right to Information Act, 2009</b> <b>Bangladesh</b></p> <p>The Act was notified in the Bangladesh Gazette on Monday, 6 April, 2009. It</p>	Applicable	The project Authority will follow the Act.

Summary of Applicable legislation/ Policy	Agency Responsible	Applicable Permit and Requirements
<p>received the President's assent on 5 April 2009.</p> <p>The Act makes provisions for ensuring free flow of information and people's right to information. The freedom of thought, conscience and speech is recognized in the Constitution as a fundamental right and the right to information is an alienable part of it. Since all powers of the Republic belong to the people, it is necessary to ensure right to information for their empowerment.</p> <p>The right to information shall ensure that transparency and accountability in all public, autonomous and statutory organizations and in private organizations run on government or foreign funding shall increase, corruption shall decrease and good governance shall be established. It is expedient and necessary to make provisions for ensuring transparency and accountability.</p>		

## 2.4 Asian Development Bank (ADB) Safeguard Principles and Policies

### 2.4.1 Safeguard Policy Statement (SPS), 2009

Built upon the three previous safeguard policies on the Involuntary Resettlement Policy (1995), the Policy on Indigenous Peoples (1998) and the Environment Policy (2002), the Safeguard Policy Statement was approved in 2009. The safeguard policies are operational policies that seek to avoid, minimize or mitigate adverse environmental and social impacts including protecting the rights of those likely to be affected or marginalized by the developmental process. ADB's safeguard policy framework consists of three operational

policies on the environment, indigenous peoples and involuntary resettlement. A brief detail of all three operational policies have been mentioned below:

**Environmental Safeguard:** This safeguard is meant to ensure the environmental soundness and sustainability of Projects and to support the integration of environmental considerations into the Project decision making process.

#### **Applicability to Environmental Safeguards**

*The proposed Project is an **Edible Oil industry and Captive Power Plant** is likely to have significant environmental impacts during construction and operation phase. The impacts and risks associated with the generation, use, storage, release, and/or disposal of pollutants has been assessed as part of this ESIA and appropriate mitigation measures have been proposed. Practices like minimal release of waste/emissions, safe disposal of waste, waste water management etc. shall be considered prior to each Project phase. The Environmental Safeguard is thus applicable to the proposed Project.*

**Involuntary Resettlement Safeguard:** This safeguard has been placed in order to avoid involuntary resettlement whenever possible; to minimize involuntary resettlement by exploring Project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre- Project levels; and to improve the standards of living of the displaced poor and other vulnerable groups.

#### **Applicability to Involuntary Resettlement Safeguards**

*The sale of land has been undertaken directly on a ‘willing buyer willing seller’ basis by City Economic Zone with the landowners and **City Edible Oil Captive Power Plant Limited**. has leased the land from the EZ authority. Hence, as no physical and economic displacement in terms of involuntary acquisition of land and involuntary restrictions on land use is triggered, the Involuntary Resettlement Safeguard is not applicable for the proposed Project.*

**Indigenous Peoples Safeguard:** This safeguard looks at designing and implementing Projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems and cultural uniqueness as defined by the Indigenous Peoples themselves so that they receive culturally appropriate social and economic benefits; do not suffer adverse impacts as a result of Projects; and participate actively in Projects that affect them.

#### **Applicability to Indigenous Peoples Safeguards**

*The proposed Project area does not report any indigenous tribes, minorities or aborigines. Hence the Indigenous Peoples Safeguard and the requirements there under are not*

*applicable for this Project.*

**Information, Consultation and Disclosure:** Consultation and participation are essential in achieving the safeguard policy objectives. This implies that there is a need for prior and informed consultation with affected persons and communities in the context of safeguard planning and for continued consultation during Project implementation to identify and help address safeguard issues that may arise. The consultation process begins early in the Project preparation stage and is carried out on an ongoing basis throughout the Project cycle. It provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people and is undertaken in an atmosphere free of intimidation or coercion. In addition, it is gender inclusive and responsive and tailored to the needs of disadvantaged and vulnerable groups and enables the incorporation of all relevant views of affected people and other stakeholders into decision making.

ADB requires the borrowers/clients to engage with communities, groups or people affected by proposed Projects and with civil society through information disclosure, consultation and informed participation in a manner commensurate with the risks to and impacts on affected communities. For Projects with significant adverse environmental, involuntary resettlement or Indigenous Peoples impacts, ADB Project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in Project design and safeguard plans.

A series of consultations were carried out with the land sellers, community and other (direct and indirect) stakeholders involved in the proposed Project by **City Edible Oil Captive Power Plant Limited** and **Environmental Study & Research Division (ESRD)**. Details pertaining to the consultation process are provided in relevant section of this report.

#### **2.4.2 Social Protection Strategy, 2001**

ADB has designed a set of policies and programs for social protection in 2001, that is, to reduce poverty and vulnerability by promoting efficient labor markets, diminishing people's exposure to risks, and enhancing their capacity to protect themselves against hazards and interruption/loss of income. The basic aim of the Social Protection Strategy (SPS) is to assist individuals to break the cycle of poverty and enhance the quality of growth through adequate

and developed social protection systems in the member countries of ADB. The type of risks covered through the SPS may be economic, environment or social/governance related.

The proposed Project shall ensure that the requirements of the ADB's SPS are complied with. Priority shall be given to any identified vulnerable groups. Based on the gender analysis and status of women in the Project area, measures for ensuring their overall development shall be taken up by the Project Proponent. **City Edible Oil Captive Power Plant Limited.** shall comply with applicable labor laws in relation to the Project. **City Edible Oil Captive Power Plant Limited** shall also take the following measures to comply with the core labor standards for the ADB financed portion of the Project;

- a. Carry out its activities consistent with the intent of ensuring legally permissible equal opportunity, fair treatment and non-discrimination in relation to recruitment and hiring, compensation, working conditions and terms of employment for its workers (including prohibiting any form of discrimination against women during hiring and providing equal work for equal pay for men and women engaged by the Borrower);
- b. Not restrict its workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment;
- c. Engage contractors and other providers of goods and services:
  - who do not employ child labor or forced labor;
  - who have appropriate management systems that will allow them to operate in a manner which is consistent with the intent of (A) ensuring legally permissible equal opportunity and fair treatment and non-discrimination for their workers, and (B) not restricting their workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment; and
  - Whose subcontracts contain provisions which are consistent with paragraphs (i) and (ii) above.

#### **2.4.3 Public Communications Policy 2011**

The Public Communications Policy (PCP) of ADB, originally formulated in 2005 and revised in 2011, is aimed at promoting improved access to information about ADB's operations related to fund Projects. It endorses greater transparency and accountability to stakeholders involved in a Project. The PCP establishes the disclosure requirements for documents and information

related to Projects. It mandates Project-related documents normally produced during the Project cycle to be posted on the web.

#### **2.4.4 Categorization of Projects**

As part of its review of a Project's expected social and environmental impacts, ADB uses a classification system. This classification is used to reflect the significance of potential environmental impacts understood as a result of the client's impact assessment and to establish ADB's safeguard requirements. The categories used by ADB are:

- Category A Projects: Projects which are likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented.
- Category B Projects: Projects with potential adverse environmental impacts that are less in number, generally site-specific, mostly reversible and readily addressed through mitigation measures;
- Category C Projects: Projects with minimal or no adverse environmental impacts;
- Category FI Projects: Projects which involve investment of ADB funds to or through a financial investment.

#### **Box 13: Applicability for ADB Project Categorization**

*Since the proposed Project is an Edible Oil industry which will have impacts both in its construction and operation phase, the Project is classified as a 'Category B' Project as per the Bank's categorization system based on Environmental Safeguards. Categorization of the Project as per Involuntary Resettlement and Indigenous Peoples is 'Category C'.*

### **2.5 Safeguard Requirements of Equator Principle Financial Institutions**

The ten requirements of the Equator Principle Financial Institutions (EPFIs) correspond to the following parameters:

#### **2.5.1 Principle 1 (Review and Categorization)**

Using categorization, the EPFI's environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts. The categories are:

*Category A – Projects with potential significant adverse environmental and social risks and/or impacts those are diverse, irreversible or unprecedented;*

*Category B* – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and

*Category C* – Projects with minimal or no adverse environmental and social risks and/or impacts.

### **2.5.2 Principle 2 (Environmental and Social Assessment)**

For all Category A and Category B Projects, the EPFI will require the client to conduct an assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed project (which may include the illustrative list of issues found in Exhibit II to the EPs). The Assessment Documentation should propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.

### **2.5.3 Principle 3 (Applicable Environmental and Social Standards)**

The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. The EPFI will require that the assessment process evaluates compliance with the applicable standards as follows:

For projects located in Non-Designated Countries, the assessment process evaluates compliance with the then applicable IFC Performance Standards and the World Bank Group EHS Guidelines;

### **2.5.4 Principle 4 (Environmental and Social Management System and Equator Principles Action Plan)**

For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree an Equator Principles Action Plan (AP). The Equator Principles AP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards;

### **2.5.5 Principle 5 (Stakeholder Engagement)**

For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the project, the project's phase of development; the language preferences of the Affected Communities, their decision-making processes and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation.

To facilitate Stakeholder engagement, the client will, commensurate to the project's risks and impacts, make the appropriate Assessment Documentation readily available to the Affected Communities, and where relevant Other Stakeholders, in the local language and in a culturally appropriate manner.

The client will take account of and document, the results of the Stakeholder Engagement process, including any actions agreed resulting from such process. For Projects with environmental or social risks and adverse impacts, disclosure should occur early in the assessment process, in any event before the project construction commences, and on an ongoing basis.

EPFIs recognize that indigenous peoples may represent vulnerable segments of project affected communities. Projects affecting indigenous peoples will be subject to a process of informed Consultation and Participation, and will need to comply with the rights and protections for indigenous peoples contained in relevant national law, including those laws implementing host country obligations under international law. Consistent with the special circumstances described in IFC Performance Standard 7 (when relevant as defined in Principle 3), projects with adverse impacts on indigenous people will require their Free, Prior and informed Consent (FPIC) 3.

### **2.5.6 Principle6 (Grievance Mechanism)**

For all Category A and, as appropriate, Category B projects, the EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

The grievance mechanism is required to be scaled to the risks and impacts of the project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the Stakeholder Engagement process.

#### **2.5.7 Principle 7(Independent Review)**

For all Category A and, as appropriate, Category B projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence, and assess Equator Principles compliance. The Independent Environmental and Social Consultant will also propose or opine on a suitable Equator Principles AP capable of bringing the Project into compliance with the Equator Principles, or indicate when compliance is not possible.

#### **2.5.8 Principle 8 (Covenants)**

For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. Furthermore, for all Category A and Category B Projects, the client will covenant the financial documentation:

- to comply with the ESMPs and Equator Principles AP (where applicable) during the construction and operation of the Project in all material respects; and
- to provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts, that i) document compliance with the ESMPs and Equator Principles AP (where applicable), and ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and
- to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan

Where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the project back into compliance to the extent feasible. If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, as considered appropriate.

### **2.5.9 Principle 9 (Independent Monitoring and Reporting)**

To assess project compliance with the Equator Principles and ensure ongoing monitoring and reporting after Financial Close and over the life of the loan, the EPFI will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the EPFI.

### **2.5.10 Principle10 (Reporting and Transparency): For all Category A and, as appropriate, Category B Projects**

- The client will ensure that, at a minimum, a summary of the EIA is accessible and available online; and
- The client will publicly report GHG emission levels (combined Scope1and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO<sub>2</sub> equivalent annually.

## **2.6 Triggering of World Bank Performance Standards**

The triggering of the WBG Performance Standards (PS) in the present project with explanations are given in the Table below. The applicable GOB laws, Rules, Policies, and Guidelines are listed alongside the WBG PS. The International Conventions signed by Bangladesh are also included, as once signed these are equivalent to the laws.

Table 2-3: Triggered WBG Performance Standard (PS) in the Project

Sl.	PS and Title	Triggered (Yes/No)	Applicable Bangladesh Laws/Rules and Conventions to which Bangladesh is a Party
1.	<b>Performance Standard 1:</b> Assessment and Management of Environmental and Social Risks and Impacts	Yes	Bangladesh Environmental Conservation Act (ECA '95), 1995 and amendments; Environment Conservation Rules (ECR), 1997 and amendments; National Environmental Policy, 2018 &1992; Environmental Court Act, 2010; National Environmental Management Action Plan, 1995, National Water Policy, 2000;

			National Water Management Plan, 2001
<b>Explanations:</b> PS1 is triggered in this project. This is an umbrella Standard as Assessment and Management of Environmental and Social Risks and Impacts are important in all projects with land-based activities. The project has environmental and social aspects which may pose potential E&S risks and/or impacts. These include noise emissions, air emissions, wastes and effluents, labour influx, traffic congestion etc. Projects where E&S aspects exist, should possess systems for assessing and managing potential E&S risks and impacts.			
2.	<b>Performance Standard 2:</b> Labor and Working Conditions	Yes	Bangladesh Factories Act (1965); Bangladesh Labor Act, 2006; Bangladesh Labor Rules (2015), Bangladesh Children's Act 2013; ILO Conventions 29, 87, 98, 100, 105, 111 and 182
Workers (temporary) would be engaged to carry out various duties related to <b>Power Plant</b> . It is therefore necessary for the Project to maintain appropriate labour and working conditions for these workers. As such, PS 2 is applicable.			
3.	<b>Performance Standard 3:</b> Resource Efficiency and Pollution Prevention	Yes	ECA 95 and amendments, ECR 97 and amendments; Noise Pollution (Control) Rules 2006, International Convention for the Prevention of Pollution of the Sea by Oil, London, 1954 (Ratified 1981); The Ground Water Management Ordinance, 1985; Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, Basel, 1989 (Ratified 1993); Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 (Ratified 1990), (London Amendment, 1990) (Ratified 1994).
<b>Explanation:</b> There will be lots of civil works and land excavation/drilling which are likely to generate wastes during the construction phase. Running heavy equipment will also have noise pollution potential. Therefore, PS3 is applicable.			
4.	<b>Performance Standard 4:</b> Community Health, Safety, and Security	Yes	The Fertilizer Regulation Order, 1995; Disaster Management Act 2012; Motor Vehicle Ordinance 1983; Bangladesh Private Security Regulations Act, 2006.
<b>Explanation:</b> Though the project will have some positive effects through employment generation, there could be concerns to community regarding traffic congestion, risk of injury			

etc. Therefore, PS4 is applicable.			
5.	<b>Performance Standard 5:</b> Land Acquisition and Involuntary Resettlement	No	Acquisition and Requisition Ordinance, 1982.
<b>Explanation:</b> City Edible Oil Captive Power Plant Limited is located within <b>City Economic Zone</b> and The EZ authority purchase the land from proper owner of the land on a willing buyer – willing seller basis. <b>City Economic Zone authority</b> have developed the land and received the final license from Bangladesh Economic Zone Authority (BEZA). The project authority has leased the land from City Economic Zone Authority. So, no land acquisition is required to establish the project. Therefore, this Performance Standard will not be applicable.			
6.	<b>Performance Standard 6:</b> Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	Bangladesh Wild Life (Preservation) Act, 1974; National Biodiversity Strategy and Action Plan (2004); Fish Act and Rules, Bangladesh Water Act 2013; National Water Bodies Protection Act 2000, National Conservation Strategy, 1992, ECA95, National Water Policy, 2000; National Water Management Plan, 2001; International Plant Protection Convention, Rome, 1951 (Ratified 1978); Convention on Wetlands of International Importance, especially as Waterfowl Habitat, Ramsar, 1971; the Ramsar Convention (Ratified 1992); Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973 (CITES Convention) (Ratified 1982); Agreement on the network of Aquaculture Centers in Asia and Pacific (NACA), 1988; Convention on Biological Diversity, Rio de Janeiro, 1992 (Ratified 1994); International Convention to Combat Desertification, 1994.
<b>Explanations:</b> City Seed Crushing Industry Limited, is developing within an Economic Zone, which already developed by Zone Developer. So Ecological and Bio diversification threat will arise due to the project. So, Hence PS6 will not be applicable.			
7.	<b>Performance Standard 7:</b> Indigenous Peoples	No	Chittagong Hill Tracts Regional Council Act, 1998.
<b>Explanations:</b> City Seed Crushing Industry Limited Unit-2, located within Narayanganj District			

(is a popular district of Bangladesh), No indigenous people are live here and project is not nearly close to Chittagong Hilly Area. So, PS7 will not be applicable for this project.

8.	<b>Performance Standard 8:</b> Cultural Heritage	No	Antiquities Act, 1968; Convention Concerning the Protection of the World Cultural and Natural Heritage, Paris, 1972 (World Heritage Convention) (Ratified 1983).
Explanations: No cultural heritage site was found during site visit within 1km. So, PS8 will not be applicable.			

## 2.7 Applicable International Conventions

Environmental problems which migrate beyond the jurisdiction (Trans-boundary) require power to control such issues through international co-operation by becoming a Contracting Party (CP) i.e. ratifying treaties or as Signatory by officially signing the treaties and agreeing to carry out provisions of various treaties on environment and social safeguards. Bangladesh has signed and ratified various Multilateral Environmental Agreements (MEAs), International Labor Organization (ILO) Conventions, and international maritime conventions. The relevant international conventions have been summarized in following table.

Table 2-4: Applicable International Conventions

SN	International Conventions	Salient Features
Multilateral Environmental Agreements (MEAs)		
1.	Rio Declaration, 1992	Bangladesh is a signatory to Principle 4 of the declaration 1992 a global action program for sustainable development called Rio Declaration and Agenda 21 was adopted in the annual United Nations Conference on Environment and Development (UNCED) held in Rio De Janeiro, Brazil.
2.	Convention on Biological Diversity, 1992	<p>It was adopted on June 5, 1992.</p> <p>The signatory has an obligation of:</p> <ul style="list-style-type: none"> <li>Introducing appropriate procedures requiring environmental impact assessments of its proposed Projects that are likely to have significant adverse effects on biodiversity, with a view to</li> </ul>

SN	International Conventions	Salient Features
		<p>avoiding or minimizing such effects, and where appropriate allow for public participation in such procedures; and</p> <ul style="list-style-type: none"> <li>• Introducing appropriate arrangements to ensure that environmental consequences of its programs and policies, that are likely to have significant adverse impacts on biodiversity, are duly taken into account.</li> </ul> <p>As per the convention, ESIA shall consider impacts on biodiversity due to Project activities.</p>
3.	Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar (1971)	<p>This is an intergovernmental treaty, which provides the framework for international co-operation for the conservation of wetlands habitat.</p> <p>Obligation for Contracting Parties include the designation of wetlands to the “List of Wetlands of International Importance”, the provision of wetland considerations within their national land use planning, and the creation of Natural Reserves. Parts of Sundarbans Reserved Forest (Southwest of Bangladesh) are one of the Ramsar Sites.</p>

## 2.8 International and National Environment Standards/ Guidelines

Bangladesh and World Bank environmental standards and guidelines relevant to the construction and operation of the “**City Edible Oil Captive Power Plant Limited.**” cover the following issues:

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

## 2.9 Ambient Air quality standards

As per the provisions of Rules 12 and 13 of the ECR 1997, the MoEF is responsible for laying down environmental quality standards (pertaining to air, water, sound, odour and other components) and standards for discharge and emission of waste. Ambient air quality

standards have been stipulated in Schedule 2 (Standards for Air) of the Rules. However, these standards were revised by MoEF in 2005. The revised standards have been illustrated in the following table.

Table 2-5: Air quality Standards of Bangladesh.

Pollutant	Averaging Time	Concentration
<b>Carbon Monoxide (CO)</b> <b>(mg/m<sup>3</sup>)</b>	8 hours	10 (9 ppm)
	1 hour	40 (35 ppm)
<b>Lead (Pb)</b> <b>(μg/m<sup>3</sup>)</b>	Annual	0.5
<b>Oxides of Nitrogen</b> <b>(NO<sub>x</sub>)</b> <b>(μg/m<sup>3</sup>)</b>	Annual	100 (0.053 ppm)
<b>Sulphur dioxide (SO<sub>2</sub>)</b> <b>(μg/m<sup>3</sup>)</b>	Annual	80 (0.03 ppm)
	24 hours	365 (0.14 ppm)
<b>Suspended Particulate Matter (SPM)</b> <b>(μg/m<sup>3</sup>)</b>	8 hours	200
<b>Coarse Particulates</b> <b>(PM<sub>10</sub>)</b> <b>(μg/m<sup>3</sup>)</b>	Annual	50
	24 hours	150
<b>Fine Particulates</b> <b>(PM<sub>2.5</sub>)</b> <b>(μg/m<sup>3</sup>)</b>	Annual	15
	24 hours	65
<b>Ozone (O<sub>3</sub>)</b> <b>(μg/m<sup>3</sup>)</b>	8 hours	157 (0.08 ppm)
	1 hour	235

		(0.12 ppm)
--	--	------------

Source: Air Quality Standards, 2005

## 2.10 Water quality standards

As per Schedule 12 of the ECR 1997, designated best use classification has been prescribed for inland surface water as given in table below.

Table 2-6: Standards for Industrial water.

SN	Best Practice based classification	Parameter			
		pH	BOD mg/l	DO mg/l	Total Coliform number/100
a.	Source of drinking water for supply only after disinfecting	6.5-8.5	2 or less	6 or above	50 or less
b.	Water usable for recreational activity	6.5-8.5	3 or less	5 or more	200 or less
c.	Source of drinking water for supply after conventional treatment	6.5-8.5	6 or less	6 or more	5000 or less
d.	Water usable by fisheries	6.5-8.5	6 or less	5 or more	---
e.	Water usable by various process and cooling industries	6.5-8.5	10 or less	5 or more	5000 or less
f.	Water usable for irrigation	6.5-8.5	10 or less	5 or more	1000 or less

Notes:

1. In water used for pisciculture, maximum limit of presence of ammonia as Nitrogen is 1.2 mg/l.
2. Electrical conductivity for irrigation water – 2250  $\mu$  mhos/cm (at a temperature of 25 ° C); Sodium less than 26%; boron less than 0.2%.

The standards for drinking water have been presented in following Table as per Schedule 12 of ECR-1997.

Table 2-7: Standards for Drinking water.

S. N.	Parameters	DoE Standards (Drinking Water Standards)
1.	pH	6.5 – 8.5
2.	Temperature (in ° C)	20-30° C

<b>3.</b>	Turbidity (in NTU)	10
<b>4.</b>	Color	15 Hazen
<b>5.</b>	TDS (in mg/l)	1000 mg/l
<b>6.</b>	TSS (in mg/l)	10 mg/l
<b>7.</b>	Oil and Grease (in mg/l)	0.01 mg/l
<b>8.</b>	Chlorides (in mg/l)	150-600 mg/l
<b>9.</b>	Total Hardness (in mg/l)	200-500 mg/l
<b>10.</b>	Calcium (in mg/l)	75 mg/l
<b>11.</b>	Magnesium (in mg/l)	30-35 mg/l
<b>12.</b>	Sulphate (in mg/l)	400 mg/l
<b>13.</b>	Fluorides (in mg/l)	1.0 mg/l
<b>14.</b>	Nitrate (in mg/l)	10 mg/l
<b>15.</b>	Iron (in mg/l)	0.3-1.0 mg/l
<b>16.</b>	COD (in mg/l)	4 mg/l
<b>17.</b>	BOD (in mg/l)	0.2 mg/l
<b>18.</b>	Ammonia (in mg/l)	0.5 mg/l
<b>19.</b>	Phosphate (in mg/l)	6 mg/l
<b>20.</b>	Copper (in mg/l)	1 mg/l
<b>21.</b>	Mercury (in mg/l)	0.001 mg/l
<b>22.</b>	Balium (in mg/l)	0.01 mg/l
<b>23.</b>	Cadmium (in mg/l)	0.005 mg/l
<b>24.</b>	Arsenic (in mg/l)	0.05 mg/l
<b>25.</b>	Lead (in mg/l)	0.05 mg/l
<b>26.</b>	Zinc (in mg/l)	5 mg/l
<b>27.</b>	Chromium (in mg/l)	0.05 mg/l
<b>28.</b>	Manganese (in mg/l)	0.1 mg/l
<b>29.</b>	Total Coliform (in n/100 ml)	0
<b>30.</b>	Faecal Coliform (in n/100 ml)	0
<b>31.</b>	Chlorophyll (in mg/l)	--

<b>32.</b>	Aluminium ( in mg/l)	0.2
<b>33.</b>	Benzene( in mg/l)	0.01 mg/l
<b>34.</b>	Boron ( in mg/l)	0.2 mg/l
<b>35.</b>	Chlorinated alkanes	
	Carbontetrachloride (in mg/l)	0.01 mg/l
	Dichloroethylene (in mg/l)	0.001 mg/l
	1.2 dichloroethylene (in mg/l)	0.03 mg/l
	Tetrachloroethylene (in mg/l)	0.03 mg/l
	trichloroethylene(in mg/l)	0.09 mg/l
<b>36.</b>	Chlorinated phenols	
	- pentachlorophenol (in mg/l)	0.03 mg/l
	trichlorophenol ( in mg/l)	0.03 mg/l
<b>37.</b>	Chlorine (residual) ( in mg/l)	0.2 mg/l
<b>38.</b>	Chloroform	0.09 mg/l
<b>39.</b>	Cyanide	0.1 mg/l
<b>40.</b>	Detergents	0.2 mg/l
<b>41.</b>	DO	6 mg/l
<b>42.</b>	Kjeldhl Nitrogen (total)	1 mg/l
<b>43.</b>	Nickel	0.1 mg/l
<b>44.</b>	Nitrite	<1 mg/l
<b>45.</b>	Odor	Odorless
<b>46.</b>	Phenolic Compounds	0.002 mg/l
<b>47.</b>	Silver	0.02 mg/l
<b>48.</b>	Sodium	200 mg/l
<b>49.</b>	Suspended particulate matters	10 mg/l
<b>50.</b>	Sulfide	400 mg/l
<b>51.</b>	Tin	2 mg/l
<b>52.</b>	Selenium	0.01 mg/l
<b>53.</b>	Potassium	12 mg/l

<b>54.</b>	Radioactive materials (gross alpha activity)	0.01 Bq/l
<b>55.</b>	Radioactive materials (gross beta activity)	0.1 Bq/l

## 2.11 Liquid Effluent Discharges

As per Schedule 10 of ECR 1997, standards for Waste from Industrial Units or Project Waste have been described. The same has been detailed in table below:

Table 2-8: Standards for Liquid Effluent Discharge.

<b>S. No.</b>	<b>Parameter</b>	<b>Unit</b>	<b>Places for determination of standards</b>		
			<b>Inland Surface Water</b>	<b>Public Sewerage System connected to treatment at second stage</b>	<b>Irrigated Land</b>
<b>1.</b>	Ammonical Nitrogen (as elementary N)	mg/l	50	75	75
<b>2.</b>	Ammonia (as free ammonia)	mg/l	5	5	15
<b>3.</b>	Arsenic (as)	mg/l	0.2	0.05	0.2
<b>4.</b>	BOD 5 at 20°C	mg/l	50	250	100
<b>5.</b>	Boron	mg/l	2	2	2
<b>6.</b>	Cadmium (as Cd)	mg/l	0.5	0.05	0.05
<b>7.</b>	Chloride	mg/l	600	600	600
<b>8.</b>	Chromium (as total Cr)	mg/l	0.5	1.0	1.0
<b>9.</b>	COD	mg/l	200	400	400
<b>10.</b>	Chromium (as hexavalent Cr)	mg/l	0.1	1.0	1.0
<b>11.</b>	Copper (as Cu)	mg/l	0.5	3.0	3.0
<b>12.</b>	Dissolved Oxygen	mg/l	4.5-8	4.5-8	4.5

S. No.	Parameter	Unit	Places for determination of standards		
			Inland Surface Water	Public Sewerage System connected to treatment at second stage	Irrigated Land
	(DO)				
13.	Electro-conductivity (EC)	micro mho/cm	1200	1200	1200
14.	Total Dissolved Solids	mg/l	2100	2100	2100
15.	Fluoride (as F)	mg/l	2	15	10
16.	Sulfide (as S)	mg/l	1	2	2
17.	Iron (as Fe)	mg/l	2	2	2
18.	Total Kjeldahl Nitrogen (as N)	mg/l	100	100	100
19.	Lead (as Pb)	mg/l	0.1	1.0	0.1
20.	Manganese (as Mn)	mg/l	5	5	5
21.	Mercury (as Hg)	mg/l	0.01	0.01	0.01
22.	Nickel (as Ni)	mg/l	1.0	2.0	1.0
23.	Nitrate (as elementary N)	mg/l	10	Not yet Fixed	10
24.	Oil and Grease	mg/l	10	20	10
25.	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	1.0	5	1.0
26.	Dissolved Phosphorus (as P)	mg/l	8	8	15
27.	Radioactive substance	To be specified by Bangladesh Atomic Energy Commission			
28.	pH	-	6-9	6-9	6-9

S. No.	Parameter	Unit	Places for determination of standards		
			Inland Surface Water	Public Sewerage System connected to treatment at second stage	Irrigated Land
29.	Selenium (as Se)	mg/l	0.05	0.05	0.05
30.	Zinc (as Zn)	mg/l	5	10	10
31.	Total Dissolved Solids	mg/l	2100	2100	2100
32.	Temperature	° C	40	40	40- Summer
			45	45	45- Winter
33.	Suspended Solids (SS)	mg/l	150	500	200
34.	Cyanide (as Cn)	mg/l	0.1	2.0	0.2

Notes:

- (1) These standards shall be applicable to all industries or Projects other than those specified under the heading "Standards for sector-wise industrial effluent or emission."
- (2) Compliance with these standards shall be ensured from the moment an industrial unit starts trial production, and in other cases, from the moment a Project starts operation.
- (3) These standards shall be inviolable even in case of any sample collected instantly at any point of time. These standards may be enforced in a more stringent manner if considered necessary in view of the environmental conditions of a particular situation.
- (4) Inland Surface Water means drains/ponds/tanks/water bodies/ditches, canals, rivers, springs and estuaries.
- (5) Public sewerage system means treatment facilities of the first and second stage and also the combined and complete treatment facilities.
- (6) Irrigable land means such land area which is sufficiently irrigated by waste water taking into consideration the quantity and quality of such water for cultivation of selected crops on that land.

## 2.12 Ambient Noise Standards

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

Table 2-9: Ambient Noise Standards as per DoE.

S. No.	Type of Area	Limits in dB(A)L <sub>eq</sub>	
		Day	Night

<b>1.</b>	Silent Zone	50	40
<b>2.</b>	Residential area	55	45
<b>3.</b>	Mixed area	60	50
<b>4.</b>	Commercial area	70	60
<b>5.</b>	Industrial area	75	70

**Note:**

1. dB(A)  $L_{eq}$  represents time-weighted average noise level on the Decibel-A scale
2. Day time is from 6am to 9pm, Night time is form 9pm to 6 am
3. Mixed area is mainly residential area, and also simultaneously used for commercial and industrial purposes
4. Area up to a radius of 100 m around hospitals/educational institutions/special institutions/ establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

### **3 Description of the Project**

#### **3.1 Project Definition**

**City Edible Oil Captive Power Plant Limited** is a 17.6 MW power generation company, is located on the eastern bank of Shitalakshya River, and to the east of Dhaka, and west of Narayanganj. The project is located in City Economic Zone, Uttar Rupshi, Rupganj, Narayanganj within Latitude 23°44'45.04" North and Longitude 90°30'55.59" East. The entire project is completely enclosed and is owned by the **City Group**. The project is also under the **City Economic Zone** which area is 77.96 Acres. **The project** is utilizing the standard as guideline to monitor and control all the activities related to Production, Quality Control and Quality Assurance.

#### **3.2 Location of the project**

**The Project** is located at City Economic Zone, North Rupshi, Rupganj, Narayanganj and is easily accessible by all kinds of transports. The project site is about 1.78 km away from Rupshi Bus Stand, Narayanganj and just eastern bank of Shitalakha River.

Bangladesh Edible Oil, Navana Health Care and Navana Pharmaceutical Ltd, Gazi Auto Tires Factory, Rony Knit Composite, Mir Cement etc. project are surrounding 2 km project from the project area. Location map of the project has been shown in Figure 3-1 following figures.

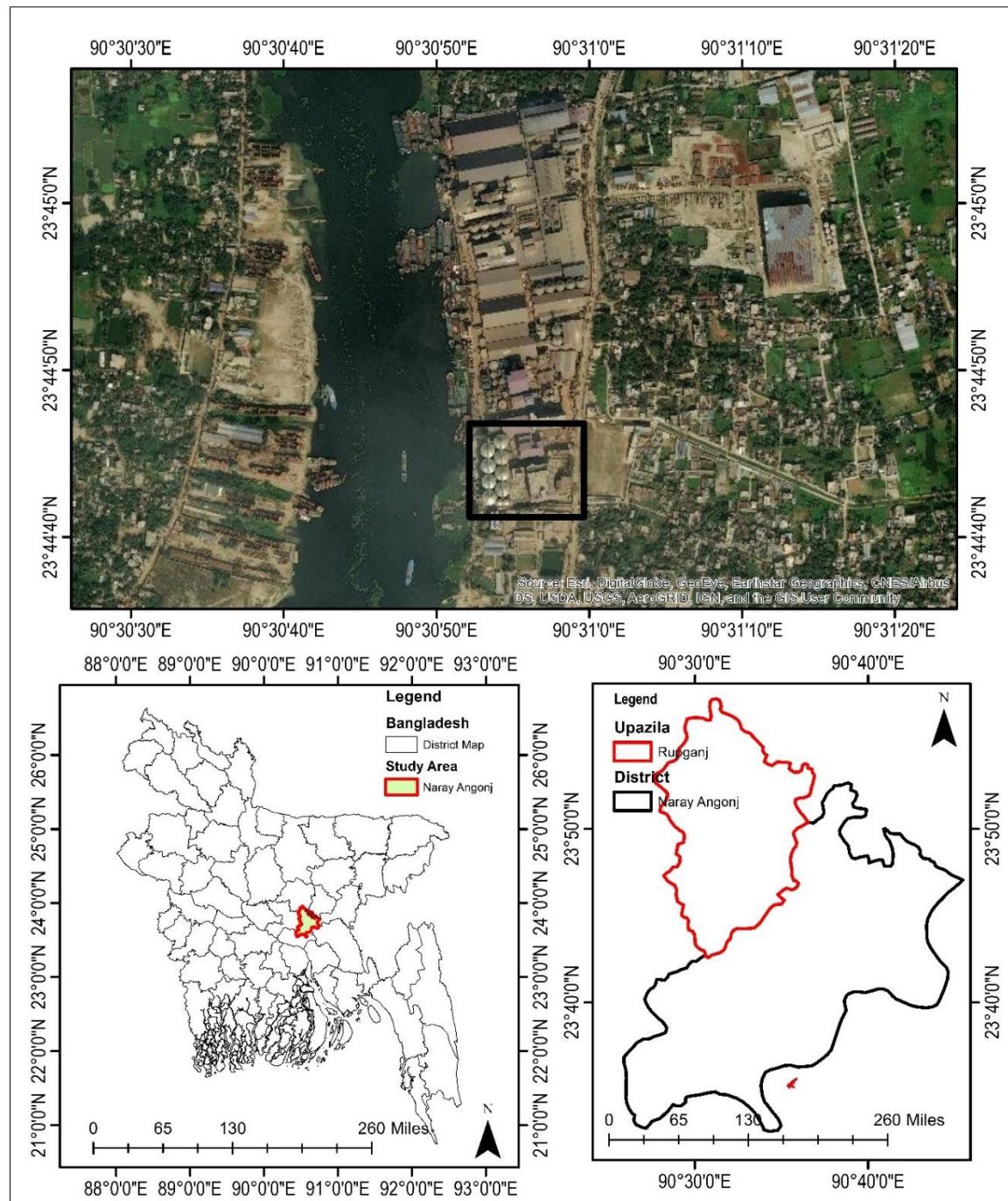


Figure 3-1: Location Map of **City Edible Oil Captive Power Plant Limited**.

### 3.3 Basic Information of Project

**City Edible Oil Captive Power Plant Limited** running project and it continue its production since 2019. The proponent has taken NOC from BEZA, REB, Fire Service and Local Authority and Department of Environment. The proponent is now in the process of taking a loan from Asian Development Bank (ADB). The basic data of the project has been shown in the following Table.

Table 3-1: Basic Information of **City Edible Oil Captive Power Plant Limited**.

Name of the project:	<b>City Edible Oil Captive Power Plant Limited</b>
Project Proponent:	Fazlur Rahman (Managing Director)
Project Location:	Block: B, Plot No: 17, at Uttar Rupshi, Rupgonj, Narayangonj.
Office Address:	City House, Plot # NW (J) 06, Road # 51, Gulshan - 02, Dhaka-1212, Bangladesh.
No. of Employees:	20 persons
Employees Engaged in Environmental Management	01
Total area of land of Economic Zone:	77.96 Acre
Project Area:	1780 m <sup>2</sup>
Type of Industry:	Red
Status of Operation	Running
Present use of land:	Covered with industrial activities.
Final Product (Name & Amount) :	Gas Engine Based Power
Production Capacity	17.6 MW
Power Plant Capacity & Co-Generation:	<p><b>Power Plant:</b> 4 x 4.4 MW GEJ Jenbacher Gas Engine Based Power Plant (Total: 17.6 MW) 4 Nos Gas Generator</p> <p><b>Additional:</b> 3 Exhaust Gas Boiler (APROVIS, Germany) as Co-Generation <math>\{(2 \times 4) + (1 \times 2)\} = 10</math> Ton/Hour Steam @ 18bar (3 Nos Exhaust Gas Boiler)</p> <p><b>Additional:</b> 2 Absorption Chiller (Broad, China) as Co-Generation <math>(2 \times 466) = 932</math> RT 2 Nos Chiller</p>
Boiler Plant:	3x 55 Ton/Hour (Total: 165 Ton Per Hour Net Steam @ 18 Bar Pressure) 3 Nos Water Tube Boiler
Daily Water Requirements:	500 m <sup>3</sup> /day
Source:	River & Deep Tube Well.
Power Requirements:	50 KW/H
Gas Requirements:	4400 m <sup>3</sup> /hr.
Possible Air Pollutants Escaped:	Through stack
Stack	4 nos.
Stack Height	39 m or 128 feet

### 3.4 Project components

**City Edible Oil Captive Power Plant Limited** has consisted of the following major units which are

The major infrastructures within the project include:

1. Gas Engine Room
2. PCB (power Control Board)
3. ECB (Exhaust gas Boiler)
4. Stack
5. Colling Tower
6. Water Reservoir Tank
7. Chiller
8. Lube oil reservoir tank
9. Gas pipe networking
10. Power network line
11. Step down transformer

Economic Zone Master plan & project layout plan of **City Edible Oil** has been shown in following figure

### **3.5 Final Product:**

The project is a 17.6 MW power generation company. The final product capacity is-

Table 3-2: Production List with Capacity of **City Edible Oil Captive Power Plant Limited**

Product Name	Amount
Power	17.6 MW

### **3.6 List of Machinery:**

Table 3-3:: List of Machinery, Equipment and Accessories (Imported) for Power Generation

SL	Equipment name	Use Area	Nos. of Equipment	Capacity
1	Jenbacher Gas Engine Based Power Plant	Power Plant	4	4x 4.4 MW =17.6 MW
2	Exhaust Gas Boiler (APROVIS, Germany)	Exhaust Gas Boiler as Co-Generation	3	{(2 x 4) + (1 x 2) = 10 Ton/Hour Steam @ 18bar
3	Absorption Chiller (Broad, China) as Co-Generation	Absorption Chiller as Co-Generation	2	(2 x 466 = 932 RT)

### **3.4 Raw Materials:**

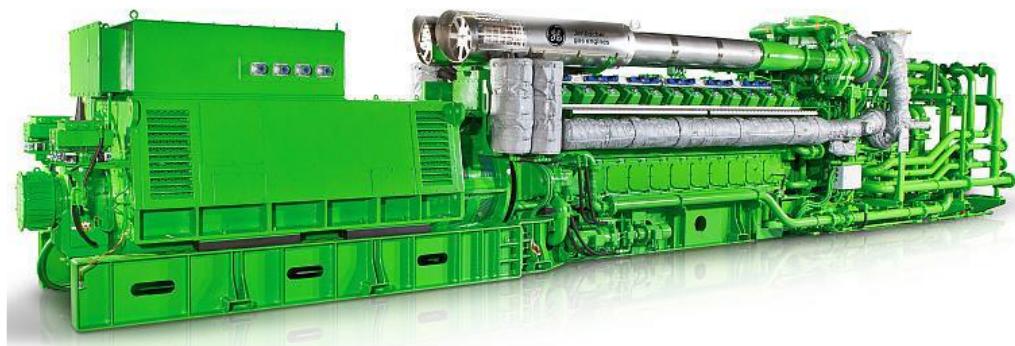
Raw Materials	Quantity/hr.	Origin
Gas	4400 MT	Titas Gas

### **3.7 Production process & Description for Power Plant & Co generation**

Announcing the world's first 2-stage turbocharged gas engine it providing a new level of engineering excellence, the generator offers significant advantages, particularly in the area of multiple engine power plants for independent power generation and combined heat and power (CHP) solutions.

Electrical output: 4397 kW el.

Thermal output: 2071 kW



### 3.7.1 Technical Data:

			100%	75%	50%
Power input	[2]	kW	9,695	7,423	5,151
Gas volume	*)	Nm³/h	950	728	505
Mechanical output	[1]	kW	4,491	3,368	2,246
Electrical output	[4]	kW el.	4,397	3,291	2,180
<b>Recoverable thermal output</b>					
~ Intercooler 1st stage	[9]	kW	1,248		
~ Lube oil		kW	138		
~ Jacket water		kW	685		
~ Exhaust gas cooled to 377 °C		kW	~		
Total recoverable thermal output	[5]	kW	2,071		
Total output generated		kW total	6,468		
<b>Heat to be dissipated</b>					
~ Intercooler 2nd stage		kW	452		
~ Lube oil		kW	281		
~ Surface heat	ca. [7]	kW	174		
Spec. fuel consumption of engine electric	[2]	kWh/kWel.h	2.21		
Spec. fuel consumption of engine	[2]	kWh/kWh	2.16		
Lube oil consumption	ca. [3]	kg/h	0.90		
Electrical efficiency			45.4%		
Thermal efficiency			21.4%		
Total efficiency	[6]		66.7%		
<b>Hot water circuit:</b>					
Forward temperature		°C	95.0		
Return temperature		°C	80.0		
Hot water flow rate		m³/h	119.6		
Fuel gas LHV		kWh/Nm³	10.2		

### 3.7.2 Exhaust gas data

Exhaust gas temperature at full load	[8]	°C	377
Exhaust gas temperature at bmepl= 18 [bar]		°C	~ 419
Exhaust gas temperature at bmepl= 12 [bar]		°C	~ 467
Exhaust gas mass flow rate, wet		kg/h	23,262
Exhaust gas mass flow rate, dry		kg/h	21,813
Exhaust gas volume, wet		Nm³/h	18,376
Exhaust gas volume, dry		Nm³/h	16,572
Max.admissible exhaust back pressure after y-pipe		mbar	50

### Combustion air data

Combustion air mass flow rate		kg/h	22,563
Combustion air volume		Nm³/h	17,460
Max. admissible pressure drop at air-intake filter		mbar	10

### 3.7.3 Technical data of heat recovery

#### General data - Hot water circuit

Total recoverable thermal output	kW	2,071
Return temperature	°C	80.0
Forward temperature	°C	95.0
Hot water flow rate	m³/h	119.6
Nominal pressure of hot water	PN	10
min. operating pressure	bar	6.0
max. operating pressure	bar	9.0
Pressure drop hot water circuit	bar	1.70
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

#### General data - Cooling water circuit

Heat to be dissipated	kW	733
Return temperature	°C	55
Cooling water flow rate	m³/h	50
Nominal pressure of cooling water	PN	10
min. operating pressure	bar	0.5
max. operating pressure	bar	5.0
Loss of nominal pressure of cooling water	bar	~
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

connection variant H2-ioi

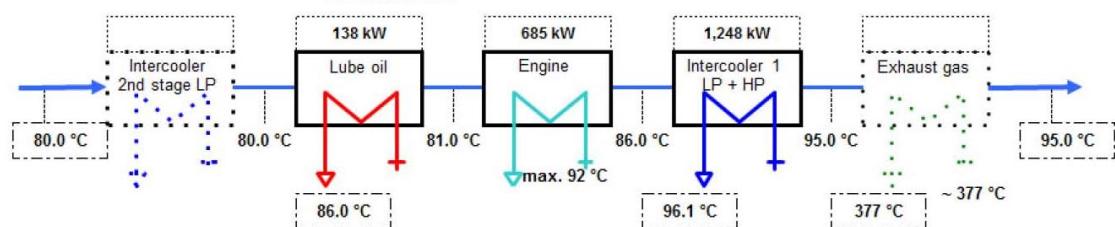
JMS624 J 624 GS-H111

## Hot water circuit (calculated with Glykol 3%)

**Recoverable thermal output =** 2,071 kW

(±8 % tolerance +5 % reserve for cooling requirements)

**Hot water flow rate =** 119.6 m<sup>3</sup>/h

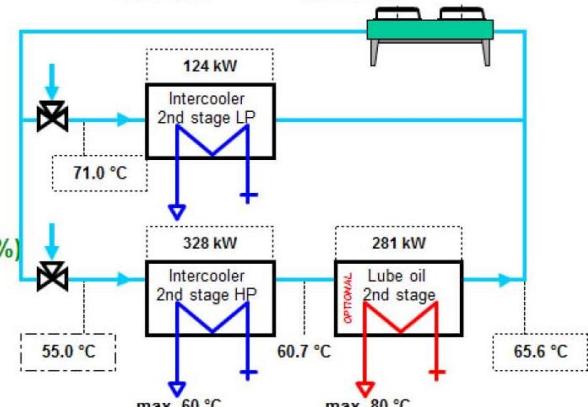


## Low temperature circuit (calculated with Glykol 3%)

**Heat to be dissipated =** 733 kW

(±8 % tolerance +5 % reserve for cooling requirements)

**Cooling water flow rate =** 50.0 m<sup>3</sup>/h

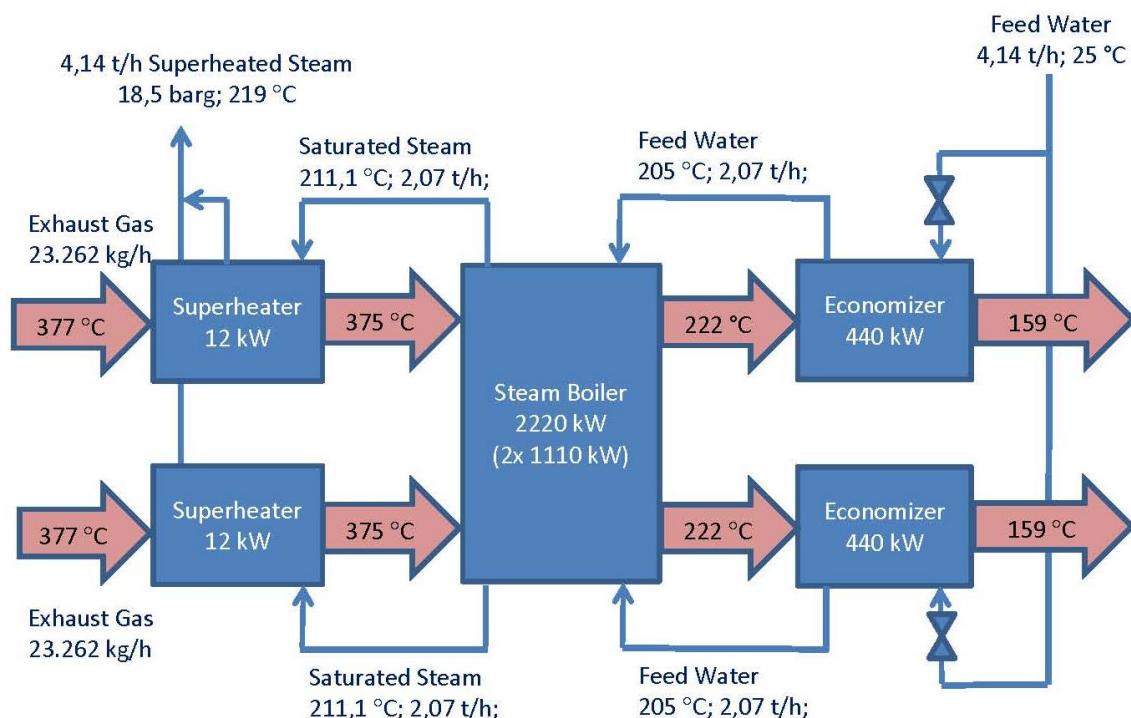


### 3.7.4 Double Steam Generator for 2x engines (natural gas):

#### THERMAL BALANCE (100% load of each engine)

thermal output	kW	2x 1110 + 2x 440 (eco) + 2x 12 (superh.)
		$\Sigma 3124 \text{ kW}$
<b>Exhaust Side</b>		
flow rate	kg/hr	2x 23.262
inlet temperature	°C	377
outlet temperature	°C	159
pressure drop	mbar	35,5
<b>Water Steam Side</b>		
flow rate	kg/hr	4.140
inlet temperature (feed water)	°C	25
outlet temperature	°C	219
steam pressure	barg	18,5

### 3.7.5 Double Steam Boiler with 2 Economizers and 2 super heaters:



Total exhaust gas back pressure (each exhaust duct): 35,5 mbar

### 3.7.6 Steam Generator:

thermal output	kW	2220 + 880 (Eco)
steam production	kg/hr	4.140 (saturated at 18,5 barg)
<b>TUBE SIDE</b>		<b>exhaust gas (natural gas)</b>
flow rate (wet)	kg/hr	2x 23.262
inlet temperature	°C	375
outlet temperature	°C	222
max. operating temperature	°C	500
max. operating pressure	barg	0.1
pressure drop	mbar	22 (each bundle)
connections	DN/PN	700/10
<b>SHELL SIDE</b>		<b>water / saturated steam (18,5 barg)</b>
flow rate	kg/hr	4.140
inlet temperature	°C	205
outlet temperature	°C	211,1
max. operating pressure	barg	21
connections	DN/PN	in: 25/25 out: 80/40
<b>MATERIALS</b>		
tubes		steel
tube plates		steel
baffles		steel
shell		steel
exhaust gas inlet chamber		steel
exhaust gas outlet chamber		steel
gaskets		ceramic seal (tube side) Sigraflex Universal (shell side)
total length	mm	+/- 9500
shell diameter	mm	Ø 2000

### **3.7.7 Safety Equipment:**

According to TRD 604 / 24 h operation

Consisting of:

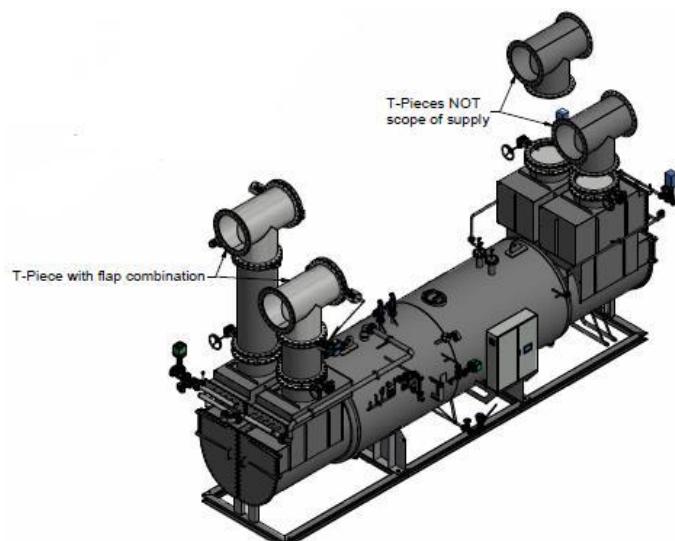
- 2 pieces water level limiter (LW), electrode and switch amplifier
- 1 piece water level controller (interval)
- 1 piece water level gauge visual
- 2 pieces safety valve, blow-off pressure 21 barg**
- 1 piece maximum pressure limiter
- 1 piece maximum pressure controller (as pressure transducer)
- 1 piece maximum temperature limiter (after superheater)
- 1 piece conductivity electrode
- 1 piece continuous blow-down valve (automatic)
- 1 piece bottom blow-down valve (automatic)  
incl. 3/2-way-solenoid valve
- 1 piece manometer with test connection
- Wiring between control box and safety equipment  
(only possible with insulation)

Additional:

- 1 piece stop valve for bottom blow-down
- 1 piece stop valve for continuous blow-down
- 1 piece stop valve for feed water inlet
- 1 piece stop valve for steam outlet
- 1 piece sealed stop valve

On-site requirements:

- Power supply: 3~400V+N+PE 50Hz, TN-C-S
- Fused: 25 A
- For Bottom blow-down valve (automatic)
  - Pressurized air supply: min. 4 barg, max. 6 barg
  - Installation of piping



### **3.7.8 Non-Electric Chiller:**

Non-Electric Chiller (Chiller + water distribution system)

**3.7.9 Function**

Cooling, heating, hot water (separately or simultaneously)

**3.7.10 Application**

Provide chilled/heating water for central air conditioning system

**3.7.11 Cooling capacity**

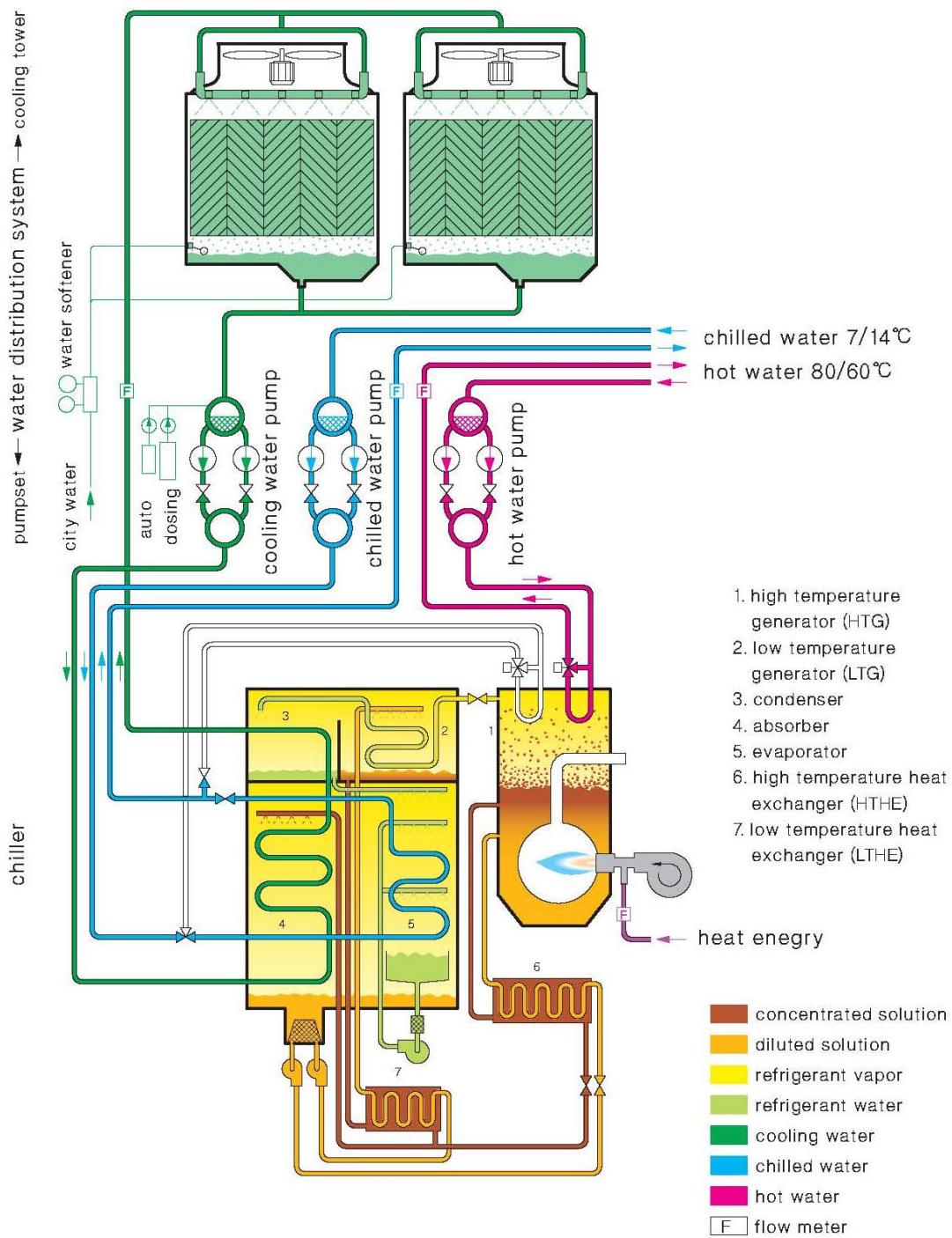
( $2 \times 466 = 932$  RT)

**3.7.12 Energy sources**

Waste heat from power generation industrial waste streams (steam, hot water, exhaust, etc.)

**3.7.13 The cooling principle**

The input heat energy heats LiBr solution to 140°C and generate vapor, which is then condensed into water by cooling water. When the refrigerant water enters evaporator (in high vacuum condition), its temperature goes down immediately to 5°C and is sprayed over the evaporator tubes, to make chilled water drop down from 14°C to 7°C to make cooling. The refrigerant water absorbs heat from air conditioning system and evaporates, then is absorbed by concentrated LiBr solution from the generators. The cooling water takes away the heat and rejects it into the air. Diluted solution is pumped into HTG and LTG separately to be heated to begin the process all over again.



### 3.7.14 Energy Saving Comparison

Compared with conventional machine room layout, BROAD packaged pumpset system reduces the rated power demand by 50~70%, and the operating electricity consumption by 70~85% (the electricity for pumpset only amounts to 2~5% of the rated cooling capacity).

### **3.7.15 Power consumption comparison:**

- BY300 (pumpset for 3489kW/992Rt chillers)

Power consuming parts	Conventional machine room power demand	Packaged pumpset power demand	Operating power consumption
Cooling water pump	180 kW	44 kW	11~44 KW
Cooling tower fan	37 kW	37 kW	6~37 KW
Chilled/heating water pump	110 kW	60 kW	30~60 kW
Total electricity/cooling capacity	327 kW 9.4 %	141 kW 4.04 %	100 kW (annual) 2.86%
Annual operating consumption	<b>1000 MWh</b>	<b>300 MWh (power saving is 76 %)</b>	

### **3.7.16 Safety**

- The world's only non-electric chiller with full range of American and European safety certificates
- High temperature generator is equipped with 8-level mechanical and electronic anti-explosion devices to ensure no explosion (even in case of sabotage)
- Cooling water system is equipped with auto biocide device to eliminate legionnaires



## Project Description



Some photography of total project is given below



Figure: Power generating Engine



Figure: PCB (Power Control Board)



Figure: Power Distribution Board.

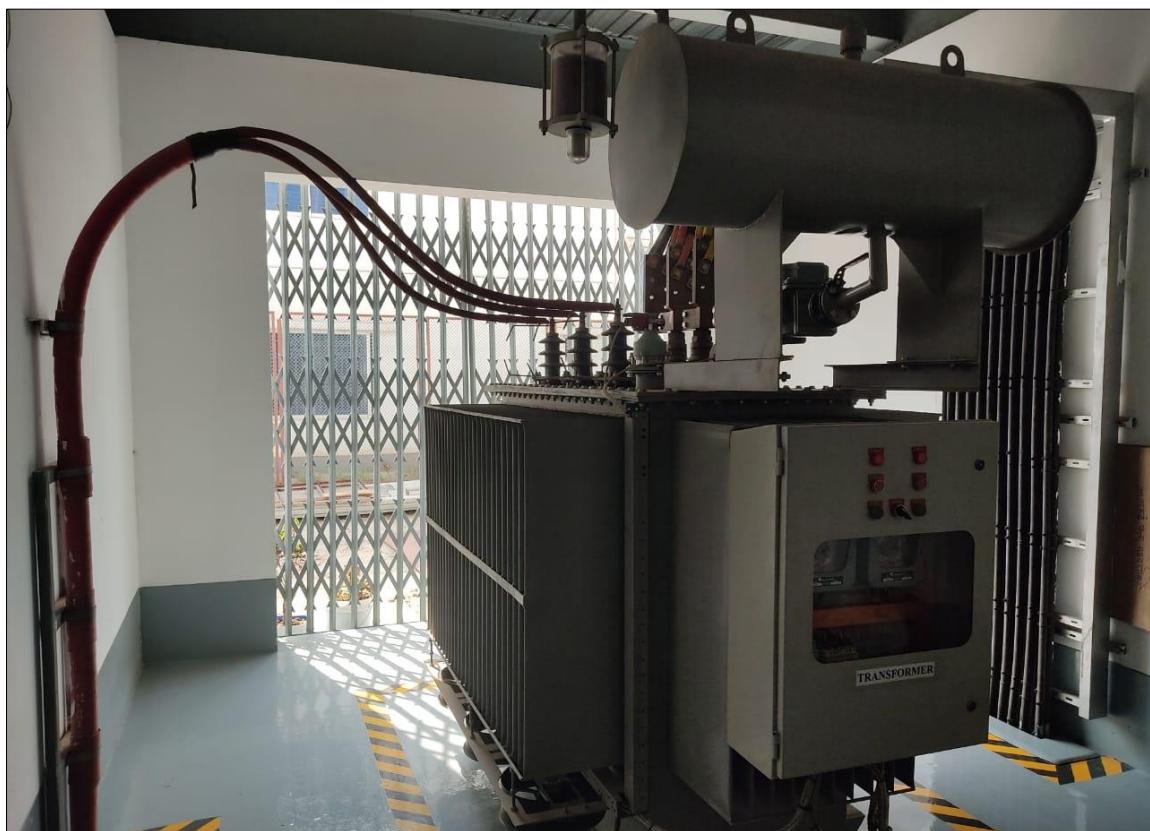


Figure: Transformer (power is converted through this transformer and supplied to production unit)



Figure: Exhaust Gas Release through this stack (stack height 39m)



Figure: Water Cooling tower.



Figure: Exhaust gas distribution pipe network.

### **3.8 Resources and Utility Demand**

#### **3.8.1 Fuel & Lubricant:**

Vehicles will consume Octane while Generator will use gas as fuel. Required lubricants will be available locally. No lubricant oil will be utilized for combustion work as the burnt lubricants will only be used for internal cooling process of electric generators.

#### **3.8.2 Water Demand:**

**City Edible Oil Captive Power Plant Ltd.** consumes 500 m<sup>3</sup> of water per day.

### **3.9 Gas Distribution line**

The project, City Edible Oil Captive Power plant located within City Economic Zone. A total 7 km gas distribution line was built to continues supply of natural gas to the project. The EZ authority has developed the 7km long distribution line by their own cost alongside of EZ connectivity road. Daily 105600 m<sup>3</sup> gas is required for operate the four Engine properly. This total amount of gas supplied from EZ so this project is not involving to develop any gas pipeline for this project.

The gas supply pipeline is passes beside the government road and no resettlement issue arise because to total land area is owned by government itself. Local area people also benefited by this pipeline because the gas pipeline is only gas distribution line to supply gas.

## **4 Environment Baseline Study**

### **4.1 Introduction**

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

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

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

### **4.2 Objective and Methodology**

The primary objective of the environmental and social baseline condition study is to provide an environmental and social baseline against which potential impacts from the construction and operational phases of the Project can be compared. The methodology adopted for collecting the baseline data was as follows:

- Study area of 10 km radial zone from the center of the proposed Project location was selected for the baseline studies.
- The environmental and social Baseline data and survey was carried out during the period of October 2018 to November 2018.
- Primary data collection was through environmental monitoring and field survey for water, air, soil, noise and ecology.
- Social baseline of the study area was captured through social surveys involving field consultations, interviews, meeting with stakeholders, discussions with government departments and secondary data review etc.
- Secondary data was collected from government reports, academic institutes, websites, published literature, interactions with government department and stakeholders etc.

Table 4-1: Existing Environmental Settings of City Edible Oil Captive Power Plant.

Particulars	Details
<b>Location</b>	City Edible Oil Captive Power Plant Ltd., Uttar Rupshi, Rupgonj, Narayangonj, Dhaka Division
<b>Total Area</b>	19010 m <sup>2</sup>
<b>Site Elevation</b>	Average 17 feet from ASL
<b>Land Type</b>	Medium high and low land, the project area is barren and less productive land.
<b>Connectivity</b>	Road Connectivity: Only 500 away from Dhaka-Sylhet highway; Rail Connectivity: 10 km away from Komolapur Railway Station; Air Connectivity: 14 km away from Hazrat Shahjalal International Airport (HSIA); Port Connectivity: Dhaka River port is 12 km away from the project; Chittagong Sea Port is 235 km away from Project.
<b>Climatic conditions</b>	Temperature: Annual average maximum: 36° C; minimum: 12.7° C Humidity: Average humidity is 80 to 90% Rainfall: Mean annual rainfall is over 2376 mm
<b>Seismic Zone</b>	Zone II
<b>Forests / National Parks</b>	None within 10 km
<b>Archaeological Site</b>	None within 300 m from the site (Sonargaon Archaeological site about 3km north)
<b>Water Bodies</b>	Shitalakshya River
<b>Ecologically Critical Area</b>	No ecologically critical areas were found in the study area. Shitalakshya River, one of the ECAs, located about 20km from the project.
<b>Reserve/Protected Forests</b>	No reserve or protected forests area was found in the study area.
<b>Predominant Geological Formations</b>	The project site is underlain by several hundred meters of alluvial sediments. The surface is covered by two meters of alluvial silt, which is underlain by approximately 0.3 meters of silty sand and sand.
<b>Topography</b>	The project site, and indeed the entire region, has a flat topography with very little relief or changes in elevation. The area has an elevation of 0.1 meters to 5.3 meters.
<b>Major Physiographic Units</b>	The area falls into Physiographic unit of old Meghna estuarine floodplain
<b>Major Soil Type</b>	The area general soil type is non-calcareous dark grey floodplain soils.
<b>Principal crops</b>	Like other cities of Bangladesh, agriculture is important in parts of the project area. The major products of the area are paddy, potato, brinjal, patal, cauliflower, sugarcane and mula (radish). Extinct or nearly extinct crops are kaun, sesame, jute, and mustard seed, indigo.
<b>Flooding</b>	This area is more prone to flood than the other area of Dhaka city. The area is generally flooded by the ingress from the backwater flow of the Meghna Rivers, Shitalakshya and Balu Rivers.

<b>Seismicity</b>	The project area falls in the Earthquake Zone-II of the seismic map of Bangladesh. This zone refers medium intensity of seismic effects.
<b>Environmental Hotspots</b>	River, School, College, Madrasha, Masjid, Mender etc.
<b>Major Settlement</b>	Residential area, Commercial area, Slums and Squatters, Bus terminals, Institutional etc.
<b>Major Industries/ Business Entrepreneurs</b>	City Auto Rice & Dal Mills Ltd, City Sugar Mills Ltd., and all industries in City Economic Zone Ltd.

#### 4.3 Study Area

Narayanganj was a sub-division of former Dhaka district. It was upgraded to a district on 15th February, 1984. Narayanganj the oldest and the most prominent river port of Bangladesh, grew into a prominent place of trade and commerce in the long past for which it was previously known as a Ganj. It is said that one prominent Hindu religious leader named Bicon Lal Pandy acquired the ownership of this region from East India Company. He declared the markets located on the bank of the river Shitalakshya as endowed property by a will in order to meet the expenses of the worship of God Narayan. Consequently, the name Ganj was turned into Narayanganj after the name of God Narayan. The district is bounded on the north by Gazipur and Narsingdi districts, on the east by Brahmanbaria and Cumilla District, on the south by Munshiganj District and on the west by Dhaka District. The total area of the District is 684.37 sq. km. (264.00 sq. miles). The District lies between 23°33" and 23°57" north latitudes and between 90°26" and 90°45"east longitudes. In this study, study area covers both the immediate site, and an extended area of about 2 km radius. Geographically the project is located at 23.749430° and 90.516158°.

In this study, study area covers both the immediate site, and an extended area of about 2 km radius. Immediate area here is the area that is enclosed by the project perimeter which falls mainly in **City Edible Oil Captive Power Plant Ltd.**, Rupganj Upazila. Geographically the project is located at Latitude 23.749430° North and Longitude 90.516158° east.

However, the surrounding area covers mainly Rupgonj Upazila. In physico-chemical component, parameters included are land, water quality, air quality, climate, and noise. Primary and secondary data has been collected. In case of primary data collection emphasis has been given only to project boundary area. Secondary data has been collected from different government and non-government organizations. Secondary data covers environmental and socioeconomic information of Narayanganj area of Bangladesh. Following

figures shows the google location map and 1 Km, 2 km and 10km surrounding areas of **City Edible Oil**.

## **4.4 Environment: Physical**

### **4.4.1 Climate**

The climate of Narayanganj of which the project is a part, is average tropical monsoon with alternating dry/wet seasons. It has three main seasons:

- Summer/pre-monsoon - March and April
- Rainy season/monsoon - May to October
- Winter - November to February

Winter: November to February: The winter or dry season is the coolest and driest period. However, according to Bangladesh Meteorological Department (BMD) the highest temperature recorded during winter in Narayanganj is 37° C and a minimum of 9° C. Rainfall is very rare during this period. Winds are predominantly blowing from the Northwest but with a high frequency of calm wind situations.

Pre-Monsoon: March and April: In the summer pre-monsoon season and the early months of the wet seasons, the highest temperatures are reached. The monthly average temperature can rise up to 36° C. During this period, air becomes more humid, rainfall increases, and heavy rains with thunderstorm occur.

Monsoon: May to October: In the wet season more than 85% of the total annual rainfall occurs. Monthly average temperatures remain high with a maximum of 36° C. The period of periodic heavy thunderstorms lasts until June. June to mid-September to early November is the transitional period with decreasing rainfall, often thunder. Following table shows the average and monthly maximum and minimum temperature of last 2 year of study area.

#### **4.4.1.1 Temperature**

The period from February to March is marked by continuous increase in the temperatures. May is the hottest month of the year with a mean daily maximum and minimum temperature of 34 °C and 27 °C, respectively. With the onset of monsoon by mid-May, the temperatures descend slightly. January is the coolest month of the year with a mean daily maximum and minimum temperature of 24 °C and 14 °C, respectively.

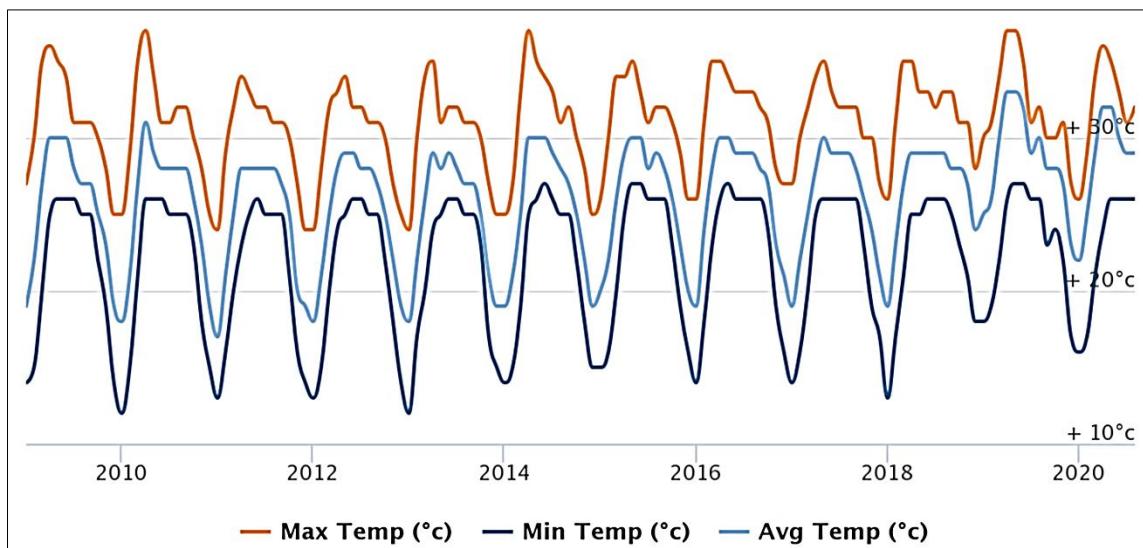


Figure 4-1: Temperature of the study area

#### 4.4.1.2 Wind

The following graph shows that the maximum monthly wind speed is available in the months of April, May, June and July. Minimum monthly wind speed found in the months of October, November and December. The wind speed in the months of January, February and March is moderately higher than in the months of December and November. The average wind speed in the study area is more than 12 km / h. Maximum wind speed recorded at more than 30.7 km / h in May, 2013.

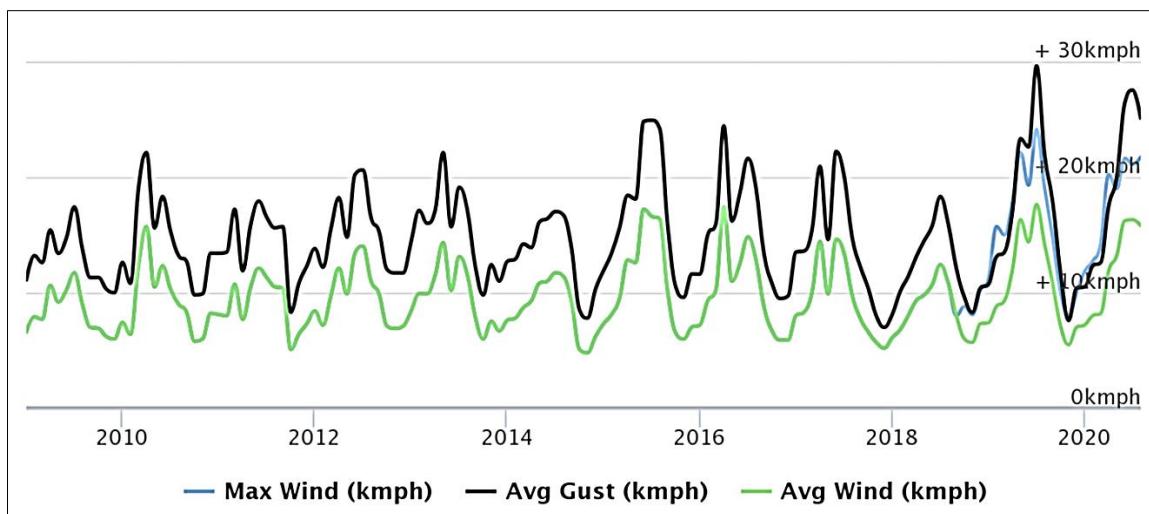


Figure 4-2: Average Monthly Wind Speed over the Year at Project Site.

Following graph represent the direction of wind at the study area. According to the graph yearly 1438-hour time wind roses from south to east, 1303-hour wind roses from south to

south east. 902 hours from East to southeast, 796 hours from south, only 672-hour wind roses from North.

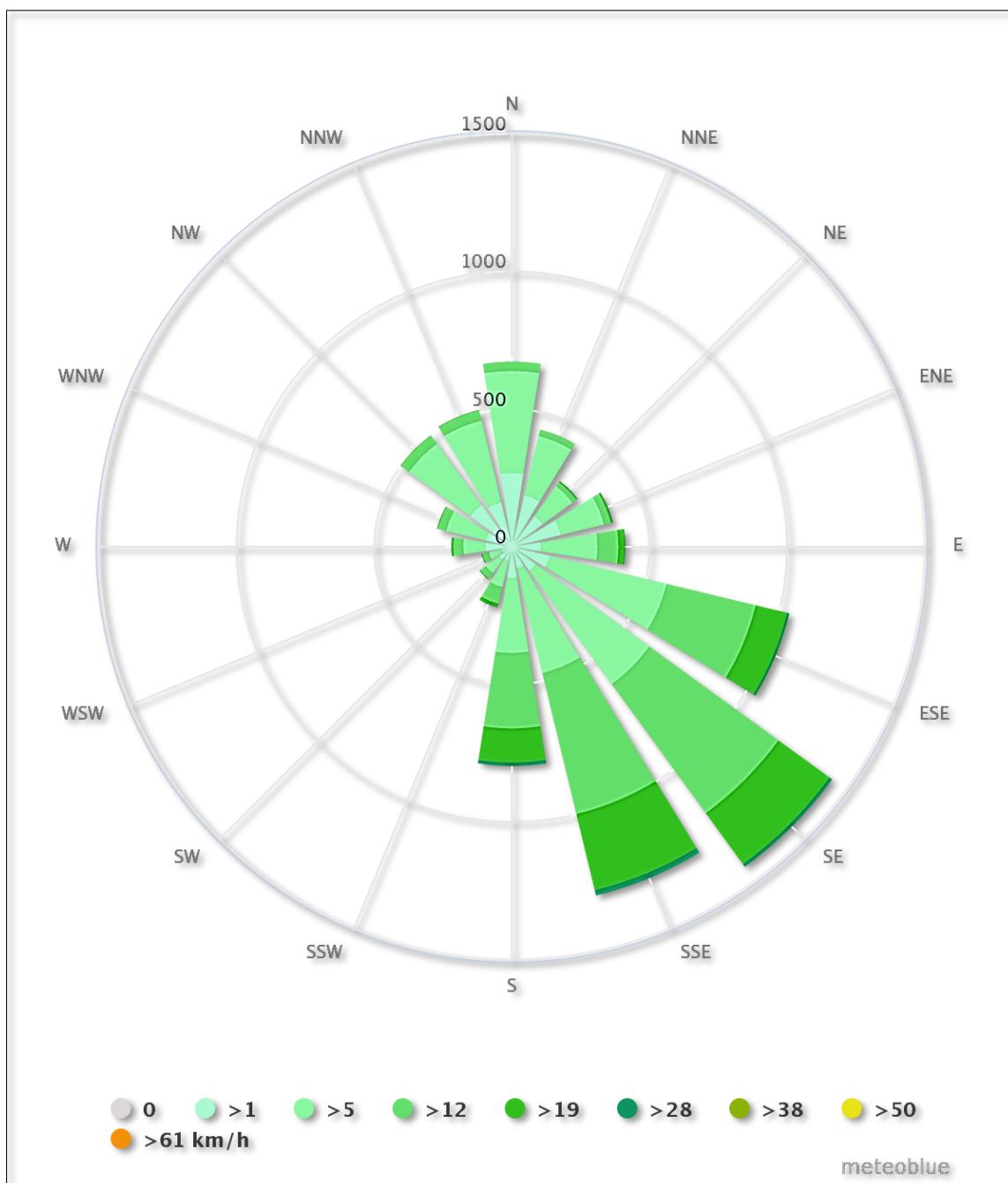


Figure 4-3: Wind Roses over the Year at Project Site.

#### 4.4.1.3 Precipitation

About 80% of the precipitation occurs during five monsoon months (May to September). Minimum precipitations were recorded during the month of November to February whereas average showering does occur in March, April and October. According to world-weather the annual rainfall in 2019 was 2947.8 mm and total rainy day was 222 and.

Maximum intensity of rain occurs in month October, 2018 and it was, 26.16 mm per day. Approximately 80% of it occurs during the monsoon. The monthly average normal rainfall variation based on the climatology data and number of normal rainy days in each month in the project area have been given in the following figure represent the average precipitation data of the study area.

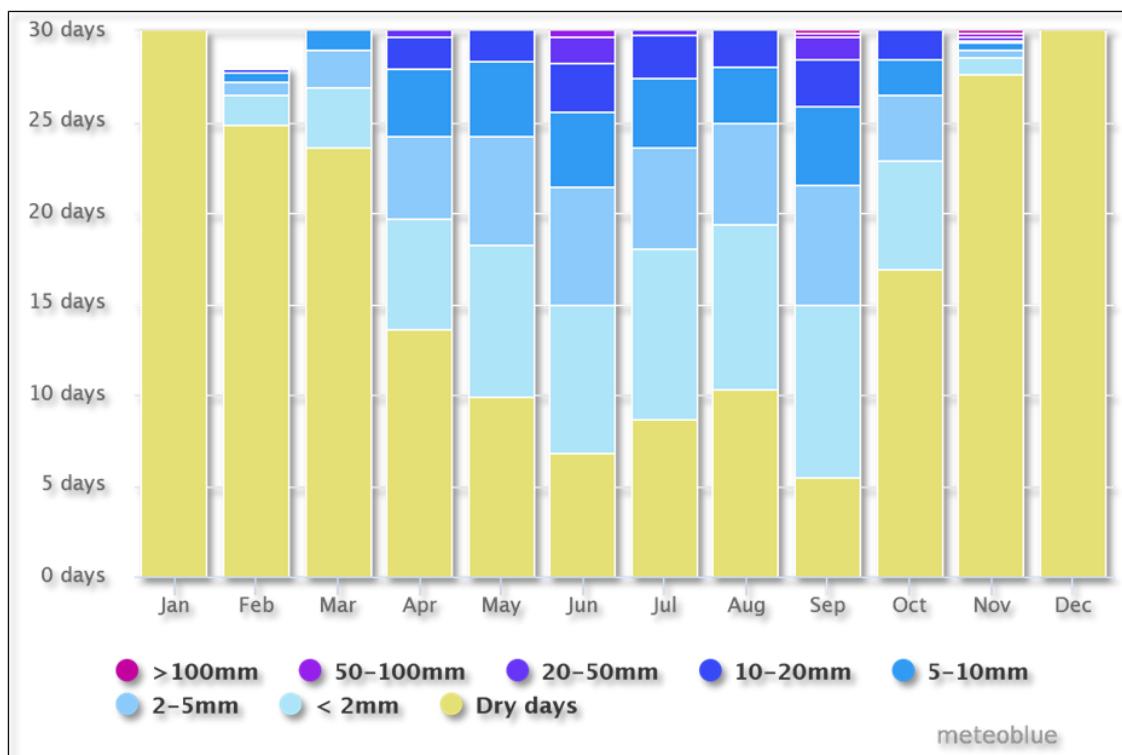


Figure 4-4: Average Rainfall amount and Rainy Day

#### 4.4.1.4 Humidity

Due to the heavy rainfall and high air temperature, the humidity levels in Bangladesh remains high. Analyzing the meteorological data, it has been found that during the pre-monsoon period the humidity level remained at its lowest point. Within the study area, February is the driest month with an average minimum of around 49% humidity. However, humidity increases to maximum in the monsoon period. The average maximum humidity ranges from 80% to 90%, whereas the minimum average ranges from 42% to 64%. The monthly maximum, and maximum averages and minimum, minimum average of the last 10 years (2009-2019) are shown in the following Figure.

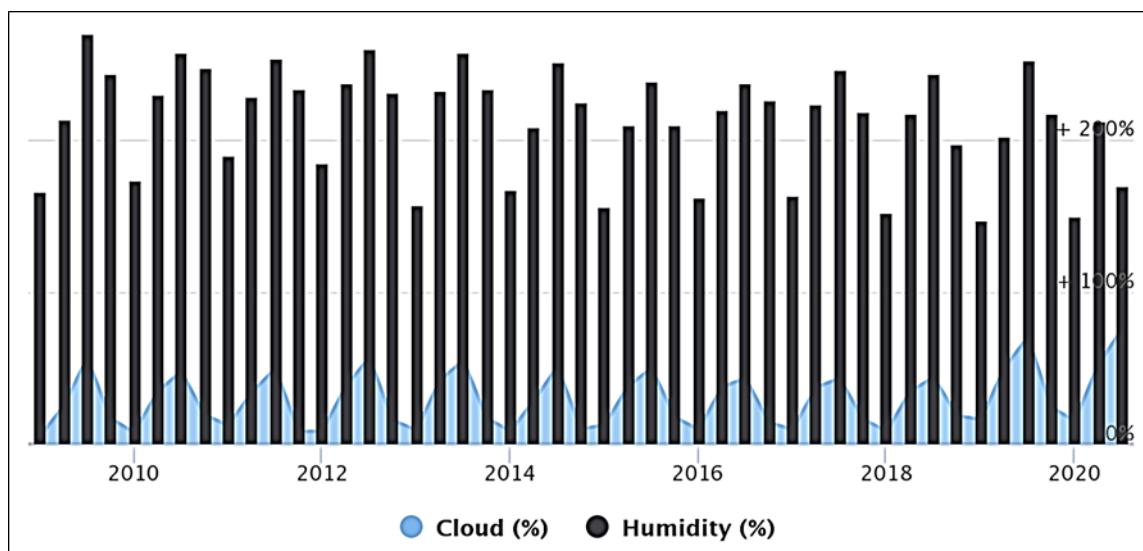


Figure 4-5: Monthly Maximum, Minimum and Average Humidity at study area

#### 4.4.2 Land Use

The area enjoys all the infrastructure facilities like water, electricity, NG, telecommunication etc. Narayangonj District is a district in central Bangladesh, part of the Dhaka Division. The main city of the district is Narayangonj. It is near the capital city of Dhaka. Narayangonj District consists of five district. 47 unions and 827 Mauza. Out of the five up district Rupganj is the largest with an area of 247.97 km<sup>2</sup>. Which is 32.65% of the total area of the District. Bandar is the smallest with an area of 55.84 km<sup>2</sup>. Sharing 7.34% of the total area of the District.

A land use map on 2km study area has been generated by using GIS and classified into five different classes which area Industrial area, agriculture area, dense vegetation area, newly developed area and water body. According to LULC 0.109 km area covered with Newly developed area, which may have developed for any kinds of development activities like, industry, building or others. 3.1075 km area covered with industrial and land development activities, 7.506 km area is barren land and agricultural land and 0.46 km area is dense vegetation land. Details LULC of the 2km study area is given in table

SN	Class	Count	Area (m <sup>2</sup> )	Area (km <sup>2</sup> )
1	Newly Developed Land	485	109125	0.109125
2	Built Area	13810	3107250	3.10725
3	Wetland	6857	1542825	1.542825
4	Barren Land	33364	7506900	7.5069
5	Vegetation	2025	455625	0.455625
				12.72173
				100.1711

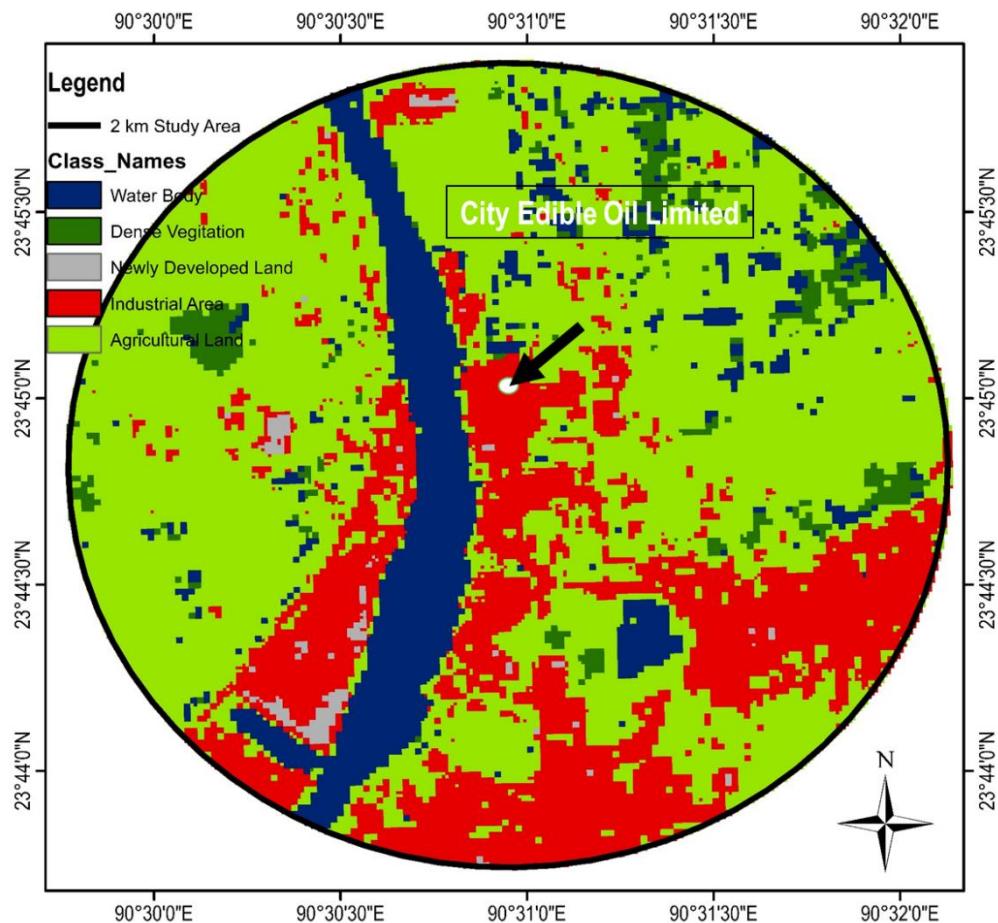


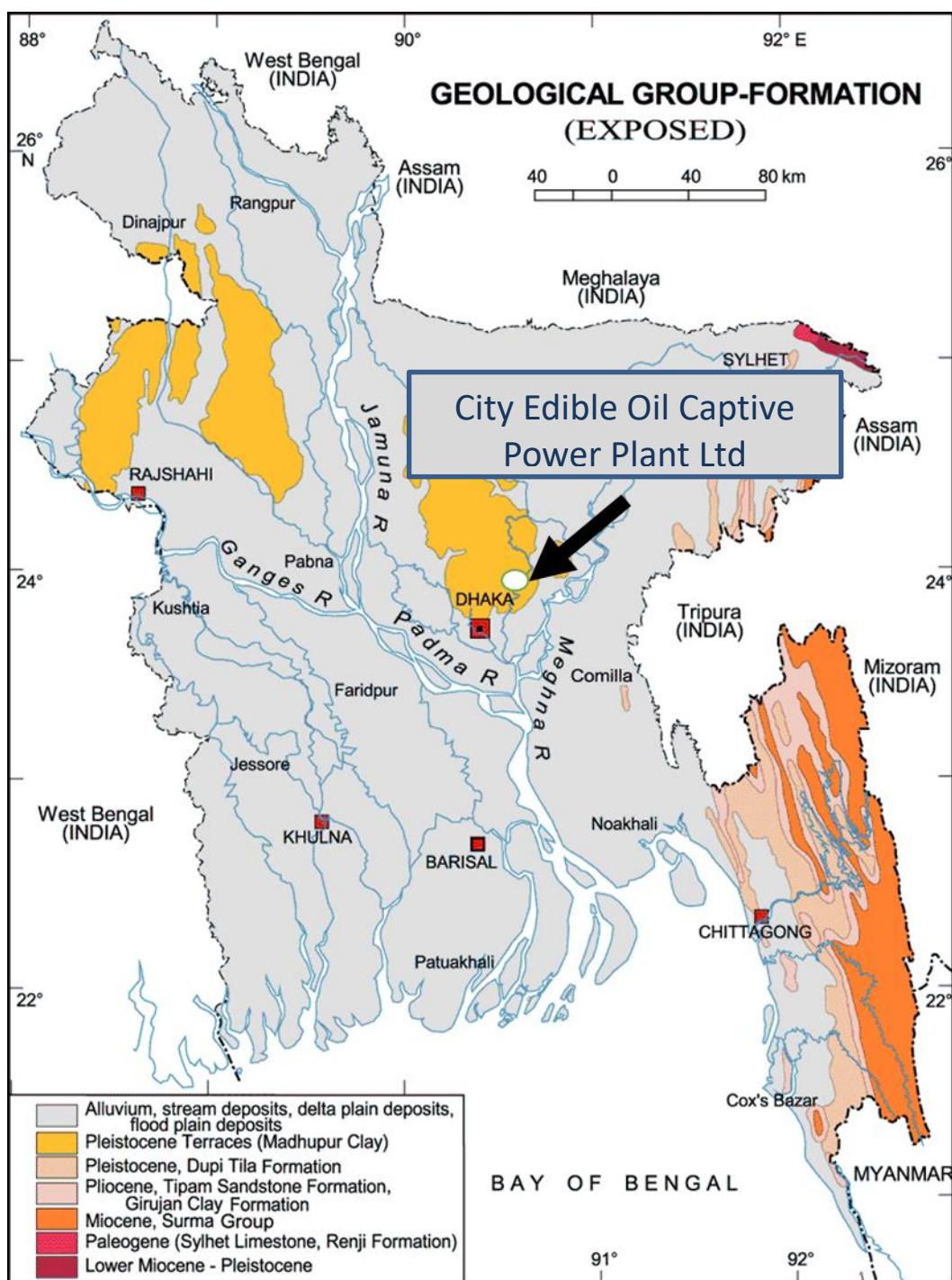
Figure 4-6: 2km Land Use and Land Cover (LULC) Map of the Study Area

#### 4.4.3 Geology

The Geology of Bangladesh is affected by the country's location, as Bangladesh is mainly a riverine country. It is the eastern two-thirds of the Ganges and Brahmaputra river delta plain stretching to the north from the Bay of Bengal. There are two small areas of slightly higher land in the north-center and north-west composed of old alluvium called the Madhupur Tract and the Barind Tract, and steep, folded, hill ranges of older (Tertiary) rocks along the eastern border.

Geologically, the study area lies on the edge of Madhupur Tract, a Pleistocene Terrace and the Holocene Floodplain, a Ganges-Brahmaputra-Meghna alluvial plain of north central part of Bangladesh, at an elevation of 0 to 10m PWD. The landform units are high land, low land, and medium high and medium low land categories. The land types are classified on the basis of maximum depth of flooding. The depth of high land is 0.3m, low land is 3.0m, medium high land is 0.9m and medium low land is 1.8m respectively. The study area mainly

composed of two major physiographic units, viz. Recent Meghna floodplain and Brahmaputra floodplain areas.



Modified from Reimann, Klaus-Ulrich, 1993

Figure 4-7: Geology of the project area

#### 4.4.4 Topography

Topography is the configuration of a land surface including its relief and contours, the distribution of mountains and valleys, the patterns of rivers, and all other features, natural and artificial, that produce the landscape. Although Bangladesh is a small country, it has considerable topographic diversity. It has three distinctive features:

- (i) a broad alluvial plain subject to frequent flooding,
- (ii) a slightly elevated relatively older plain, and
- (iii) a small hill region drained by flashy rivers.

The general topography of the project area is relatively flat. The topography of the specific project location is 11.6 – 13.9 m MSL (Figure 6.11). Topographically the cluster of the project location is almost flat, with many depressions, natural water bodies, bounded by the Rivers.

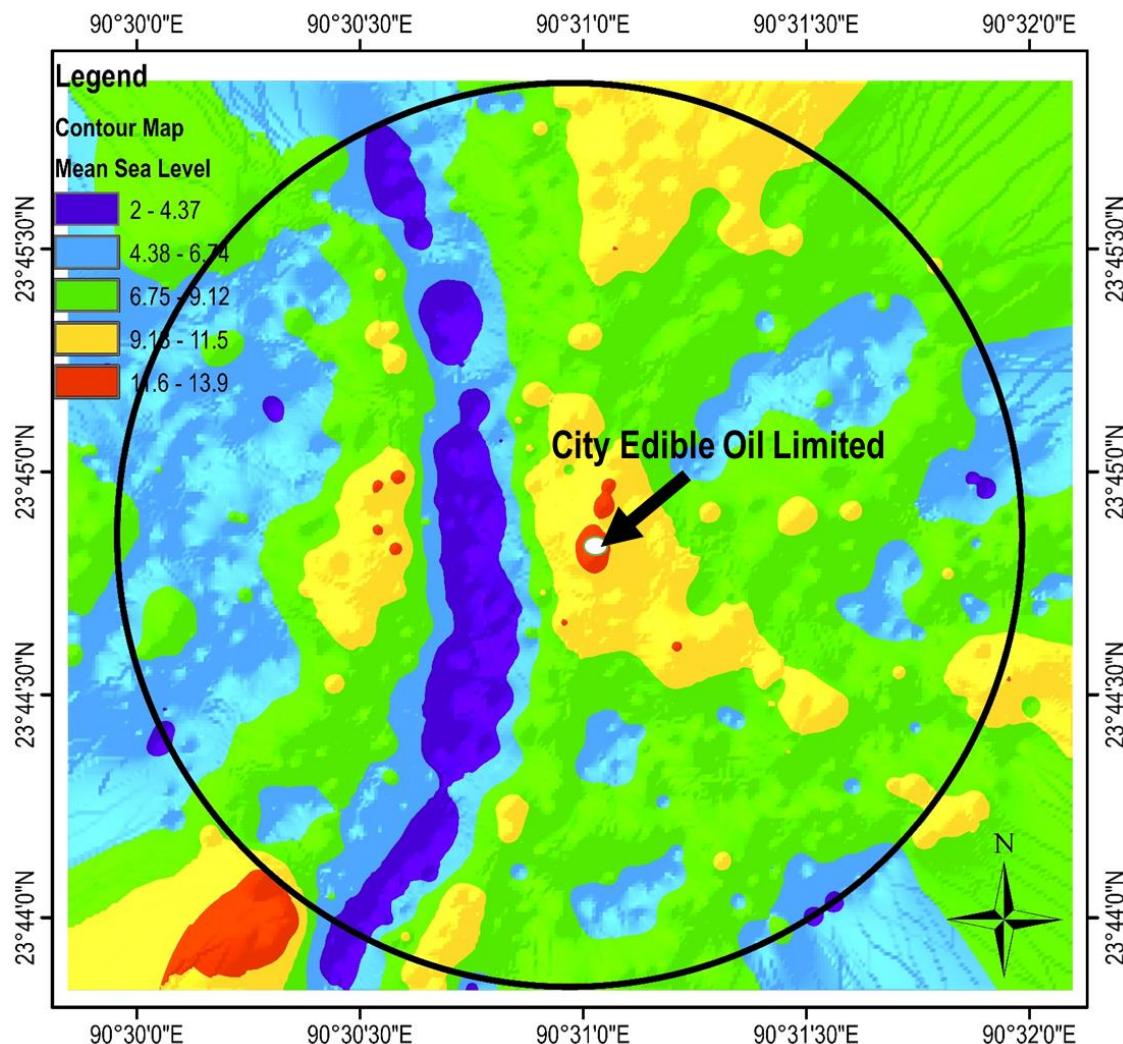


Figure 4-8: Contour Map of the study area

#### 4.4.5 Water Quality Assessment

Water sampling and analysis was undertaken to understand the overall baseline water quality characteristics of the surface and groundwater in the study area. Samples were taken from representative selected water bodies and groundwater sources representing different parts of the study area. The surface water sampling was based on the identification of major surface water bodies such as the Shitalakshya River adjacent to the site. Groundwater sampling locations were selected to obtain a representative water sample from various zones within the study area. The samples were collected from deep tube wells. A total of 4 samples, two (2) surface water and two (2) ground water samples were collected. **And the water quality standard tested by Control Engineering Laboratory (A third party testing organization) (water quality test report has attached with this report in annexure)** Detail of the sampling location is provided in following table 4-2,

Table 4-2: Details of Surface and Ground Water Sampling Locations

SI.	Sampling location	Sampling Water	Sampling Code	Geographic location	Type of Source
1.	North-West (River Side)	Surface water	SW1	23°45'4.48"N; 90°30'49.75"E	Shitalakshya River
2.	South-west (River Side)	Surface water	SW2	23°44'53.83"N; 90°30'52.28"E	Shitalakshya River
4.	North Side	Ground water	GW1	23°45'16.78"N 90°30'53.90"E	Deep tube wells
5.	South Side	Ground water	GW2	23°44'59.38"N 90°30'54.68"E	Deep tube wells

The sample were analyzed for parameters covering bacteriological and physio-chemical characteristics which include certain heavy metals and trace elements. Water samples were collected as grab water sample in a standard sampling bottle and 500 ml sterilized clean PET bottle for complete physio-chemical and bacteriological tests respectively.

The samples were analyzed as per standard procedures/method given in standard Method for examination of water and wastewater Edition 23, published by APHA as well as using on site field test kit. Details of the analysis method and protocol are presented in following table 4-3.

Table 4-3: Water quality (limited parameters) of Shitalakshya River

SN	Parameter	Unit	Test
1	Temperature	(°C)	Digital thermometer
2	TDS	(mg/l)	Digital TDS meter

3	EC	( $\mu\text{mhos/cm}$ )	Digital EC meter
4	DO	(mg/l)	Digital DO meter
5	pH		Digital pH meter
6	Salinity	(ppt)	Digital Salinity meter
7	Fecal Coliform	mg/l	Lab Analysis
8	Iron (Fe)	mg/l	3113.B
9	Oil and Grease	mg/l	Lab Analysis

Source WTB Lab. (water collected on 02.11.2019 and analysis reporting date 10.11.2019)

Table 4-4, show the surfaced Water Quality of the project are and table 4-5 shows the ground water quality,

Table 4-4: Surface water quality of the project area

Sl.	Parameters	SW1	SW2	Bangladesh Standard, mg/l
1	COD	40	40	$\leq 200$
2	DO	7.62	7.47	4.5-8.5
3	BOD	47	53	$\leq 50$
4	pH	8.3	8.3	6.5-8.5
5	TDS	110	120	$\leq 2100$
6	Alkalinity	120	120	150
7	Hardness	78	80	200-500
8	Iron	Nil	Nil	2
9	Temperature	26.9	27.1	Summer-40 Winter-45

Table 4-5: Ground water quality of the project area.

Sl.	Parameters mg/l	GW1	GW2	Bangladesh Standard (mg/l)
1.	Arsenic (As)	-	-	0.05 mg/l
2.	Iron (Fe)	0.2	0.1	0.3-1.0 mg/l
3.	Lead (Pb)	-	-	0.05 mg/l
4.	pH	7.4	7.8	6.5-8.5
5.	Temperature	27.1	27.0	20-30 °C
6.	Total Coliform	-	-	0 mg/l
7.	TDS	890	240	$\leq 1000$ mg/l
8.	Hardness	498	129	200-500

The sample collection procedures for the water quality test have been shown in figure 4.9. The test results show that the baseline water quality of both surface and ground water source has been found in the standard limit of the applicable regulations.



Figure 4-9: Images of Water quality sampling period

#### 4.4.6 Air Quality Assessment

Population density within the project area of the Upazila is high and there are many motor vehicles operating on the project roads and other roads within the upazila. It is expected that the project will not cause significant deterioration of air quality in the area. Close vegetation is observed in and around the project area.

**Most importantly, during the operational activities of City Edible Oil Plant and Power Plant (which are already described in Section 3.7), no activator species were found that could cause much air pollution to conduct any air dispersion model.**

On basis of production process and emitted air quality, no air modelling is conducted during prepared this EIA. To ensure the subproject does not cause deterioration of ambient air quality

a detail management plan has been included in this EIA report. See Figure 4-10 for an illustration of how to measure air quality in a given location.



Figure 4-10: Air Quality Monitoring at Project Site

Table 4-4 shows the air quality standard and table 4-5 show the method of air quality data analysis.

Table 4-6: Air Quality Standard

Parameters	SPM	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	CO	CO <sub>2</sub>	NO <sub>x</sub>
Units	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ppm	ppm	µg/m <sup>3</sup>
DOE Standard	200	65	150	365	9	NYS	100
NAAQS	500	65	150	120	9	NYS	120

Table 4-7: The following methods were used to analyze the indoor air quality parameters

Parameters	Methods
CO (Carbon Monoxide)	Electrochemical
CO <sub>2</sub> (Carbon Dioxide)	NDIR (Non-Dispersive Infrared)
SO <sub>2</sub> ( Sulphur Dioxide)	Electrochemical
NO <sub>2</sub> ( Nitrogen Dioxide)	Electrochemical
SPM (Suspended Particulate Matter)	Laser
PM <sub>2.5</sub> (Particulate Matter)	Laser

PM <sub>10</sub> (Particulate Matter)	Laser
---------------------------------------	-------

Table 4-8: The following measurement uncertainties were assigned to the respected parameters

CO (Carbon Monoxide)	± 0.2 ppm
CO <sub>2</sub> (Carbon Dioxide)	2 % of Rdg. ± 10 ppm
SO <sub>2</sub> ( Sulphur Dioxide)	± 0.5 ppm of Rdg
NO <sub>2</sub> ( Nitrogen Dioxide)	± 0.5 ppm of Rdg
SPM (Suspended Particulate Matter)	± 0.4%
PM <sub>2.5</sub> (Particulate Matter)	± 0.4%
PM <sub>10</sub> (Particulate Matter)	± 1.1%

The geographical location and setting of the ambient air quality monitoring locations has been listed in following table.

Table 4-9: Ambient Air Quality Sampling Locations

Sl.	Station Code	Geographic Location	Sampling Location
1.	AQ1	23°45'4.48"N; 90°30'49.75"E	North-west corner
2.	AQ2	23°44'53.83"N; 90°30'52.28"E	South-west corner
3.	AQ3	23°45'5.70"N; 90°30'59.68"E	North-east corner
4.	AQ4	23°44'55.34"N; 90°30'59.81"E	South-east corner

Ambient air quality measurements are essential to provide a description of the existing conditions or the baseline against which changes can be measured and to assist in the determination of potential impacts of the proposed **City Edible Oil Limited. Unit-2** air quality. Air quality test has been conducted on 2<sup>nd</sup> November, 2019 at the proposed project site and the test was analyzed by **Control Engineering Laboratory** (is a sister concern of WTB). The test results are given in the below Table 4-4.

Table 4-10: Test Results of Air Quality Analysis in the project premises

Sl. No.	Sampling Locations	SPM	PM <sub>2.5</sub>	PM <sub>10</sub>	CO	SO <sub>2</sub>	NO <sub>x</sub>
01	North-west corner	105	25	82	0.5	05	05
02	South-west corner	115	33	72	1.0	19	09

03	North-east corner	197	49	147	0.7	07	18
04	South-east corner	176	29	133	0.4	13	14

(Source: Environmental Monitoring Report City Economic Zone)

**The baseline survey result shows that the ambient air quality is in the limit of applicable standards discussed above. SPM of north-east corner is very high level ( $197 \mu\text{m}$ ) and close to the acceptable level of DoE ( $200 \mu\text{m}$ ).**

#### 4.4.7 Ambient Noise Quality

Noise levels were recorded at four (4) locations in the project area during the sampling time. Noise levels were recorded in the form of sound pressure levels with the help of a digital sound level meter. The details of noise monitoring locations are given in following table. The purpose of ambient noise level measurement was to determine sound intensity at the monitoring locations. These locations are chosen in such a way that a representative data could be recorded all over the block. The sound level is recorded in form of A-weighted equivalent continuous sound pressure level (Leq) values with the use of A-weighting filters in the noise measuring instrument.

The noise level at the project site has given in table 4-11 and noise quality test report is given in table 4-12.

Table 4-11: Bangladesh Standard According to ECR-1997

<b>Location</b>	<b>Average Noise Level (dB(A))</b>				<b>Applicable Standard* (dB(A))</b>	
	$\text{Leq}_{\text{day}}$	$\text{Leq}_{\text{night}}$	$\text{Leq}_{\text{max}}$	$L_{\min}$	Day	Night
NS 1	55.5	43.5	67.33	41	75	70
NS 2	50.5	39	59	42	75	70
NS 3	56.5	44.5	69.67	41.67	75	70
NS 4	57.5	47	71	45	75	70

Table 4-12: Details of Ambient Noise Monitoring Locations

<b>Sl.</b>	<b>Station Code</b>	<b>Geographic Location</b>	<b>Sampling Location</b>
1.	NS1	$23^{\circ}45'4.48''\text{N}$ ; $90^{\circ}30'49.75''\text{E}$	North-west corner
2.	NS2	$23^{\circ}44'53.83''\text{N}$ ; $90^{\circ}30'52.28''\text{E}$	South-west corner
3.	NS3	$23^{\circ}45'5.70''\text{N}$ ; $90^{\circ}30'59.68''\text{E}$	North-east corner

4.	NS4	23°44'55.34"N; 90°30'59.81"E	South-east corner
----	-----	------------------------------	-------------------

The noise quality result shows very close to the acceptable limit of DoE standards when the maximum Leq is considered. So, it is necessary for the project to take actions necessary to mitigate the noise level as well as to provide protection to the workers working beside the source of noise generation.



Figure 4-11: Noise Quality Sampling Images

## 4.5 Environment: Ecological

### 4.5.1 Introduction

Narayanganj is an area in central Bangladesh situated near the capital city Dhaka. The area mainly covers with home state forest areas, marshy lands, agricultural crop lands and vegetation. Wetland includes ponds, ditches, and small canal connect to the Shitalakshya River. The areas support a diverse animal group and hold a balanced ecosystem.

While establishing this project a lot of interventions were carried out there. These might have impacted on the terrestrial and aquatic biodiversity within the impact zone of the project. In view of this, this study assesses the terrestrial and aquatic flora and fauna within the impact zone of the project. The section below outlines the scope of work or core components of this study.

### 4.5.2 Scope of work

The proposed Captive Power Plant will contribute 17.6 MW of electricity which will be completely used for the day-to-day process of Edible Oil Plant reducing the electricity pressure on the national grid. The proposed project will have substantive amount of environmental and social impact which demands and impact assessment. The scope of conducting the ESIA study includes

- a) Identify the terrestrial plants within 5km radius of the project the impact zone of project.
- b) Identify the terrestrial fauna (vertebrate) within the impact zone of project.
- c) Identify the aquatic macro fauna/fish species within the impact zone of project.

#### 4.5.3 Methodology

To identify the biodiversity, data were collected from the impact zone of project during **January 2020** as outlined below through physical observation and carrying out FGD and KIIs with the local people:

#### 4.5.4 Collection of Terrestrial Plants Data

Plant species were recorded surrounding 5 km of plant area. At first, the areas were visited to monitor and plant species were recorded. Then one focus group discussion (FGD) and two key informant interviews were carried out with the local people to prepare a checklist of the plant species available in that area. The participants were also asked to express their observations about changes of plant diversity in last one year by showing the images of plant found nearby plant area.

#### 4.5.5 Collection of Terrestrial Fauna Data

Four vertebrate classes (mammals, birds, reptiles and amphibians) were surveyed as this group of animals presumably important and indicator species of a balanced ecosystem. To conduct the biodiversity survey, the researcher team carried out an ecological survey in the core and surrounding areas (up to 5 km) of the plant site. The sampling was made in a realistic manner to achieve the objectives of this study. Within the impact zone a broad range of terrestrial habitats were identified where wildlife species distributed in a dynamic way with having diversity, abundance and the status of animal species/animal groups supported by those micro and macro-habitats.

Survey of amphibians, reptiles, mammals and birds in the **project** areas and adjacent areas carried out through conducting field survey by employing different survey methods such as transact line sampling, point sampling, time sampling methods, opportunistic survey and zigzag survey, and one FGD. Data were collected based on the direct observation in the field. However, where the animal was not immediately available or difficult to locate or trace, observations were made on foot print, pug marks, trailing, tracks, burrows, nests, animal holes, caves on the trees or fruits made by animal, etc. Besides, local people were discussed

(during FGD) to ascertain the existence and to assess the status/abundance of amphibians, snakes, monitor lizards, mongooses, jackals, foxes, bats, dolphins, birds etc.

Standard taxonomy books, field notebooks, field manuals and taxonomic sheets used for identification of species. The species, which were not possible to identify in the field, brought to laboratory of the Department of Zoology, University of Dhaka for proper labeling for its subsequent identification.

#### **4.5.6 Collection of fish data**

Fish species was identified and changes in their biodiversity were investigated using key 2 informant interviews and 1FGD. Key informant interviews were conducted with respondents from both aquatic habitat dependent people and outside people who have good knowledge about the biodiversity in those habitats. FGD (4-8 people) was conducted with the habitat depended people to discuss any disputed issue that might have arisen from interviews as well as to triangulate the findings. The fish species were identified using the book of Rahman (2005) and the latest scientific names were updated according to ITIS (2016).

#### **4.5.7 Results**

##### **4.5.7.1 Flora**

The plant species recorded from the surrounding area (10 km radius) of the **project** are given in following Table.

Table 4-13: List of plant species recorded from the surrounding area (10 km radius) of the Project, Narayangonj.

<b>SN</b>	<b>Scientific Name</b>	<b>Family</b>	<b>Local Name</b>	<b>Local Status</b>	<b>IUCN Status</b>	<b>Usage</b>	<b>Habit</b>
1.	Banyan ( <i>Ficus benghalensis</i> )	Moraceae	Bat tree	R	T	Medicine, Rubber	Tree
2.	Azadirachta indica	Meliaceae	Neem	VC	T	Medicine, Vegetable, Wood	Tree
3.	Aegle marmelos	Rutaceae	Bel	C	LC	Fruit and Medicine	Tree
4.	Aphanamixis polystachya	Meliaceae	Pithraj	R	LC	Wood	Tree
5.	Syzygium cumini	Myrtaceae	Jaam	VC	LC	Fruit	Tree
6.	Bombax ceiba	Ceiba pentandra	Simul Tree	R	LC	Cotton, Wood	Tree
7.	Borassus flabelifer	Palmae	Tal	R	LC	Fruit, Fuel wood and	Tree

SN	Scientific Name	Family	Local Name	Local Status	IUCN Status	Usage	Habit
						Timber	
8.	<i>Mangifera indica</i>	Anacardiaceae	Aam	VC	LC	Fruit and Timber	Tree
9.	<i>Phoenix dactylifera</i>	Arecaceae	Khejur	C	LC	Fruit	Tree
10.	<i>Cocos nucifera</i>	Palmae	Narikel	VC	LC	Fruit and Fuelwood	Tree
11.	<i>Litchi chinensis</i>	Sapindaceae	Lichu	C	LC	Fruit	Tree
12.	<i>Areca catechu</i>	Palmae	Supari	VC	LC	Fruit and Timber	Tree
13.	<i>Carica papaya</i>	Caricaceae	Pepe	C	LC	Fruit	Shrub
14.	<i>Cynodon dactylon</i>	Gramineae	Durba	R	LC	Grass	Herb
15.	<i>Psidium guajava</i>	Myrtaceae	Peyara	C	LC	Fruit	Shrub
16.	<i>Dipterocarpus turbinatus</i>	Dipterocarpaceae	Garjon	R	LC	Timber	Tree
17.	<i>Albizia procera</i>	Fabaceae	Sheel koroi	R	LC	Wood and Timber	Shrub
18.	<i>Zizyphus mauritiana</i>	Rhamnaceae	Baroi	C	LC	Fruit	Tree
19.	<i>Averrhoa carambola</i>	Averrhoaceae	Kamranga	C	LC	Fruit	Tree
Local status: VC – Very Common, C – Common, R – Rare, VR – Very rare							
IUCN status: VU – Vulnerable, NT – Near Threatened, LC – Least Concern							

#### 4.5.7.2 Fauna

##### Amphibian:

There are 42 species of amphibian species, 157 reptilian species, 124 species of mammals and 718 birds' species reported from Bangladesh (Khan 2010, Sarker and Sarker 1988). However, in the current study, a total of 9 Amphibians, 17 reptiles, 12 mammals and 43 birds were identified in the project surrounding areas.

A total of 2 amphibian species were identified in the present surrounding area (Table 4.14). On the basis of frequency of occurrence or relative abundance Common Toad, Skipper Frog and Indian Bull Frog were commonly (44.45%) found. Furthermore, Green Frog, Pierries Cricket Frog and Ornate Narrow-mouthed Frog were less common (33.33%). On the other hand, Common Tree Frog was rare (22.22%) anuran species in the study area.

Table 4-14: List of Amphibian species identified in the surrounding areas of the **project**, Narayanganj.

SL	Scientific Name	English Name	Local Name	IUCN Status	Local Status	Occurrence of species	
						Primary Survey	Local people consultation
1.	Bafo melanostictus	Common Toad	Bang	LC	CR	✓	
2.	Rana Cyanophycitis	Skipper Frog	Bang	LC	C		✓

Local Status code: CR – Common Resident, C – Common, UR – Uncommon Resident, RR – Rare Resident, V – Vagrant, WV – Winter Visitor; UWV – Uncommon Winter Visitor  
IUCN Status code: CR – Critically Endangered, EN - Endangered, VU - Vulnerable, LC - Least Concern

### Reptiles:

A total of 3 reptile's species were identified in the present study area (Table 4.15). On the basis of frequency of occurrence or relative abundance Common Garden Lizard, Common skink, Common House Lizard, Yellow-bellied House Gecko and Checkered Keelback water snake were found as common (29.41%). Indian Roofed Turtle, Common House Lizard, Common Smooth Water Snake, Common Wolf Snake, Indian Rat Snake/Western Rat Snake and Spectacled Cobra were less common (35.29%) in this area.

Table 4-15: List of Reptilian species identified in the impact zone of the project, Narayanganj.

SN	Scientific Name	Local Name	Family	IUCN Status	Local Status	Occurrence of species	
						Primary Survey	Public consultation
1.	Enhydris enhydris	Smooth Water Snake	Painnya	-	C		✓
2.	Hemidactylus	House Lizard	Shap/Huriya	LC	CR	✓	
3.	Naja naja	Kaouthia	Narrow headed Softshell	Goda Tik Tiki	LC	CR	✓

Local Status code: CR – Common Resident, C – Common, UR – Uncommon Resident, RR – Rare Resident, V – Vagrant, WV – Winter Visitor; UWV – Uncommon Winter Visitor  
IUCN Status code: CR – Critically Endangered, EN - Endangered, VU - Vulnerable, LC - Least Concern

### Mammals:

A total of 04 mammalian species were identified in the impact area (Table 4.16). On the basis of frequency of occurrence or relative abundance Indian Grey Mongoose and House Rat were

commonly (16.67%) found in the study area. Jungle cat, Mole Rat, Greater Bandicoot Rat, Asian House Shrew are common (66.66%) in the study area.

Table 4-16: List of Mammals identified in the surrounding area of the PROJECT, Narayanganj

SN	Scientific Name	Common Name	IUCN status	Occurrence of species		
				Primary Survey	Local people consultation	Published Literature
1.	Canis aureus	Jackal	LC		✓	
2.	Herpestes edwardsii	Mongoose	LC	✓		
3.	Sciurus carolinensis	Squirrel	LC		✓	
4.	Felis chaus	Jungle Cat	NT		✓	

IUCN Status code: CR – Critically Endangered, EN - Endangered, VU – Vulnerable, LC-Least Concern, NT- Near Threatened

### Birds:

A total of 09 bird's species were found in the surrounding area (Table 4.17). On the basis of frequency of occurrence or relative abundance commonly (54.76%) found species were Red Junglefowl, Spotbill Duck, Burmes Hoopoe, Common Kingfisher, Asian Cuckoo, House swift, Rock Pegion, Spotted Dove, Little Cormorant, Indian Pond Heron, House Crow, Grey Drongo, White-rumped Shama, Oriental Magpie, Asian Pied Starling/Myna, Jungle Myna, Bank Myna, Common Myna, Red-vented Bulbul, House sparrow etc. Bar-headed Duck, Greylag Goose, Black-rumped Flameback, Barn Owl, Crested Goshawk, Brahminy Kite, Great Cormorant, Little erget, Black-hooded Oriole and Purple-rumped Sunbird were less common species (26.19%) in the study area.

Table 4-17: List of Birds identified in the surrounding area of the PROJECT, Narayanganj.

SL	Scientific Name	English Name	Local Name	IUCN Status	Birdlife Status	Occurrence of Species	
						Primary Survey	Local people consultation
1.	Corvus splendens	House Crow	PatiKak	LC	LC	✓	
2.	Passer domesticus	House Sparrow	Pati Chorui	LC	LC	✓	
3.	Alcedo atthis	Common Kingfisher	Machranga	LC	LC	✓	
4.	Copsychus saularis	Ribon	Doel	LC	LC	✓	✓
5.	Corvus splendens	House Crow	Kak	LC	LC	✓	✓
6.	Egretta albe	Great Egret	Baro Bak	LC	LC	✓	

7.	Egretta gazatta	Small Egret	Chhoto Bak	LC	LC	✓	
8.	Dirrurus gazatta	Black Drongo	Fingry	LC	LC	✓	
9.	Dirrurus adsimilis	House Sparrow	Choroi	LC	LC	✓	✓
IUCN Status code: CR – Critically Endangered, EN - Endangered, VU - Vulnerable, LC - Least Concern							

**Fish:** The fish species recorded from the impact zone (10 km radius) of the PROJECT are given in following table.

Table 4-18: Fish species identified in the impact zone (10 km radius) of the **PROJECT**, Narayangonj.

SL#	Scientific Name	Local Name	IUCN status
1.	carp tribe	Cyprinidoes	LC
2.	Labeo rohita	Rui	LC
3.	Catla catla	Catla	LC
4.	Cirrhinus mrigala	Mrigel	LC
5.	Labeo calbasu	Kalibaush	LC
6.	Mystus aor	Airh	LC
7.	Mystus vitatus	Tangra	LC
8.	Clarias batrachus	Magur	LC
9.	Heteropneustes fossilis	Shing	LC
10.	Wallago attu	Boal	LC
11.	Channa marulius	Gazer	LC
12.	Ompok pabda	Pabda	LC
13.	Punti	Barbus puntius	
14.	Ctenopharyngodon idella	Grass Carp	LC
15.	Hypophthalmichthys Molitrix	Silver carp	LC
16.	Oreochromis mossambicus	Telapia	LC
17.	Oreochromis niloticus	Nilotica	LC

## 4.6 Natural Hazards

### 4.6.1 Seismicity

threat and damage. Earthquake vulnerability of any place largely depends on its geology and topography, population density, building density and quality, and finally the coping strategy of its people and it shows clear spatial variations. Bangladesh has been classified into three seismic zones where Zone-I the most severe and Zone-III the least impact. The project area falls in Zone-II, which means that there is considerable risk regarding earthquake.

However, the project area is comparatively less prone to earthquake compared to northern part of Bangladesh. The seismic zones of Bangladesh have been provided in following figure. The following Table shows the seismic zones of Bangladesh where indicated that the project area is fallen in the II category which is quieter than Zone I. This has been considered in the civil construction design so that the construction can withstand earthquake of 7 on the Richter scale.

Table 4-19: Seismic Zoning of Bangladesh

Zoning	Area Marcella Scale
I	North and East Region of Bangladesh
II	Lalmai, Barind, Madhupur Tracts, Dhaka, Narayangonj, Cumilla, Noakhali, and Easter part of Chittagong folded belt.
III	Khulna division south-east Bangladesh.

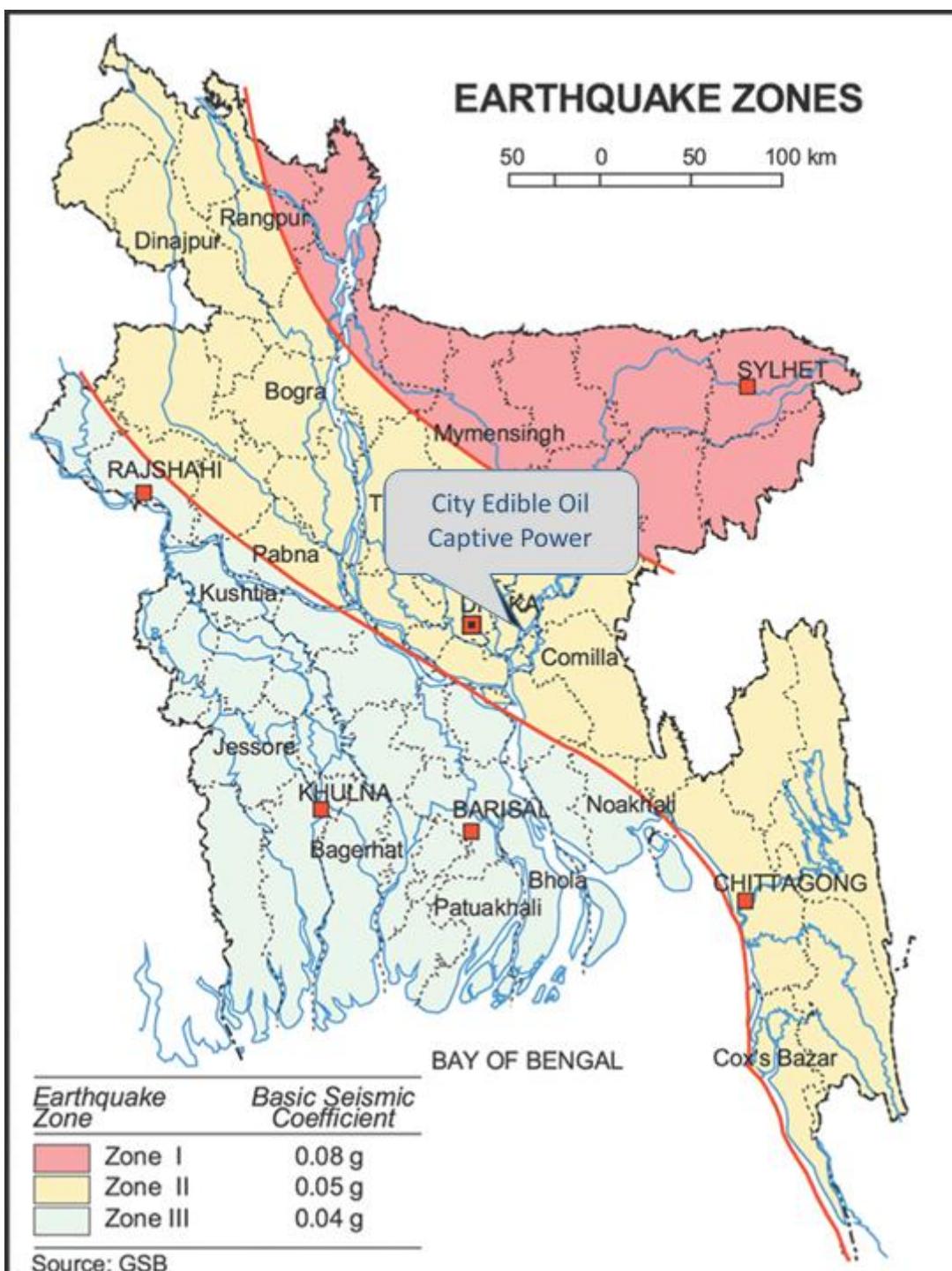


Figure 4-12: Earthquake zoning map of Bangladesh

#### 4.6.2 Cyclone

Typhoons are tropical revolving storms. They are called 'Cyclones' in English, when they occur in the Indian Ocean area. The coastal regions of Bangladesh are subject to damaging cyclones almost every year. They generally occur in early summer (April-May) or late rainy season (October-November). Cyclones originate from low atmospheric pressures over the

Bay of Bengal. During the years 1960 to 1998, Bangladesh has been hit by 30 severe cyclones and during 1998 to 2017 has been hit by 10 severe cyclones, 32 of which were accompanied by storm surges. Following table contain a brief account of these disasters with particular reference to the wind speed, surge height, loss of life, damage to crop and properties, etc. Following figure represent the cyclone prone area of Bangladesh.

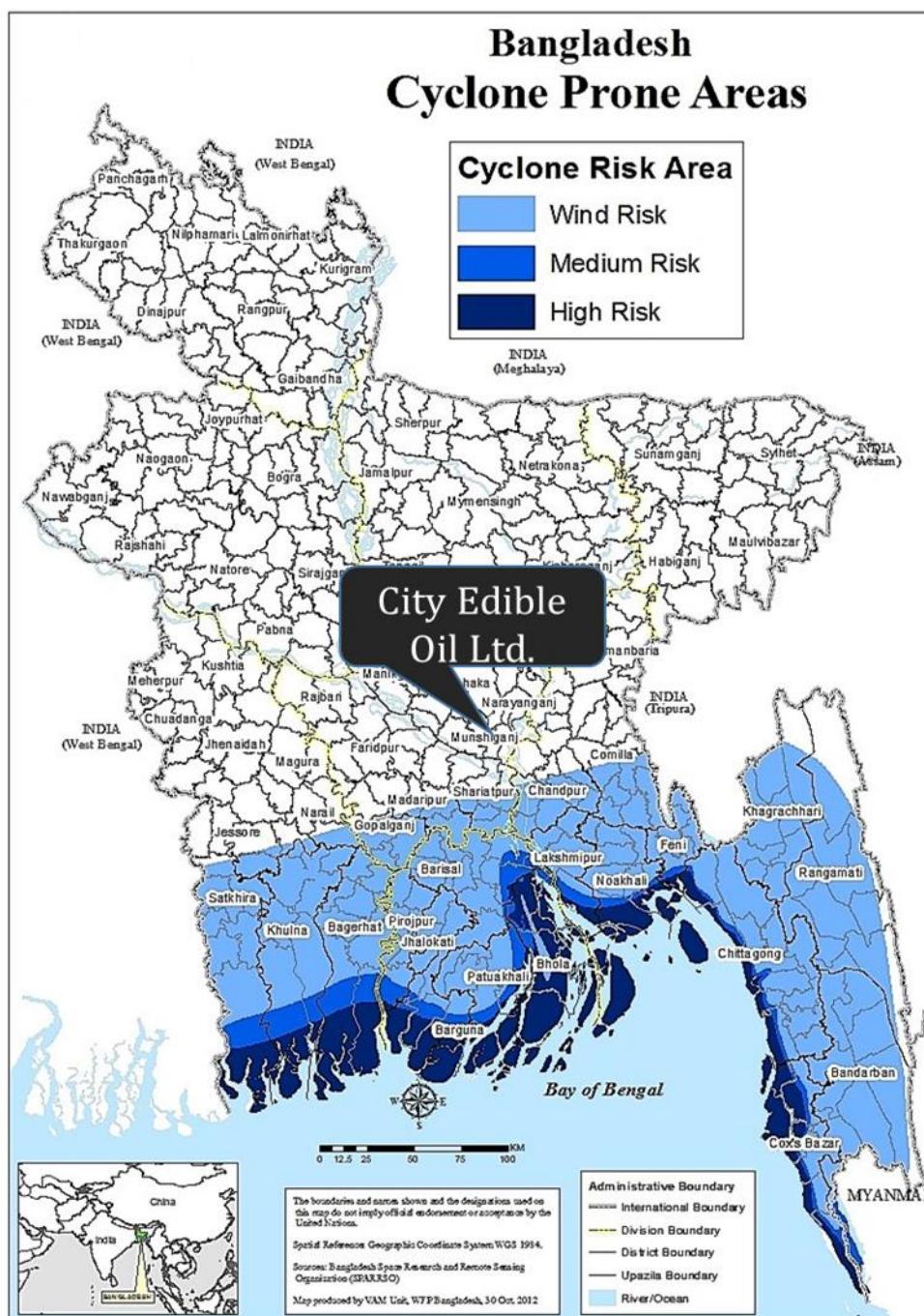


Figure 4-13: Cyclone Prone area Map of Bangladesh

On basis of above study and history it is completely clear to us that **PROJECT** is not at a cyclone prone area.

#### 4.6.3 Flood

Flood relatively high flow of water that overtops the natural or artificial banks in any of the reaches of a stream. When banks are overtapped, water spreads over the floodplain and generally causes problems for inhabitants, crops and vegetation. Since floodplain is a desirable location for man and his activities, it is important to control floods so that the damage does not exceed an acceptable level.

Floods are more or less a recurring phenomenon in Bangladesh and often have been within tolerable limits. But occasionally they become devastating. Each year in Bangladesh about 26,000 sq. km, 18% of the country is flooded. During severe floods, the affected area may exceed 55% of the total area of the country. In an average year, 844,000 million cubic meter of water flows into the country during the humid period (May to October) through the three main rivers the Ganges, the Brahmaputra-Jamuna and the Meghna. This volume is 95% of the total annual inflow. By comparison only about 187,000 million cu m of stream flow is generated by rainfall inside the country during the same period. Following figure show the flood intensity during 1954 to 1999 in Bangladesh.

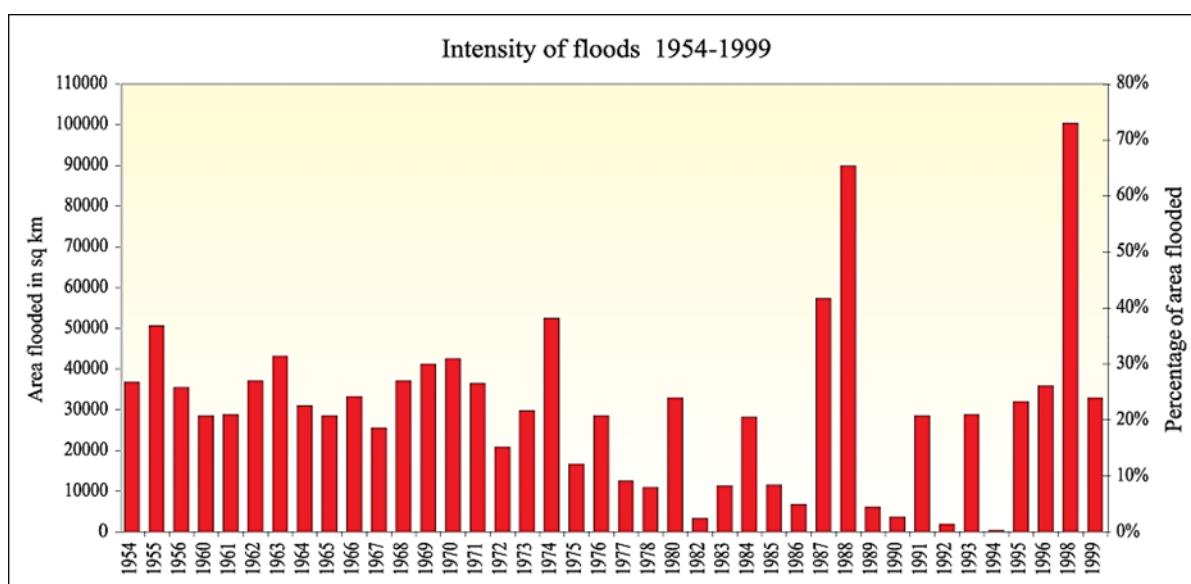


Figure 4-14: Intensity of Flood during 1954-1999

#### 4.6.4 River Morphology

The terms river morphology and its synonym fluvial geomorphology are used to describe the shapes of river channels and how they change in shape and direction over time. The

morphology of a river channel is a function of a number of processes and environmental conditions, including the composition and credibility of the bed and banks (e.g., sand, clay, bedrock); erosion comes from the power and consistency of the current, and can affect the formation of the river's path. Also, vegetation and the rate of plant growth; the availability of sediment; the size and composition of the sediment moving through the channel; the rate of sediment transport through the channel and the rate of deposition on the floodplain, banks, bars, and bed; and regional aggradation or degradation due to subsidence or uplift. From the historical imagery (2002, 2012 and 2020) of Shitalakshya River adjacent to the project site it can be concluded that there is no significant shifting tendency occur. The shape and direction of River also did not change and no substantial erosion and sedimentation found in the River banks. The following Figure shows the morphological changes of Shitalakshya River near the project site during the period of 2002 to 2020.

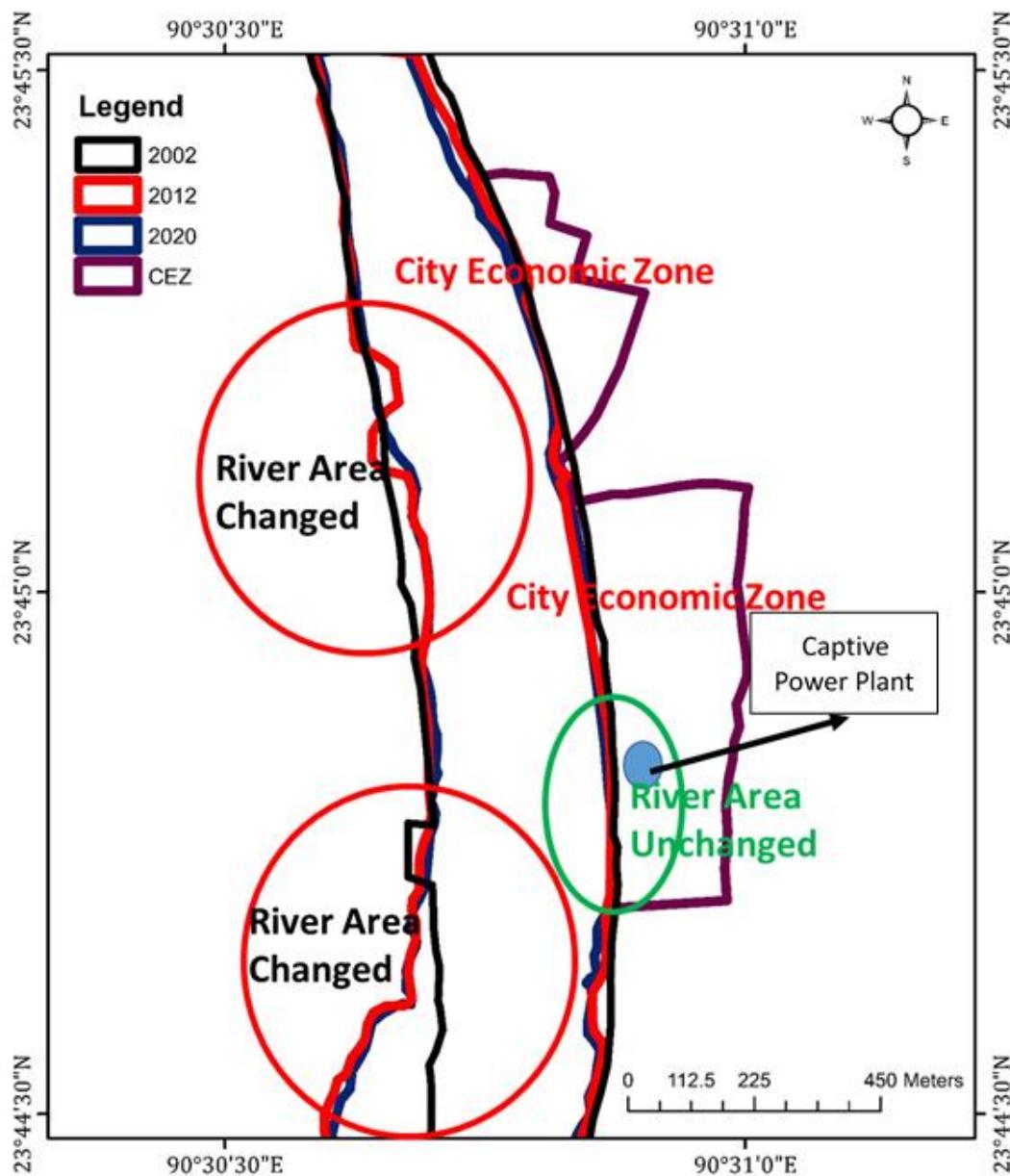


Figure 4-15: River Morphological study beside **City Edible Oil Limited**.

## **5 Description of The Social Conditions**

### **5.1 Background**

The socio-economic baseline survey was carried out within 1 kilometer of the plant location which has been considered as the impact zone for the project. A total number of 100 HHs were surveyed. Additionally, the socio-economic impacts of the project will not extend over 1 kilometer radius. Both primary and secondary sources data are utilized for understanding socio economic condition at the project area. Narayanganj was a sub division of former Dhaka district. It was upgraded to a district on 15th February, 1984. Narayanganj, the oldest and the most prominent river port of Bangladesh, grew into a prominent place of trade and commerce in the long past for which it was previously known as a Ganj. Rupganj thana was turned into an upazila in 1983. Nothing is definitely known about the origin of the upazila name. It is said that there lived an influential Zaminder named Rup Babu and the upazila name might have derived as Rupganj after the name of that Zamindar.

**Area and Location:** The upazila occupies an area of 176.48 sq. km. It is located between 23°37' and 23°43' north latitudes and between 90°28' and 90°37' east longitudes. The Thana is bounded on the north by Kaliganj upazila of Gazipur zila, on the east by Palash and Narsingdi Sadar upazilas of Narsingdi zila and Araihazar upazila of Naranganj zila, on the south by Sonargaon upazila and on the west by Gazipur Sadar upazila of Gazipur zila and Uttara, Gulshan and Demra upazila of Dhaka zila.

### **5.2 Economic Situation**

The district is pioneer in merchandising and manufacturing of jute, yarn and dying items. Cottage industry like weaving abounds in this district. International trading, import and export business, garments industries, knitwear garments, shipyard brickfield etc, create employment opportunities to the people facilitating additional income to the household population. The rural economy of Narayanganj District is agricultural. Various fruits like banana, guava are grown and fish of different varieties abound in this district. Varieties of fishes are caught from rivers, channels, creeks and from paddy fields during rainy season. The major income generating activities of the people in this district is business and working in the mill and factories.

The status of non-farm activities in the district is increasing. The following Table 5.1 shows the number of establishments and their distribution by major industries and the persons engaged by sex and activity.

Table 5-1: Physical and cultural resources and the persons engaged by activity

Activity	Establishments			Person Engaged		
	Total	Urban	Rural	Total	Male	Female
Manufacturing	5	4	1	213	206	7
Electricity, gas and water supply	12805	7452	5353	208074	172734	35340
Construction	30	24	6	477	464	13
Wholesale and retail trade	37	37	0	1641	1451	190
Hotels & Restaurants	46120	33010	13110	104872	102144	2728
Transport, storage and communication	4808	3333	1475	13543	12974	569
Bank, insurance and financial institution	1389	850	539	5780	5177	603
Real estate and renting	281	255	26	3743	2729	1014
Public administration and defense	226	160	66	3373	3086	287
Education	1635	645	990	8818	6813	2005
Health and social work	3790	3666	124	80239	6936	1103
Community, social and personal services	7569	4671	2898	19529	17572	1957
Narayangang district	79557	54776	24781	381012	335136	45876

Source: Census of non-farm economic activities 2011-2013

To assess the baseline socio-economic condition in the project area relevant stakeholders and key informants were met. As a source of secondary data, Bangladesh Bureau of Statistics (BBS), Banglapedia, concerned books and periodicals were also consulted. The socio economic information has been taken within the area of one Kilometer radius from the project site.

### 5.3 Household Socio-Economic Study

#### 5.3.1 Socio economic study

In order to assess the baseline conditions of the population living within the air-shed of 1 kilometer from the Project site, a socio-economic questionnaire survey of 100 families was carried out. The 100 families represent a sample of the total households which were covered by the baseline survey carried out in January 2017.

#### Study Methodology

The methodology for the social baseline study included different methods and tools, as follows:

- Collection of Secondary Data through literature survey;
- Sample-based household survey of 100 HHs;
- Focus Group Discussions (FGD) with day laborers, women groups and the land owners and
- Consultations with project affected persons, representatives of the local elite, local government, local administration and chairman of the local union parishad (the local government administration and members of the Union parishad).

Secondary data on demographic and socioeconomic issues of the study area have been collected from various sources including the population census of Bangladesh Bureau of Statistics (BBS) and from Upazila level offices and Ward Council.



Figure 5-1: Field Enumerator at the Respondent Premises

### **Coverage of the survey**

For socio-economic baseline study the household surveys were carried within 1km in radius from the plant in Rupshi Bazar area. The complete lists of all households located in the above mentioned areas have been prepared to generate sampling frame of the study population. Each sample household has been interviewed by a Field Investigator and data/information has been gathered from the sample households using a questionnaire.

#### **Introduction**

The proposed plant will be constructed within City Economic Zone. So there is no need for land acquisition. Additionally, there is no settlement in this area, and the area is not used for any income generation activities.

Therefore, no population will be displaced and no resettlement will be required; and no loss of income is associated with the proposed project.

### **5.4 Socio-Demographic Characteristic of the Project Area**

#### **5.4.1 Household size and Sex-ratio**

According to the household survey, males and females constitute 56.2% and 43.8% respectively of the population in the study area. The average sex-ratio in the project area is 128.2, which indicates prevalence of male population in the study area (Table, 5-2). The national sex-ratio was found to be 98.21 according to the population census of 2011.

Table 5-2: Sex Distribution of Household Members by Study Area

Study Area	Percentage		
	Male	Female	Total
All	56.2	43.8	100.0

According to the household survey, the average household size is 4.1 in all area (i.e. the average number of persons per household). Overall, the average household size in the Project area is lower than the national average household size which is 4.5 persons (BBS, 2011). The following Table shows the average family size of the project area

Table 5-3: Average Family Size and Sex Ratio of Household Members by Study Area

Study Area	Average Family Size(number)	Sex Ratio
All	4.1	128.2

#### 5.4.2 Age Distribution of the Population and Marital Status

Age distribution of the population in study area obtained from survey data shows that 6.1% of the population is children (0-4 years), 19.9% are adolescents in the 5-14 years old group, 32.0% are 15-30 years of age, 26.4% are of age 31-45, 12.3% are of age 46-60 and the remaining 3.3% are above 60 years (Table-5-4).

Table 5-4: Age Distribution of Household Members

Age Group (Year)	Percentage
Up to 4	6.1
5-14	19.9
15-30	32.0
31-45	26.4
46-60	12.3
Above 60	3.3
<b>Total</b>	<b>100.0</b>

Table 1-19 presents marital status of the population in the study area. It is revealed from the table that, 56.6% of the population in the study area is married. The percentage of unmarried people in study area is 42.5. However, 0.7% and 0.2% of the population in the study area are widow and divorced respectively.

Table 5-5: Marital Status of Household Members of Study Area

Marital Status	Percentage
Married	56.6
Unmarried	42.5
Divorced	0.2
Widow	0.7
<b>Total</b>	<b>100.0</b>

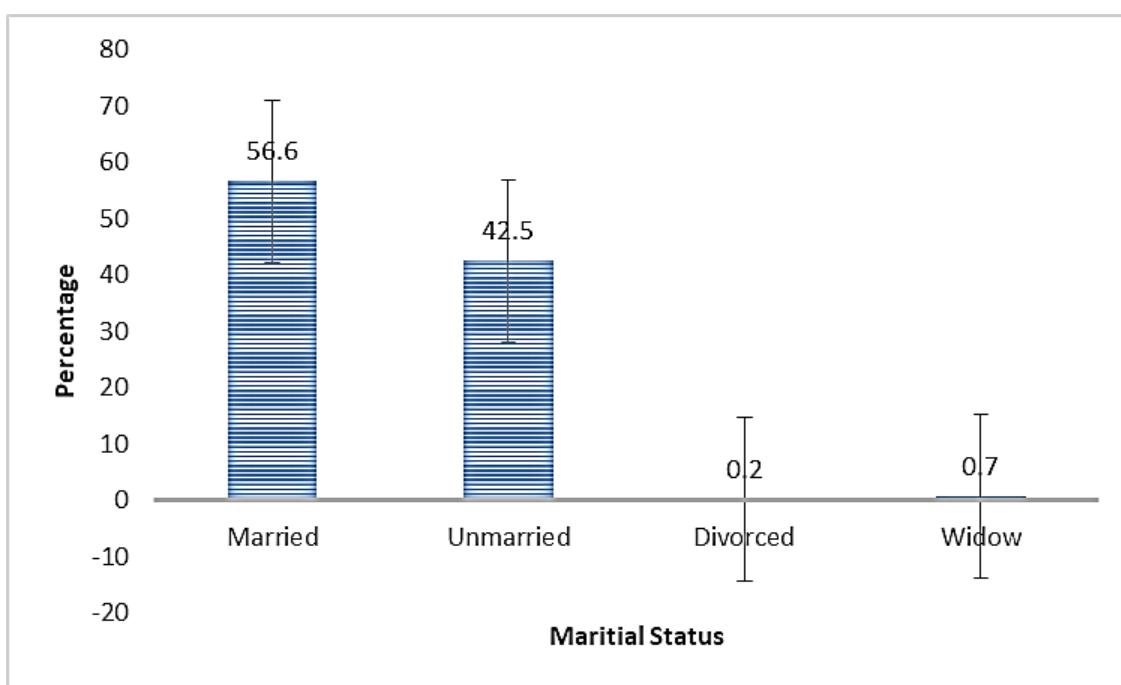


Figure 5-2: Marital Status of Household Member

## 5.5 Educational Status

According to the survey, in the study area, 0.3% of the population is illiterate and 5.4% of the population can sign their name, although they can neither read nor write. The population having primary level education (up to 5 years of schooling) and secondary level education (up to 10 years of schooling) are 34.9% and 32.3% respectively. Based on the data collected from the socio-economic survey, 14.6% of the population has a Secondary School Certificate (S.S.C) and equivalent. It has been found that 8.2% of population has Higher Secondary Certificate (H.S.C) and equivalent and 4.3% of the population has Bachelors/ equivalent degree and above (Table-5.6). The national literacy rate is estimated at 57.91%, according to BBS 2011.

Table 5-6: Educational Status of Household Members of Study Area

Educational Status	Percentage
Illiterate	0.3
Can sign only	5.4
Primary	34.9
Secondary	32.3
S.S.C and equivalent	14.6
H.S.C and equivalent	8.2
Degree and above	4.3
<b>Total</b>	<b>100.0</b>

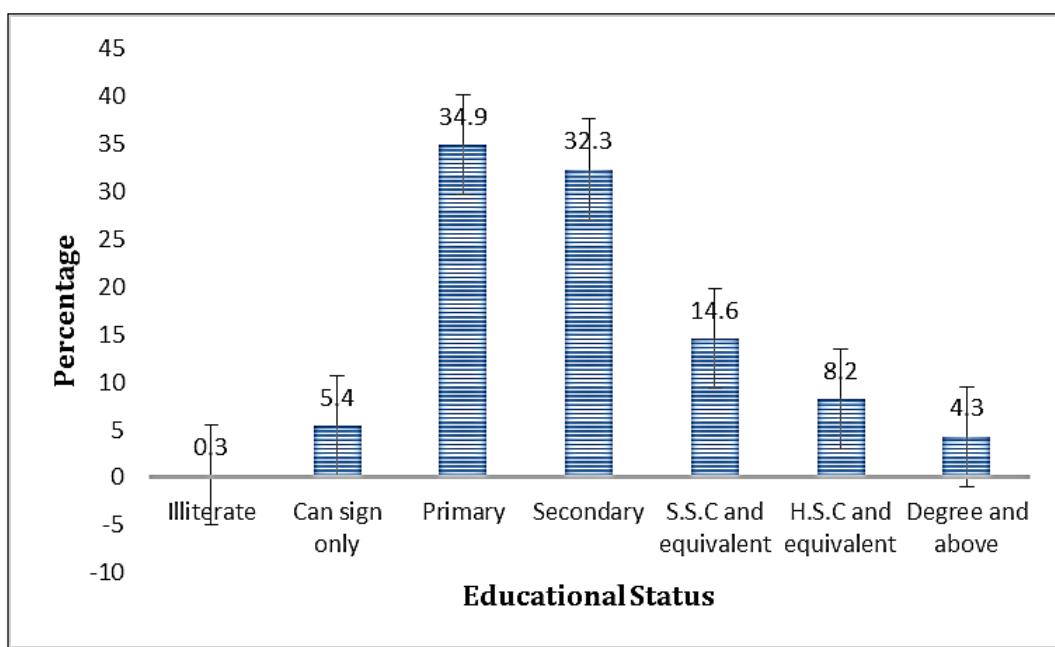


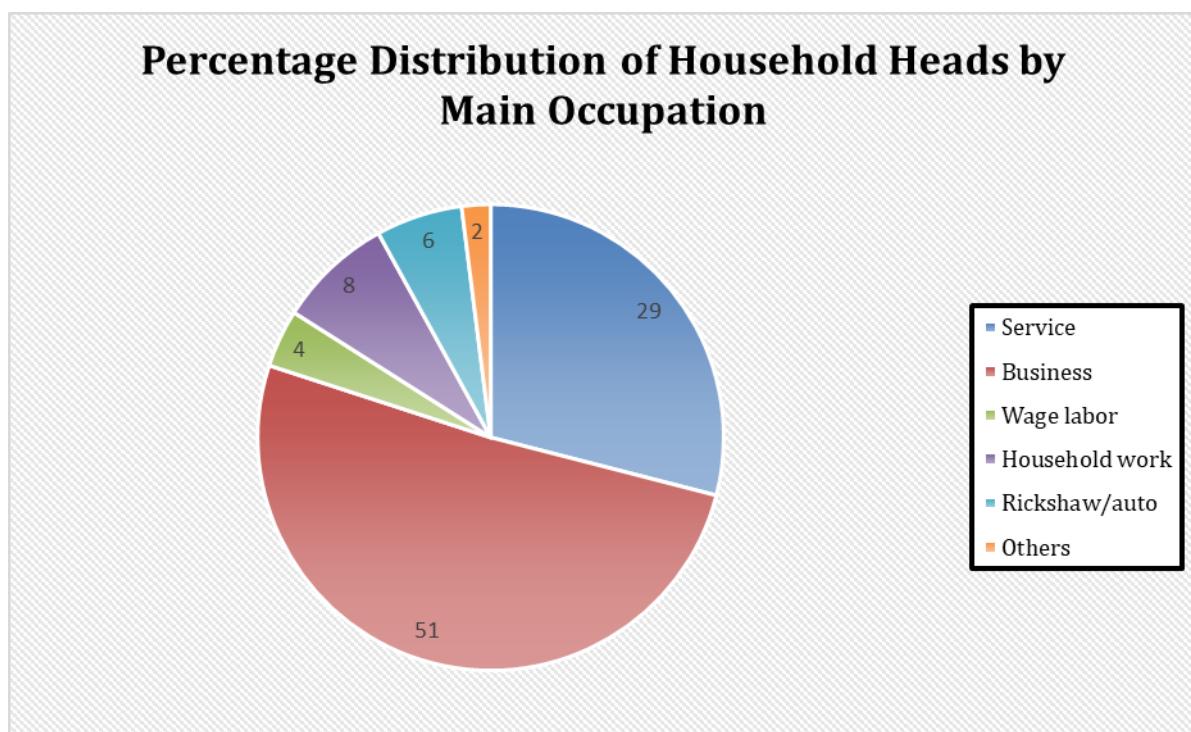
Figure 5-3: Educational Status of Household Members of Study Area

## 5.6 Occupation and Employment

The household heads in the surveyed are engaged in different types of primary occupation such as service and business etc. The survey reveals that, the highest percentage (51.0%) of the workforce is engaged in Business followed by different types of services (29.0%); only 4.0% household heads are wage laborer and 8.0% of the household heads is engaged in household work (Table-5-7).

Table 5-7: Percentage Distribution of Household Heads by Main Occupation

Main Occupation	Study Area
Service	29
Business	51
Wage labor	4
Household work	8
Rickshaw/auto	6
Others	2
<b>Total</b>	<b>100</b>



However, the survey reveals that 33.3% of the household heads are engaged in business as secondary occupation whereas 66.7% of the household heads are engaged in wage labor in the study area (Table-5-8).

Table 5-8: Percentage Distribution of Household Heads by Secondary Occupation

Secondary Occupation	Study Area
Wage labor	2(66.7)
Business	1(33.3)

<b>Total</b>	<b>3 (100.0)</b>
--------------	------------------

Note: Figures within parentheses represent percentages

### 5.7 Religion status of the study area

According to the survey, 100% of the household heads in the study area are Muslim by Religion.

Table 5-9: Percentage Distribution of Household Heads by Religion

<b>Religion</b>	<b>Study Area</b>
Muslim	100(100.0)
<b>Total</b>	<b>100(100.0)</b>

### 5.8 Land Use pattern and Household Land Ownership:

According to the household survey, about 3.0% of household land is allocated for the agricultural lands. Other types of household land use include: 100% for homestead and 2.0% for pond/ditches respectively (Table-5-10).

Table 5-10: Percentage Distribution of Households Surveyed by Different Uses Pattern of Land

<b>Pattern</b>	<b>Study Area</b>
Homestead	100.0
Agricultural land	3.0
Pond/Ditch	2.0

### 5.9 Household Income, Expenditure and Distribution

According to the survey, average annual income per household is Taka 160,140 in the study area whereas the average annual expenditure per household is Taka 84,040 in the study area.

Table 5-11: Average Annual Income and Expenditure per Household by Study Area

<b>Study Area</b>	<b>Average Annual Income Per Household(Tk.)</b>	<b>Average Annual Expenditure Per Household(Tk.)</b>
All	160,140	84,040

Average annual income per household at current price was estimated at taka 137,748 at the national level, according to BBS 2011. However, according to BBS 2011, at the national level, average annual expenditure per household was estimated at taka 134,400 at current price.

The distribution of household income as obtained from the survey reflects that about 5.0% of households in the study area have annual income of Taka 250,000 and above. 12.0 % of households belong to the annual income bracket ranging from Taka 200,000-250,000. According to the survey, 34.0% households belong to the average income ranging from Taka 150,000 to Taka 200,000 and 33.0% households belong to the average income ranging from Taka 100,000 to Taka 150,000. The survey reveals that, 16.0% of the households in the study area have annual income of Taka 100,000 and below.

The survey reveals that annual expenditure is up to Taka 100,000 for about 74.0% of the households in the study area. 26.0% of the households belong to the average annual expenditure ranging from Taka 100,000-150,000.

### **5.10 Sources of Household Income**

According to the survey, business is one of the major sources of livelihood accounting for 45.2% of household income in the study area, succeeded by service that contributes 29.0% to household income. The survey also reveals that, 8.1% of the households' income source is house rent.

Table 5-12: Percentage Distribution of Households by Source of Income

Source	All
Service	29.0
Business	45.2
Daily labor	4.8
Foreign remittance	2.4
Rickshaw/auto	4.8
House rent	8.1
Others	5.7
<b>Total</b>	<b>100.0</b>

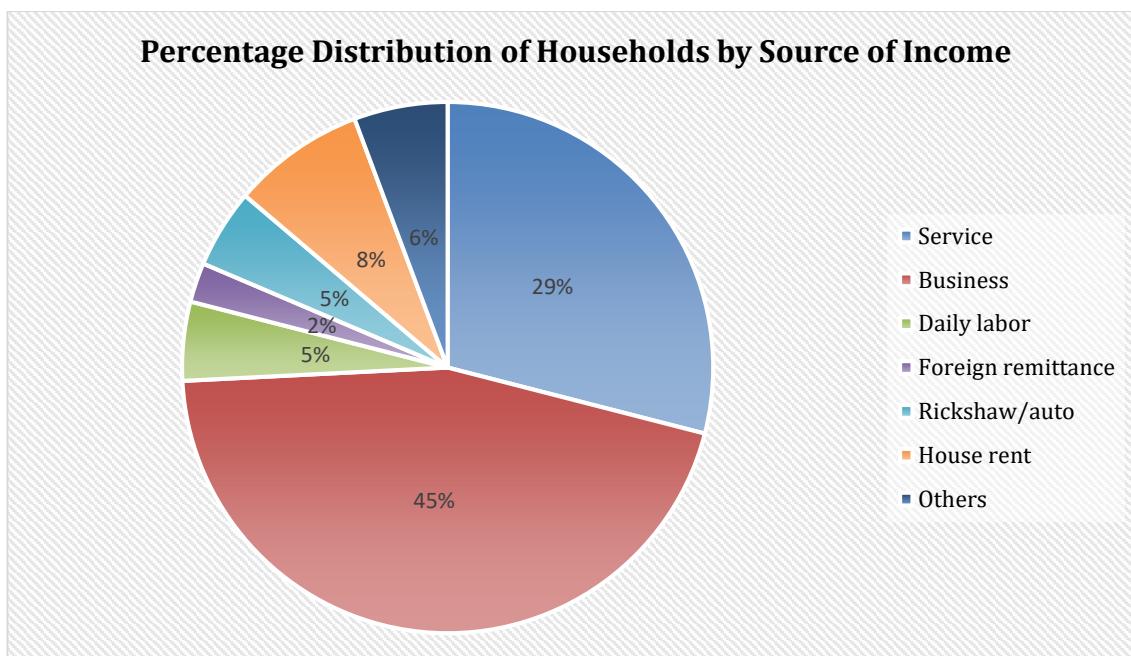


Figure 5-4: Percentage Distribution of Households by Source of Income

### 5.11 Transportation and Communication

To reach in the project area, there are better communication facilities with a network of metalled road. A number of roads of different categories namely national highway, Upazila, Union and Rural roads passes through the study area. Communication facilities includes Pucca road 85 km, mud road 200 km. The following table describes the communication facilities of the projected area.

Table 5-13: Transportation and Communication system of Study area

SN	Name	Number
1.	Length of metalled( Km)	147.32
2.	Semi metalled road(km)	41.99
3.	Bridge (km)	3
4.	Baily bridge (km)	3
5.	Culvert	219
6.	Bus stand	12
7.	registered rickshaw	11314

### **5.12 Industry**

There are industrial activities in or around the project site. The industries that are existing around the project area mainly, garments industry, knitting, dyeing, bio-polythene industry etc. No local industries will be affected by the project activities. Noted manufactories Garments factory, cement factory, spinning mill, steel mill, printing mill, rolling mill, paper mill, oil mill, textile mill. Cottage industries includes goldsmith, blacksmith, weaving, wood work, bamboo work, cane work. Main exports Industrial products, sari, cotton fabrics, and vegetables. According to the census of BBS 2011 the number of selected industry are given below.

Table 5-14: Number of selected industry in study area

SN	Industry name	Number
1.	Textile mill	32
2.	Garments factor	82
3.	Rice mill	56
4.	Steel and engineering	24
5.	Aluminum	1
6.	Jute mill	1
7.	Sugar mill	2

### **5.13 Cultural and Social Resources:**

No major archaeological excavations have been found within a radius of 10 km from the project. But, Rupganj Upazila is bounded by kaliganj (gazipur) and palash upazilas on the north, sonargaon upazila on the south, araihazar and narsingdi sadar upazilas on the east, demra, khilgaon, badda and khilkhet thanas on the west. Archaeological heritage and relics are found Bajra Mosque, residence of Mura Para Zamindar, Mura Para Shahi Mosque, At-ani Mosque and Tara Mosque at Gandharbapur, Brahmangaon Jami Mosque, Golakandail Kalim Shah Jami Mosque.

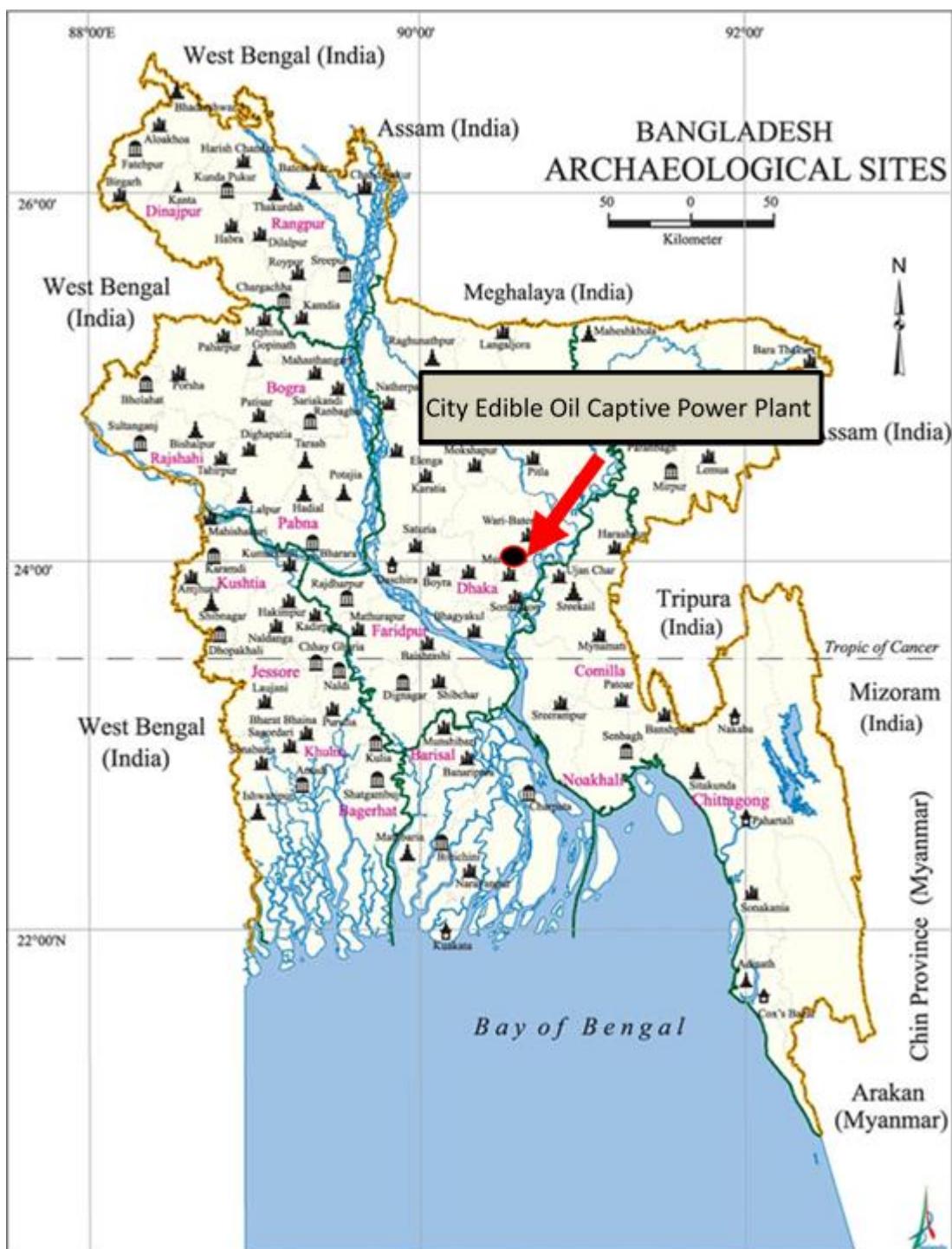


Figure 5-5: Major Archeological Site of Bangladesh and Project Location

## 6 Public Consultation and Disclosure

### 6.1 Introduction

Community participation always plays a key role for sustainable development. According to the guidelines of the DOE and the development partners, people's participation in planning and implementation phases of category A & B Projects (usually red category) is essential to take necessary actions for minimizing any undue socio-cultural, political or any other conflicts and to address environmental issues. People have the right to know about what is going to happen in their surroundings. They must be informed about the positive and negative impacts of the proposed Project. Therefore, a series of public consultation meetings (PCM) and public disclosure (PD) were undertaken with community stakeholders in accordance with the World Bank's Environmental Guidelines.

### 6.2 Approach and Objectives of PCM and PD for ESIA

#### 6.2.1 Approach of PCM and PD for ESIA

PCM and PD offer an opportunity for people to participate in the decision making process for design, development, and implementation of the Project. It provides a platform for project-affected persons and different stakeholders to express their views on possible impacts of the proposed intervention on environmental and social parameters.

PCM and PD for ESIA are planned at two different stages (ESIA scoping stage and draft ESIA report stage) in order to collect opinions and feedback of the public and to disseminate information on the Project and EIA Study.

#### EIA Scoping Stage

The first stage of the PCM and PD for ESIA is conducted at the time of environmental scoping in the initial stage of the ESIA study. Information on the Project and scope of the ESIA study is disseminated to the public and then comments and opinions are collected to incorporate into the report.

#### Draft EIA Report Stage

The second stage of the PCM and PD for ESIA is conducted at the time of preparations of draft ESIA report. Information about findings of draft environmental and social impact assessment study and proposed mitigation measures are disseminated to the general public that are directly or indirectly affected by the Project. In addition, their feedback and opinions are obtained which are reflected in the ESIA report together with their comments and request on

the environmental and social mitigation measures, environmental management plan (EMP) and environmental monitoring plan (EMoP).

### **6.2.2 Objectives of PCM and PD for EIA**

The primary objective of the PCM and PD is to incorporate the opinion and suggestions of the public and all other stakeholders at the Project planning stage to ensure wider acceptability of the Project. The key objectives are as follows:

- 1) To provide information on the economic, environmental, and social benefits as well as potential negative impacts from the Project;
- 2) To ensure that the potential project affected persons (PAPs), stakeholders, and local communities are engaged in a meaningful dialogue and are well informed prior to the decision of the Project Proponent as to the nature and extent of social and environmental impacts attributable to the proposed Project with respect to planning;
- 3) To ensure that the concerns of, and issues raised by the PAPs, stakeholders, and local communities are incorporated and adequately addressed in the EIA study;
- 4) To engage in a participative exercise with PAPs, stakeholders, and local communities and obtain expertise and local, traditional wisdom and knowledge from them in order to plan the mitigation measures; and
- 5) To facilitate periodic opportunities to the principal stakeholders to offer their inputs on all key components of the Project.

### **6.2.3 Stakeholder Engagement Plan**

In order to ensure effective engagement and open, frequent and honest dialogue with local communities and other key stakeholders, a stakeholder engagement plan is designed throughout the life of the Project. This plan is to be developed and implemented in order to identify stakeholder and their issues of concern, establishes the methods for consultation, and provides a specific action plan for stakeholder engagement throughout the life of the Project.

Table 6-1: Stakeholder Engagement Plan

<b>Key Stakeholders</b>	
Project Proponent	: <b>City Edible Oil Captive Power Plant Ltd.</b>
Related organizations/ Local	: Union Parishad (UP member-male and female)

government	
Local people	: Land owners, Businessmen, Fishermen, Day Labor, Teacher, Religious people, etc.
Private business	: Private companies/ factories around the zone
Non-Governmental Organizations	: Community Based Organizations (CBOs)
<b>Engagement methods</b>	
EIA phase	: - Organizing consultation meetings inviting key stakeholders above at draft scoping report and draft EIA report
Pre-construction/ Construction phase/ Regular operation Phase	: – Regular communication with local community through personal contact; – Meeting with the representative of village on the quarterly basis; – Participatory meeting with villagers; – Interview survey with villagers;
<b>Information disclosure</b>	
EIA phase: Preconstruction/ Construction phase/ Regular operation Phase	: – Disclosures of draft scoping report and draft ESIA report.
<b>Grievance mechanism process and complaints register</b>	
All phase	: – Receiving complaints and opinions from the public on regular basis through the engagement method; – Meeting with the representative of village – Participatory meeting with villagers

### 6.3 Public Consultation Meetings (PCMs)

Participatory Rapid Assessment (PRA) and Focused Group Discussions (FGDs) were held in major settlement areas of the Project site to inform people about the objectives of the Project. In each of the consultation, participants were encouraged to share their observations, suggestions, and experiences on various environmental and safety issues and suitable mitigation and enhancement measures. Issues discussed are:

1. Awareness and extent of the Project and development components;
2. Benefits of the Project for the economic and social advancement of the community;
3. Labor availability in the Project area or requirement of outside labor involvement;

4. Local disturbances due to dust, noise generation during construction activities;
5. Necessity of cutting trees and the degree of clearing vegetation at Project sites;
6. Water logging and drainage problem, if any;
7. Discharge of polluted water into the River;
8. River bank protection;
9. Earth filling to develop the zone.

These meetings were aimed to:

1. ensure that the public was provided with opportunities to participate in the decision making process and to influence decisions that would affect them;
2. identify the widest range of potential issues about the Project as early as possible and in some cases, have those resolved;
3. ensure that government departments were notified and consulted early in the process; and
4. Ensure a broad range of perspectives were considered in any decision.

**Positive Impacts of the Project by Local People:**

1. The proposed project will create employment opportunity for the adjacent local community during construction and operation phases;
2. Existing road network and transportation facility will be improved due to establishment of **City Edible Oil Captive Power Plant Ltd.**;
3. Land value around the Project will be increased;
4. Education, health, bazaar, telecom, hotel & restaurant facilities will be available and established;
5. New business will be introduced;

**Negative Impact of the Project by the Local People:**

1. Pollution of river water;
2. Increase traffic congestion;
3. Pollution of air environment during construction phase.

The following recommendations have been given by the participants during consultation:

1. As positive externalities, proposed **City Edible Oil Captive Power Plant Ltd.** should improve and create livelihood to the local people;
2. For less disturbance to local settings, **City Edible Oil Captive Power Plant Ltd.** should engage qualified contractor to ensure quality of works as well as timely completion of

work;

3. Local people should be employed by the contractor during construction work;
4. Adequate safety measures should be taken during construction work;
5. Concerns were also raised on possible traffic and population pressure caused by external employed personnel;
6. Water treatment system should be installed to prevent water pollution.
7. Regarding land filling, they said that very recently by taking different scheme at 18 points the Ministry of Shipping, Dhaka, Bangladesh has taken an initiative to restore the navigability of rivers. By doing this, the navigability of the river of Meghna Branch will return, they added. They had already submitted the proposal to the relevant authority. Moreover, the authority of the **City Edible Oil Captive Power Plant Ltd.** can also use the sand for filling the zone, they said.
8. Finally, local people have appreciated the Project and employment generation; and have promised that they will cooperate with the executing agency during Project implementation.

#### **6.4 Public Disclosure Meetings (PDMs)**

For the implementation of PD at the draft ESIA stage, the additional arrangement was made to implement at the draft ESIA stage taking into account the opinion received at the scoping stage as follows:

1. Preparation and disclosure of the main part in local language in addition to the documents which are officially required in accordance with EIA procedure;
2. Arrangement of PD before the day of holding PCM;
3. Arrangement for changing PD period to 1 month from 2 weeks;
4. Distribution of the reports to more places.

#### **Public Opinion**

##### **Project City Edible Oil Captive Power Plant Limited.**

Place: Rupshi, Narayanganj

Suggestions with regard to Implementation of the Project

SN	Date	Name of the Stakeholders and designation	Suggestion	Impact +/-/0
1	15/06/2019	Mr. Alhaj Abdur Matin,	• Water and Sound pollution should be restricted.	+

		Farmer, Gazaria	<ul style="list-style-type: none"> <li>• Meeting with details lay out Plan</li> <li>• t with the concerned engineers</li> </ul>	
2	15/06/2019	Md. Sirajul Islam, Manager Local Brickfield.	<ul style="list-style-type: none"> <li>• Precautions are to be taken against environmental pollution.</li> <li>• No objection against proposed factory.</li> </ul>	+
3	15/06/2019	Jafrin Akther Housewife, Local area.	Traffic congestion occur.	-
4	15/06/2019	MD, Rezaul Maksud Jahidi, School Teacher,	<ul style="list-style-type: none"> <li>• Positive impact on overall socio-economic condition.</li> <li>• No impact on environment.</li> <li>• Precautionary measure should be taken.</li> <li>• Ensure social welfare from the plant</li> <li>• Firefighting must ensure</li> </ul>	+
5	15/06/2019	Md. Shah Alam, R.E office, REB.	No comment	0
6	15/06/2019	Mr. Bayjidul Islam, Retired teacher,	No effect	0
7	15/06/2019	Md. Momin Mia, Van Driver,	Positive impact on employment.	+
8	15/06/2019	Mr. Abu Baker Siddique, Officer, Kamil Madrasa.	Employment facility will be increased.	+
9	15/06/2019	Md. Johirul Islam, Retired School Primary School Headmaster,	Positive impact on overall socio-economic condition	+
10	15/06/2019	Md. Nurul Islam, Owner near factory,	Request for controlling to the minimum limit of sound pollution and vibration	+
11	15/06/2019	Md. Ruhul Amin Local businessman,	Negative impact, water, sound pollution and vibration.	-
12	15/06/2019	Moulana Ahmed Karim	No comments	

		Local mosque Imam		
13	15/06/2019	Md Solaiman, Student,	Positive impact on overall socio-economic condition	+

Note: Impact +/-0, Positive impact (+), Negative impact (-), Zero impact (0)



Figure: Some photography during public consultation

## 7 Key Impacts identification

### 7.1 General Consideration

In the case of most development projects, potential negative impacts are far more numerous than beneficial impacts. A number of project activities during operation of facilities of **City Edible Oil Captive Power Plant Ltd.**, have been identified in chapter 3 of this report. This chapter identifies potential positive and negative impacts that may be generated from those project activities, which is the first step of forming this EMP report.

Though regional and national economic benefits associated with the implementation of any development project are considered to fall outside the scope of an EMP, they are also considered here. It is fully recognized that the long-term benefits will ultimately contribute to an improvement in the quality of life in the project area.

### 7.2 Scoping of Impacts

Identification of potential impacts due to the **PROJECT** location, operation and any future construction has been done using Checklist. Checklists are comprehensive lists of environmental effects and impacts indicator designed to stimulate the analysis to think broadly about possible consequences of contemplated actions. In order prepare the checklist and further to analyze to associated Environmental impacts due to the project multi-disciplinary team from the consultant's side visited the existing project site, closely identified activities of the project and significant environmental components that may be affected by the project. The project officials were interview during each visit to assess their level of understanding of the interrelation of the project activities and significant environmental impacts. The visitors in the project site were also interviewed randomly to assess their level of understanding about the general responsibilities to conserve the overall environment of this recreational spot. These were done mainly to identify the major environmental components of the project and at the same time stimulate thinking environmental conservation of all the groups associated with the project.

### 7.3 Checklist for identification of probable Environmental Impact

Following table represents the checklists developed for of **PROJECT**, in this checklist major activities which create the **Significant Environmental Impacts (SEIs)** are shown. The terms none, minor, moderate major, short termed and long termed are used in checklists to classify the magnitude and duration of probable SEI.

Table 7-1: Checklist for identification of probable Environmental Impact of **PROJECT** during Operation Phase

Action Affecting Environmental Resources and Values	SEIs without Mitigation Measures				Impact Type				Duration	
	None	Minor	Moderate	Major	Adverse	Beneficial	Reversible	Irreversible	Short Term	Long Term
Noise Generated from Generator			✓		✓		✓			✓
Untreated sanitary wastewater discharge can pollute the			✓		✓			✓		✓
Air pollution from generator		✓			✓			✓	✓	
Solid Wastes from production, daily activities as well as from routine maintenance work			✓		✓			✓		✓
Accidental, Fire and Natural Hazard				✓	✓			✓		✓
Employment- Recruitment of new staffs and operators				✓		✓				✓

## **8 Evaluation of Predicated Adverse Impacts and Mitigation**

### **8.1 Impact due to Pre-Construction**

#### **8.1.1 Overland Drainage and Impact on surface water**

The potential impacts on local hydrology are principally those of altered patterns as a result of onside construction and earthwork activities. The proposed project will affect natural drainage, surface and ground water quality if not managed the construction works properly.

#### **Mitigation**

- Surface drainage are controlled to divert surface runoff away from the construction area;
- Completed areas are restored/re-vegetated;
- Containment of sanitary waste are adequately disposed of to avoid surface and ground water contamination.
- Proper storage and disposal facility has to be developed for cuttings, drilling fluids and other chemicals and lube oil wastes generated during drilling, testing and commissioning

#### **8.1.2 Change in Landscape**

##### **Impact Origin**

A landscape is a subjective concept that cannot be precisely quantified. However, in general, any project when not designed considering the local landscape, then it creates visual intrusion to the people. The proposed project may change the local landscape to some extent.

##### **Mitigation Measure**

Any built up part of the plant are designed considering key criteria of landscape like coherence, readability, hierarchy and stability. It is understood that the infrastructure is have a modern architectural view with all facilities available, which does not provide any significant visual intrusion.

#### **8.1.3 Loss of and Displacement from Agricultural land and House**

##### **Impact Origin**

The project has been set up in fallow land, which will result in no loss of agricultural land as well as agricultural product of the country also any house.

##### **Mitigation Measures**

For economic development, Bangladesh has no option other than going for commercialization. To do so, some portion of land would have to be converted to commercial/industrial land. But attention should be given so that conversion of such land use should take place in comparatively less fertile area. The present land for proposed plant is no so fertile and hence ultimate loss in economic value due to loss in agricultural products will be overcome by industrial production in near future. Moreover, the land was purchased long before by compensating actual land value, so it is expected that by this time, the displaced land owner must find himself adopted in new income generation activities.

#### **8.1.4 Disruption of Earth Surface**

##### **Impact Origin**

Establishment of the project hasn't disrupted the natural surface of earth & thus will not obstruct the natural drainage system of the area.

##### **Mitigation measures**

Since, the land development has been done efficiently, so no more mitigation measures need to be adopted.

#### **8.1.5 Inadequacy of Buffer Zone**

##### **Impact Origin**

Buffer Zones are spaces, which provide natural environmental protection from damage by external events. These spaces, in between any development projects, are usually remaining vegetated which can provide windbreaks, erosion control, sediment traps, sound insulation and visual screening. Such vegetation land is available surrounding the project plant but within the project area is not so available. This is obviously not possible from Bangladesh point of view (as a densely populated country) that industries will keep a certain space from another installation as a buffer zone. However, industries should try to keep a certain open space within the factory premises which can be developed as a buffer strip.

##### **Mitigating Measure**

A green belt has been developed by planting trees of various species in all possible open spaces within project premises. Trees take carbon-di-oxide and discharge oxygen for their photosynthesis, which helps to clean the air. Some trees also absorb the toxic gases and particulate. In addition, the wood, fruit and fuel values are considerable. It also maintains the ecological balance and improves scenic beauty.

## **8.2 Impacts due to Construction**

### **8.2.1 Air pollution**

#### **Source of Impacts**

The area is predominated by sandy-clay soils. Sometimes sandy soil can pollute the air during heavy wind. It is anticipated that the air would be polluted with dust sand particles for the movement of light and heavy transport vehicles and during piling work. This air pollution may create some breathing problems to the workers. Very few people live near the site except power station staffs.

#### **Mitigation Measures**

To reduce air pollution in site, attempt is normally made to complete the construction of infrastructures within the wet season. Due to high rainfall in this period, air and soil remain wet and dust particles cannot spread easily. If construction work is continued during dry period, dust control arrangement by sprinkler shall be placed.

### **8.2.2 Noise Pollution and vibration affect**

Noise and vibration are generated from various construction activities such as piling of foundation, crushing of stones and bricks and installation of machines and equipment, etc. In addition, working conversation of the labor force also enhances the noise pollution. The noise pollution and vibration create disturbance to the workers of the adjacent establishments and surrounding people involved in various activities as well as nearby staff quarter people.

#### **Mitigation Measures**

Generation of noise pollution and vibration are an integral component of any construction work that cannot be avoided completely. However, it is possible to take certain measures to reduce these levels to an acceptable level. Appropriate precautions and skilled operation of machines and equipment would contribute to reduce the nuisance. Precaution like selection of proper working period considering the comfortable time of the people working and living around should be followed for construction work. The construction work normally starts at about 8.00 am and continues until 6.00 pm at the plant site. Working beyond this period may create sound hazards to the local people and hence the above work period shall be enforced.

### **8.2.3 Spreading diseases**

#### **Source of Impacts**

It is not unlikely that diseases may be spread among the construction workers as most of them are illiterate and their level of knowledge on health and hygiene is very low. They are not aware of water pollution, healthy accommodation and food poisoning. Moreover, due to high concentration of labor force during construction, unhygienic condition may be created in the vicinity and thereby the same may lead to transmission of various diseases. Thus, the worker may suffer from various diseases such as diarrhoea, dysentery and skin infections. These diseases can spread from one worker to another and to the people living in the area.

### **Mitigation Measures**

During construction phase, all of the impacts are reversible including spreading of diseases among the workers and the people working and living nearby. Moreover, the impacts are of short duration. In order to reduce or avoid the spreading of diseases, it is suggested that arrangement for good quality drinking water, hygienic sanitation and accommodation facilities for the staff and the workers shall be made. Frequent medical check-up would also be helpful in controlling the spreading of diseases. Emergency medical services and adequate first aid facilities should always be available at the site during construction period.

#### **8.2.4 Accidents**

##### **Sources of Impacts**

Adequate precautionary measures will be undertaken at the project site to avoid any accident. However, accident is unexpected and it may occur any time during construction work and cause loss of lives and properties.

##### **Mitigation Measures**

A high level of precautions shall be undertaken that would reduce the occurrence of accidents remarkably. Adequate first aid facilities and emergency contacts to the adjacent health complexes and other emergency services will help to save the lives from accidents.

#### **8.2.5 Impacts on wildlife (i.e. loss of habitat, hindrance to wildlife movement)**

##### **Source of Impacts**

Heavy construction work may disturb the wildlife.

##### **Mitigation/Management Measures**

- Boundary fencing of the Project Site area are ensure wildlife choose alternative routes.

- Provision of landscaped areas, where possible, around and within the Project Site using indigenous species to supply habitat for terrestrial and riparian species and improve aesthetics.
- Construction workers will be prohibited from felling trees, hunting wildlife and fishing in the vicinity of the project site.
- Monitoring population of terrestrial and aquatic organisms of the area in every six months during the construction phase.

#### **8.2.6 Hazardous Materials**

- Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of water bodies. Spill kits will be available to contain any accidental release of hazardous materials (including within vehicles when transporting hazardous materials).
- All hazardous materials will be provided with secondary containment. Any hazardous materials to be transported to or from the Project Site will include suitable protection (in the form of manufacturer / supplier recommended packaging or as stated in the relevant Material Safety Data Sheet (MSDS) to mitigate against any accidental release.

#### **8.2.7 Environmental contamination due to spillage or accidental release of hazardous materials (i.e. fuels, lubricants, solvents) onsite**

##### **Measures should include**

- Prohibition of dumping any contaminating material on the Project Site or elsewhere;
- Storage and routine handling of fuels, lubricants, oils, solvents and other potentially contaminating substances in a weather-protected area equipped with a secondary containment system for spills;
- Requisite steps should be taken toward spill prevention and, to this end, spill contingency plan should be undertaken. Necessary equipment and materials should be made available on-site to execute cleanup operations; and
- All materials recovered during clean-up operations should be stored in labeled and secured containers for selling away to listed third party vendors.

### **8.2.8 Influx of Temporary Laborers**

- The project will monitor social impacts on the local villages due to increased demand for goods, services and public health facilities arising out of an influx of workers in the project area.
- The on-site labor camp should meet the relevant standards. The Grievance Redress mechanism is to address any complaints from local people.
- The project entrepreneur will monitor the social impacts on the local villages during the construction of the Plant and will work with local Community leaders to mitigate any adverse impact.

### **8.2.9 Economic benefits to the people of Project area**

Review the suitability and capacity of local workers. The project will be encouraged to recruit local labor, goods and services, wherever these are available provided acceptable quality and price. The project will be required to follow a local procurement policy.

The project will develop a Recruitment Policy for approval by **PROJECT**. The Recruitment Policy will include:

- I. ensure equal opportunities, fair treatment recruitment, compensation, remuneration, working conditions and terms of employment;
- II. a means of expressing grievances; and
- III. Engaging subcontractors and suppliers who do not employ child labor or forced labor, and operate appropriate management systems consistent with requirements (i) and (ii).

## **8.3 Impact at Due to Operation of the Project**

Unjustified and unplanned Operation of any project can potentially affect quality of life, air, noise, water, land, flora, fauna and human by increase in water, noise and air pollution, increase in hazardous waste generation, pollution from spillage/surface runoff, disturbance to flora and fauna, by loss of trees resulting from increased access, increase in land values, threatening agriculture, etc. Environmental issues during the operational phase of the **City Edible Oil Captive Power Plant Ltd.**, project has been identified for each of its components:

### **8.3.1 Impact on Water Environment**

#### **Impacts and Origin**

Storm water runoff is the most common way that non-point source pollution reaches local rivers, creeks, lakes, ponds and wetlands. Rainwater may carry contaminants and sediments if the water is not absorbed by soil and vegetation. So rain water flow is another problem in any project. Rain water harvesting can solve the problem.

The project will use 500m<sup>3</sup>/day capacity of water and total water use for as cooling purpose and the water is completely recyclable. So no waste water will be generated from this power plant.

### **8.3.2 Impact Acoustic Environment (Green Belt & Eco System Development)**

#### **Impacts and Origin**

During operation of the **City Edible Oil Captive Power Plant Ltd.** noise will be likely to be generated from the following activities:

- Vehicular movement outside the project
- Routine operation of project machineries
- Generators

In order to assess the present sound quality sound quality monitoring was conducted at **City Edible Oil Captive Power Plant Ltd.** in following table, which shows at project sound level does not exceeds the allowable level of 60dBA for mixed area.

#### **Mitigation Measures**

In order to resist the noise generated due to plant activity and to uptake the waste water generated to some extent, it is recommended to develop green belt around the periphery of the plant road side area.

**City Edible Oil Captive Power Plant Ltd** will have responsible for Eco friendly eco system development around the project area by community cooperation.

#### **Green Belt Development at the project site**

Green Belt design and development has been attributed a great importance and became an essential element of planning policy. The main objective of the green belt is to provide a buffer / barrier between the sources of pollution and the surrounding areas. The green belt helps to

capture the fugitive emissions and attenuate the noise apart from improving the aesthetics quality of the region. Greenbelt will be developed by using appropriate plant species as suggested by Ministry of Forest and Environment and DOE guidelines to mitigate air pollution and to improve biodiversity status of the study area.

### **Greenbelt Designing**

#### **Selection of Plant Species**

Facts considered during selection of plant species for greenbelt development are:

- Type of pollutant (mainly air) likely to disperse from project
- Agro-climatic zone and sub-zone of the project area (Meghna Flood Plain)
- Biological–filter Efficiency: Absorption of gases, Dust capturing and Noise control

#### **Recommendation of Green Belt Periphery of the Project Location**

S. No	Scientific Name	Common Name	Ecological performance	Type
1	Aegle marmelos	Bel	CN, DC	Evergreen
2	Azadirachta indica	Neem	CN, OGE, DC	Evergreen
3	Butea monosperma	Palas	CN, OGE, DC	Evergreen
4	Ficus bengalensis	Banyan	CN, DC	Evergreen
5	Ficus religiosa	Peepal	CN, OGE, DC	Evergreen
6	Terminalia arjuna	Arjun	CN, OGE, DC	Evergreen

Ecological performance: CN –Control Noise level, AGE – Absorb Gas Emission (Sexena 1991) and (Abbasi & Khan 2000), DC - Dust Controller (CPCB 2007), Environmental Adaptation (DR - Drought resistance, SR - Salinity resistance, FR - Fire Resistance, T- Tolerant to Air Pollution).

#### **Plantation Technique and Care**

##### **Plantation Technique**

Following basic procedures need to be followed for greening the area.

- Plantation of tree species required approx. 1m<sup>3</sup> pit for soil enrichment
- Pit should be filled with imported soil with 3:1:1 the ratio of sand, silt and form yard manure
- Procure well grown saplings of recommended species from the nearby Forest Department nursery

- Make 1m diameter ring bund around the planted saplings for water retention
- Watering of sapling is species specific, therefore watering need to be done once in 2 or 3 days for a period
- of two years
- Soil wok and weeding need to be done once in a two months

### **Monitoring Protocol**

- The plantations need to be managed by regular watering, soil enrichment work, applying manure, weeding and provide proper protection.
- Replacement of sapling (replanting) required whenever mortality occurs in the plantation during the growth stage.
- Plantation requires after care for a period of minimum five years till the saplings attain matured tree stage.
- Any damage to the developed greenbelt due to any natural or cattle activity should be redeveloped and maintained by the agency.

### **8.3.3 Impact due to Solid Waste Generation**

#### **Impacts and Origin**

Varieties of solid waste will be generated from daily operation of the **City Edible Oil Captive Power Plant Ltd.**, which mainly include the following:

- Papers, poly bags, water bottles etc. from the daily activities (Minor)
- Electrical and mechanical wastes (Minor)
- Oil containers and Chemical containers/bags (Very small scale)

#### **Mitigation measures**

**City Edible Oil Captive Power Plant Ltd.** will have sufficient numbers of cleaners who regularly cleans and collects solid wastes generated in the projects.

- ✓ Sufficient numbers of dustbins and sign board will have been put in place to aware people in case of electro mechanical waste the amount will be very negligible and collected and stored in store room. These items have secondary demand and it is generally sold out.

### **8.3.4 Impact on Health and Safety**

#### **Impact Origin**

There might be hazards to operators, employees and technical personnel from working at the utility sections, store rooms, & generator etc. Provisions need to be made by the project for protecting occupational health, including protection of workers from hazards, fires etc. as well as protection of workers' health and assurance of safe drinking water supply and sanitation.

## **Mitigating Measures**

The supervisors and operators should be regularly given training regarding safe operation and maintenance works. The use of PPEs will be strict for the workers working in dangerous zones and. First Aid boxes and firefighting equipment should be available at each section of the project.

### **8.3.5 Natural, Accidental Hazard and Fire**

#### **Impacts and Origin**

Due to its geographical position the project area is prone to Natural Hazard like storm surge, heavy rainfall, earthquake etc. Like Natural accidental hazard are uncertain and unexpected. The impacts could be from small injury to devastating and deadly. The accidental hazard associated with the project is:

- Accident due to operate machinery
- Accident from generator

Fire is another most important issue for this project. Proper firefighting design should be taken to consider operating this project.

#### **Mitigation measures**

To reduce impacts of Natural Hazards and accidental hazard **City Edible Oil Captive Power Plant Ltd.** has taken the following actions

- All the infrastructures have been designed and installed to withstand natural hazard
- The operators at generator are properly trained
- Sufficient fire extinguisher available in the project
- First Aid points are available with trained paramedics
- Fire alarm & fire training
- Information center is available at major locations
- Entering in the danger zone is strictly prohibited
- Safety instructions and rules are displayed at all machinery
- Trained supervisors and operators ensure proper implementations of safety rules.

As the project is just east bank of Shitalakshya River so the river is a big source of Water Body which meet the requirement of emergency firefighting water of this project.

### **8.3.6 Impact on Air Quality**

At the operational phase of such project air pollution may occur mainly from generators, increased vehicular movement and indiscriminate disposal of degradable solid waste. All of

these actions are done in very small scale. So no particular management is suggested except regular monitoring and proper management of solid waste and effective control of vehicular traffic during peak hours.

### **Mitigation measure**

The following measures will be implemented to minimize impacts to local communities during operation phase of **City Edible Oil Captive Power Plant Ltd.:**

- provision of cover on haul trucks (preferable to cover truck) transporting raw materials, final product beside and inside the factory area.
- Water spraying on exposed areas to suppress dust emission,
- Proper maintenance of equipment's relevant operational work.
- Dust collector will be preferred to establish inside the factory area so that particulate matter ( $PM_{10}$  &  $PM_{2.5}$ ) will no longer a problem.
- Use covered conveyer for final product handling to reduce emission level.
- Use water sprayer regularly around loading & unloading side so that dust emission will no longer a problem at factory side.
- Clean primary and secondary roads of factory to diminish the reluctance dust problem.

#### **8.3.7 Increase in vehicular traffic in the area**

##### **Impact Origin**

Increase in vehicular traffic in the area will be likely to be experience during operational hours of the project. Increased vehicular traffic in the area is likely to result from: -

- Personal vehicles belonging to employees;
- Service provision vehicles such as garbage collection trucks;
- Emergency service vehicles such as fire engines;

##### **Potential negative impacts from increased vehicular traffic**

- Possible traffic congestion of local roads and lanes;
- Possible of occasional experience of delays on the said local roads;
- Increased number of vehicles on roads will result in increased wear and tear of local roads thus reducing lifespan of affected roads;
- Cost of maintaining roads will increase;
- There will be more noise from increased vehicular traffic

- There will be an increase of exhaust emission from vehicles which will pollute local atmospheric air.

### **Mitigation measures**

**City Edible Oil Captive Power Plant Ltd.** have readily available the parking facilities in front of main gate. In house traffic system is build up due to avoid the traffic jam surrounding the project. In addition, the following measures can be put in place to mitigate possible negative impacts likely to result from increase in vehicular traffic in the area:

- Management to pave the dilapidated service road with tarmac or more durable material;
- All users of said roads to always observe traffic rules this will give pedestrians and cyclist their space and safety while using the road;
- Marking of the roads to be clearly done;
- Horns and sirens near main gate should be strictly prohibited;

## **8.4 Anticipated positive impacts of the Project**

### **Potential Positive impacts**

- Strengthening Local market.
- Job opportunity
- Support of local Business.
- Infrastructure development.
- Revenue to Local Municipal Council
- Increased Gaming Taxes

#### **8.4.1 Job opportunities**

Construction sites are a major source of employment opportunities. Although the jobs are not permanent, a considerable number of casuals and contracted people are able to get employment opportunities. The project in future development phase will create employment opportunities for local youths. There are still vacant posts in **City Edible Oil Captive Power Plant Ltd.** which is a good opportunity for those who are looking for jobs. **City Edible Oil Captive Power Plant Ltd.** will recruit more staffs.

#### **8.4.2 Infrastructure development**

Local infrastructure like storm water drainage, parking spaces, pedestrian walkways within and, telephone, water pipeline, and electricity connectivity has been developed. Corporate

social responsibility programs implemented **City Edible Oil Captive Power Plant Ltd.** may also lead to development of social amenities within the Area.

#### **8.4.3 Revenue to Local Municipal Council**

The project is a source of revenue for the Local Municipal Council of the Area.

#### **8.4.4 Gains to the Economy**

There will be gains to the economy due to the future construction or development in the project area.

- ✓ Creation of jobs will lead to improved livelihoods for the people within the area;
- ✓ Taxes revenues will increase commensurate with the enhanced production capacity; and
- ✓ Increase in Tourist visit will help earning foreign currency.

## 9 Environmental & Social Management Plan

### 9.1 General Consideration

**Environmental Management Plan (EMP)** for construction and operation phase is required to ensure that mitigation of adverse impacts and strengthening of positive impact resulting from the **City Edible Oil Captive Power Plant Ltd.** The objective of EMP is to identify the project specific environmental actions that will need to be undertaken, not only to mitigate impacts but also improve environmental aesthetics for the proposed plant.

Environmental protection and improvement measures must be taken at design stage itself so as to minimize impacts during construction & operation phase of augmented facilities. The impacts during the construction phase on the environment would be basically of transient nature and are expected to reduce gradually on completion of the construction activities. The Environment Management Plan (EMP) during the construction and operation phase endeavors to mitigate the adverse impacts and to encourage the positive benefits. EMP has been prepared to take into account the mitigation measures in order to synchronize the economic development of the study area with the environmental protection of the region.

### 9.2 Purpose and objectives

The purpose of the Environmental and Social Management Plan (EMP) is to provide a summary of the expected associated impacts, mitigation measures and monitoring actions in order to minimize possible negative impacts and improve the positive impacts of the Project. The EMP will provide a guide (almost a checklist) for the main stakeholders, i.e. the owner, and the contractor, on what mitigation measures should be taken and where and when they are needed. Therefore, it will help to improve the likelihood that the adverse impacts will be mitigated, the benefits of the project will be shown and standards of best environmentally beneficial practices will be provided to all involved. In particular, the EMP: the specific objectives of the EMP are:

- Define the roles and a responsibility for those involved in the implementation of the EMP and identifies areas where these roles and responsibilities can be shared with other stakeholders.
- To support and implement for the project to achieve environmental standards and to improve the methods of environmental management,
- Define the implementation mechanism for the mitigation measures identified during the present study.

- To promote green-belt development,
- Budgeting and allocation of funds for Environmental Management System,
- Provides concise instructions to project personnel and contractors regarding procedures for protecting the environment and minimizing environmental impact, making these legally binding through their inclusion in contract specifications.
- Define the monitoring mechanism and identify monitoring parameters in order to:
- Ensure the complete implementation of all mitigation measures, and
- Ensure the effectiveness of the mitigation measures.
- To reduce fire and accident hazards,
- To adopt cleaner technology and waste minimization program.
- Provide the mechanism for taking timely action in the face of unanticipated environmental or social situations,
- Identify environmental as well as social training requirements at various levels.

With the availability of cost effective advanced technology and innovative environment management practices, the EMP can act as an effective management tool to provide management solutions to all environmental pollution concerns including that of associated regulatory compliance.

### **9.3 Environmental Management System**

Identification and summary of all potentially significant adverse environmental impacts from the company's manufacturing activities; List of specific measures to be undertaken to mitigate environmental impacts; Description and technical details for each mitigation measure, including the type of impact to which it relates and the conditions under which the measure is required, as well as equipment descriptions and operating procedures; Institutional arrangements, including assignment of responsibilities for implementing mitigation measures (i.e. supervision, enforcement, monitoring of implementation, remedial action, reporting, and staff training).

### **9.4 Comprehensive Environmental Management and Mitigation Plan**

The Environmental Management Plan (EMP) prepared for the proposed project covers the anticipated impacts that may generate in the future of the proposed project, mitigation measures, management and monitoring plans during each of the phases:

- Construction,
- Operation and

The detailed EMP based on the project activities is seen in following Table.

#### 9.4.1 Land use/land cover Environment

EMP for land use / land cover is presented in following table.

Table 9-1: Environmental Management Plan of Land Use / Land Cover

Phase	Impacting Activities and Aspect that will impact land use/cover	Mitigation Measures and Rationale	Implementation and Management				
			Location	Timing	Responsibility	Monitoring	Records
Construction	Implementation and Management during construction phase	The vegetation cover clearing should only be done on which construction is to take place and less disturbing the vegetation areas	Within the demarcated project site boundary	Once	CEOCCPL	Monitoring by Environment person	Record of clearing of land and its area
		The compensatory green cover development to be carried out.	Within plant area	Once	CEOCCPL	Regular monitoring of planted region	Maintain record of the area restored
		The proper cut and fill exercise or can disturb the flow and can impact entire region	Within the demarcated project site boundary	Once	CEOCCPL	Monitoring by Environment person	

#### 9.4.2 Air Quality

No major adverse impact on the air environment is envisaged due to the proposed project, as adequate measures are proposed to be adopted. The following tables represent the proper Management Plan of air quality during the construction, commissioning and operation phase of the proposed project.

**Objective:** To ensure that air emissions due to the site preparation, installation of proposed project and operation phase will be minimum

**Concern:** Site preparation, installation of manufacturing facility and operation phase can deteriorate air quality

**The benefit of EMP:** Reduced air pollution and protection of the health of workers and local community

Table 9-2: Environmental Management Plan for Air Quality

Phase	Impacting Activities	Mitigation Measures and Rationale	Implementation and Management				
			Location	Timing	Responsibility	Monitoring	Records
Construction	Dust generation due to Site preparation	Sprinkling of water which lead to dust suppression	At the site only	Once in a day during the site cleaning/preparation	Contractor	Random checks by Site Engineer	-
Construction	Excavation work	Sprinkling of water which leads to dust suppression	At Site	Once a day during the excavation process	Contractor	Random checks by Site Engineer	
Construction	Filling of foundation	A sprinkling of water lead to dust suppression	At Site	Once a day during the excavation process	Contractor	Random checks by Site Engineer	

Phase	Impacting Activities	Mitigation Measures and Rationale	Implementation and Management				
			Location	Timing	Responsibility	Monitoring	Records
Construction	Final Clearing of site	Sprinkling of water which lead to dust suppression	At site	Once a day during the Final Clearing of site	Contractor	Random checks by Site Engineer	
Construction	Painting	Adequate safety measures along with spill control mechanism	At site	Once in a day during installation of plant	Contractor	Random checks by Site Engineer	
Construction	Transportation of raw materials and products	Adequate safety measures along with spill control mechanism	At site	During Transportation	EHS Officer	Periodic monitoring by a party acceptable to regulatory authority	Type of chemicals, operating condition of chemicals transported, Periodic Workplace air quality monitoring Record of leak detection
Operation	Operation of Power Plant	Adequate safety measures, adequate stack height and green belt development	At site	At all time, during the production process	Safety department	Periodic stack monitoring	Ambient air monitoring records of the stack

### 9.4.3 Noise Environment

Computations based on data and analysis, the distance of noise sources from the project site and the attenuation due to the green belt reveals that the noise level in the study area will remain practically unchanged. The following tables represents the proper Management Plan of Noise quality during the construction, commissioning and operation phase of the proposed project.

**Objective: To reduce noise level due to the proposed project**

**Benefit of EMP: Noise environment of the area will not be impacted by the proposed activity**

Table 9-3: Environmental Management Plan for Noise Environment

Impacting Activities	Mitigation Measures	Implementation and Management					Emergency Procedure	Procurement Schedule	Remark
		Data Analysis	Measurement Methodology	Frequency	Location	Responsibility			
Vehicular movement for site preparation and transportation of materials and equipment.	Vehicles trips during daytime only fixing route by avoiding populated area	Vehicle movement records	Manual	Daily	At material gate	Security officer	Route for safe exit will be in place.	During operation phase	

Impacting Activities	Mitigation Measures	Implementation and Management					Emergency Procedure	Procurement Schedule	Remark
		Data Analysis	Measurement Methodology	Frequency	Location	Responsibility			
Operation of WTP, Gas Engines, cooling tower, chiller, heat recovery site etc.	Suitable acoustic enclosures will be provided	Noise Levels	Sound Level Meter (SLM)	Monthly (Hourly reading for 24 hours at each location)	Near WTP, Gas Engines, cooling tower, chiller, heat recovery site etc.	Plant in charge & Third Party/ Contractor	Periodic Maintenance will be scheduled	During Operation phase	Proper personal protective equipment to be worn by workers at all times.
Dismantling of structures of the project components	Vehicles trips during daytime only & well maintained vehicles should be used	Noise Levels	Sound Level Meter (SLM)	During operation of activity	Near dismantling site	Plant in charge & Third Party/ Contractor	Periodic Maintenance will be scheduled	During dismantling phase	Proper personal protective equipment to be worn by workers at all times.

#### 9.4.4 Water Environment

The Environmental Management Plan (EMP) describes both generic good practice measures and site specific measures, the implementation of which is aimed at mitigating potential impacts associated with the proposed activities. Details of expected impact from various activities, and its management plan are given in following table.

**Objective:** To reduce surface water pollution

**Concern:** Pollution to surface water

**Benefit of EMP:** Surface water quality will not be impacted by the proposed activity

Table 9-4: Environmental Management Plan for Surface & Ground Water Management.

Impacting Activities	Mitigation Measures	Implementation and Management					Remark
		Location	Timing	Responsibility	Monitoring	Records	
Usage of Water	Water conservation practice shall be done by recycling of treated water. The Effluent water will be completely recycled in Plant to reduce the fresh water demand. The treated domestic waster will be reuse for gardening purpose to reduce fresh water demand.	At site	On going	Site EHS Manager / EHS Team	Monitoring of water consumption at intake points	Records of Water consumption at each unit to be carried out	

Wastewater generation, treatment and disposal	Wastewater generated from the proposed project shall be segregated at source and treated in ETP followed by MBR to meet ZLD.	At Site	On going	Site EHS Manager / EHS Team/ETP incharge	Monitoring of inlet and outlet quality of wastewater	Records of wastewater generation and discharge quantity to be maintained.	
Environment Management Plan for Ground Water							
Consumption of water resource	Rainwater storage and reuse	At site	Pre & Post monsoon	Site engineer	Periodic maintenance of Rainwater harvesting Chambers and Installation of piezometers to monitor water level fluctuations and water quality variation with respect to space ,depth and time	Water quality and water level log book	

### Rain Water Harvesting Maintenance Plan

The rain water harvesting maintenance plan for by the project is given below:

- Rain water harvesting maintenance plan will be followed by the project or proper operation and maintenance of rainwater harvesting systems, which will help to protect water quality and increase recharging of rain water.
- Regular inspection and cleaning of catchment, gutters, filters and pits will be ensured to reduce the likelihood of contamination of run-off.
- Before monsoon, leaves and debris from entering the mesh filters, desilting chamber and rain water harvesting pits will be cleaned.
- Impervious roof made from smooth, clean non-toxic material will clear before rains. Over hanging branches above the catchment surface should be removed.
- All the wastes (hazardous and non-hazardous) will be collected regularly to avoid contamination of runoff.

Every year before monsoon, channels and rain water recharge pits will be cleaned and flushed with water to remove sediment and debris, it will increase recharge rate. Flushing will also help in cleaning of silt and other material deposited during dry seasons.

#### 9.4.5 Socio-Economic Environment

**Implementation Arrangement:** The social management plan proposes to improve the quality of life of inhabitants of potentially affected villages directly. The goal is “a pollution free area with improved quality of life and empowered community “and the three key pillars on which this would be developed are – social, health, infrastructure improvements with efforts on minimal disruptions present life style and any ensuing negative impacts.

**Social** – Awareness on project benefits, gender empowerment, increases livelihood opportunities during implementation of technical and social remediation plans and generating community participation.

**Health** - Awareness on health, hygiene, environmental sanitation and generic issues related to improving quality of life with specific emphasis on potable drinking water, HIV/AIDS/STI mitigation)

**Infrastructure** - Developing prioritized infrastructure facilities which are related to the continuum of project benefits to the local communities and area.

#### 9.4.6 Monitoring and Evaluation

The social management plan and its activities will be implemented and monitored by the CSR division of the company.

#### 9.4.7 Environmental and Social Trainings

Environmental and social training will help ensure that the requirements of the EIA and EMP are clearly understood and followed by all project staff throughout the project period. The main responsibility for providing training to all project personnel will be that of the ESMC.

The environmental and social training program will be finalized before the start of the project, during the detailed design phase. Training will be provided to **City Edible Oil Captive Power Plant Ltd.** personnel, construction contractors and other staff members hired for the project. The training will cover all levels of personnel, ranging from management and supervision to qualified and unqualified personnel. The scope of the training will cover the general environmental awareness and the requirements of the ESIA and EMP, with special emphasis on raising the awareness of the project's personnel to the environmental and social aspects of the area.

During the operation and maintenance phase of the project, ESMC will continue carrying out these trainings for all the relevant personnel of the company.

#### 9.4.8 Grievance Redressal Mechanism

Environmental and social complaints will be handled in accordance with the mechanism for repairing project complaints. An open and transparent dialogue will be maintained with the people affected by the project when necessary, in accordance with the requirements of the ADB safeguard policy. The grievance redress mechanism (GRM) for the project provides an effective approach to complaints and the resolution of problems made by the affected community in a reliable manner. This mechanism will remain active throughout the life cycle of the project.

**City Edible Oil Captive Power Plant Ltd.** shall have a standard mechanism to

1. inform the affected people (AP) about GRM and its functions,
2. set the procedures and mechanisms adopted for making the complaints,
3. support the complainants in communicating their grievance and attending the GRM meetings and
4. Implement compliance with a GRMs' decision, its monitoring and communication to the people.

#### GRM Process

Under the GRM, the ESMC will maintain the Social Complaints Registry (SCR) on the sites to document all complaints received from local communities or any other interested party. The information recorded in the Registry will include the date of the complaint, the details of the complainant, the description of the complaint, the measures to be taken, the person responsible for taking the action, the monitoring requirements and the target date for the implementation of the complaint the mitigation measure. The registry will also record the actual measures taken to mitigate these concerns.

As soon as a complaint is received, the ESMC will determine the corrective action. If necessary, consultations will also be conducted with the contractor site administrator. Once the corrective action is decided, the responsibility for implementation and the schedule will be determined.

The proposed corrective action will be documented in the SCR, with full details (by whom and by when). The proposed corrective action will be shared with the complainant. In the same way, the actual action taken will also be documented in the Registry and will be shared with the complainant. The complainant's views on the corrective measures taken will also be documented in the Registry.

The SCR will be reviewed during biweekly meetings on the site during the project, and the elements of action will be discussed. Progress in corrective actions will also be reviewed during meetings.

### **Types of Grievances**

There are two types of grievances to be considered,

#### **1. Internal Grievance**

This includes employees hired specifically for the site. Complaints pertaining to amount of wage, salary, other remuneration or benefits, disbursement of remuneration, Working condition, health and safety of the employees etc.

#### **2. External Grievance**

Contractor and Labor related Grievances: Community Grievances including those on land and resettlement issues, project activities, CSR, intervention, employee / worker-community conflicts, and other project related issues.

### **9.4.9 Occupational Health of the Workers**

#### **Detail of Occupational Health Check Up**

Health of an individual is multi factorial. The factors which influence health lie both within the individual and externally in the society. The term environment implies all the external factors.

#### **Occupational Health Centre**

Full-fledged Occupational Health Centre is available at factory and Doctor with Diploma Industrial Health has been arranged to visit the factory on daily basis. Medical records of workmen and contract workmen are made available with the doctor.

#### **Pre-employment medical checkup:**

All the employees are eligible for pre-employment medical checkup. Employees are expected to complete their mandatory checkup in an approved hospital before joining to the organization. Periodical medical examination being carried out as per Factories Act and Rules.

### **9.5 Environment Management Cell**

In addition to preparing an EMP, it is also necessary to have a permanent organizational set up to ensure its effective implementation. Hence, **City Edible Oil Captive Power Plant Ltd** will create a team consisting of officers from various departments to coordinate the activities concerned with management and implementation of the environmental control measures. This team will undertake the activity of monitoring the stack emissions, ambient air quality, noise level etc. either departmentally or by appointing external agencies wherever necessary.

Regular monitoring of environmental parameters will be carried out to find out any deterioration in environmental quality and also to take corrective steps, if required, through respective internal departments.

An environment management cell shall be created which shall perform the following functions:

- Achieve objectives of the ‘Environment Protection Policy’ of the management.
- Collect information from regular monitoring and create a database.
- Analyze the data and decide thrust area.
- Based on the data collected, decide target for each thrust area.
- Carry out ‘Projects’ in each thrust area to arrive at practical solutions to environmental problems.
- Discuss the reports of study on environment and disseminate the information.
- Work out ‘Action plan’ for implementation of the recommendations made in the reports.
- Prepare Management Information System (MIS) reports and budget for environment management program.

The works Manager will be responsible for environmental issues at plant.

## **9.6 Monitoring Plan**

The mitigation plan is a key component of the ESMP. It lists all the potential effects of each activity of the project and their associated mitigation measures identified in the ESIA. For each project activity, the following information is presented in the plan:

- A listing of the potential impact associated with that project activity
- A comprehensive listing of mitigation measures (actions)
- The person(s) responsible for ensuring the full implementation of the action
- The person(s) responsible for monitoring the action
- The timing of the implementation of the action to ensure that the objectives of mitigation are fully met.
- It should be emphasized that the mitigation measures will have to be translated into environmental as well as social requirements and specifications to be made part of the contracts for the construction activities, with legal binding.

The objective of environmental and social monitoring during the various phases of the Proposed project will be as follows:

- Ensuring that the mitigation measures included in the ESIA are being implemented completely.
- Ensuring the effectiveness of the mitigation measures in minimizing the project's impacts on social and environmental resources

Table 9-5: Environmental Monitoring Plan (operation phase only because the project construction work already have completed and now the project is running stage)

<b>Operation Phase</b>				
Ambient air quality	SPM, PM <sub>10</sub> , PM <sub>2.5</sub> , CO, CO <sub>2</sub> , NO <sub>2</sub> , SO <sub>2</sub> .	Quarterly a Year	One point in project area	<b>CEOCPPL, EHS Team</b>
Noise level and vibration	Equivalent noise level dB(A)	Quarterly a Year	Four point at the entrance of the factory (as receptor)	<b>CEOCPPL, EHS Team</b>
Water Quality	pH, BOD, COD, TDS, Hardness, Turbidity.	Quarterly a Year	Treated water output from water Colling tower.	<b>CEOCPPL, EHS Team</b>
Solid Waste	Waste transfer notes	Quarterly a Year	Disposal of wastes, waste segregation area	<b>CEOCPPL, EHS Team</b>

## 10 Occupational Health & Safety

### 10.1 Occupational Health

**City Edible Oil Captive Power Plant Ltd.** will have adopted a detailed “safety policy” for ensuring occupational safety for all working within the industry premises. The safety policy covers precautionary measures related to working anywhere within the factory, use of any machinery, working with or near machinery in motion, stacking packing and storing materials, and carrying of excessive weight by individual factory employee. Smoking within the factory is strictly prohibited. Carrying of cigarettes and matches within the working area is also prohibited.

The commercial building and associated civil structures have been constructed as per approved design following national building codes. Provisions for approach roads, staircase, and emergency exits have been kept as per ‘Government guidelines. Electrical wiring, switchboards, and circuit breakers have been designed and installed by qualified engineering firms.

**It is necessary to inform that the project belongs to City Group and City Group itself has a Health Safety Policy for the entire plant. During the Covid-19 pandemic, the factory authorities have taken all necessary steps to avoid the effects of Covid-19, and are also complying with the World Health Organization's recommendations as well as the Bangladesh government's health recommendations.**

### 10.2 Emergency Responses

Provisions for emergency responses will have been elaborate in the “safety policy” adopted by the industry. All areas within the factory are equipped with portable fire extinguishers. These fire extinguishers have been placed in easily accessible areas and have been especially marked for easy identification. All types of fire extinguishers are labeled with user instruction and effective use period, as per recommendations of the local fire service and civil defense authority. Fire alarms with lights have also been placed at appropriate locations.

Fire emergency exit plans have been fixed at easily visible place on every production floor. The entry and exit routes to the project have been well marked and have been fitted with emergency lights. There is provision for emergency staircase for emergency evacuation, besides the regular staircase. One vehicle will be engaged full time for any emergency to carry the patient or victims to the hospital.

One qualified registered doctor and two nurses work full time in the project. Besides a five-member certified team who can provide first aid treatment is always available in the project.

### 10.3 Health and Environmental Hygiene

**City Edible Oil Captive Power Plant Ltd.** has adopted a “health and environment policy” for ensuring sanitary condition within the project premises and for providing healthcare support to the construction workers. The policy deals with cleanliness within the project premises, disposal of solid wastes, maintenance of latrines, urinals, and drains, and lighting of project promises. Potable water in sufficient volumes is made available to all employees working on every unit. As mentioned earlier, a team of one doctor and two nurses work full-time in the project to help the employee with their medical needs.

#### Health and Environment Policy-

- Maintenance of Drains: Washroom wastewater drains has been constructed properly maintaining required slope, so that nothing can be accumulated in system.
- Drinking Water Provision: There are sufficient volume of fresh natural drinking water kept in Hot and Cold water stands at convenient locations of every unit. It is our business goal to keep sound health to enhance the productivity.

#### Safety Policy-

- Safety Precaution: All machinery and equipment are designed considering the safety well as per local laws well as international safety guidelines.
- Building and Structure: Building machines and equipment are well protected to ensure workers safety. Proper safety notice & Instruction in Bi-lingual (Bangle & English) are set to required equipment. Under no circumstances no one will be allowed to use any pains in the factory. There is no machinery or equipment that is un-protected in the project which may endanger the workers.
- Fire Fighting Equipment: In factory area sufficient number of different types & size portable fire extinguishers have been placed and defined by special mark and easily located while kin emergency. Periodically local fire-service and civil defense dept. will inspect the production floor to give the certificate. All fire extinguishers have been colored as per type, details of usability as mentioned in EU standard notice which has been placed in every unit. All fire extinguishers has been labeled with effective use period and replace of dry powder, foam at regular interval and label as per

recommendation of local civil defense fire service. Fire alarm with light has been placed in easily visible range and alarm switch has been marked with proper graphic and Symbol notation with wordings. Also a 36,000 Liter (6m x 3m x 2m) Open Water Body remains near the chemical storage area for emergency firefighting.

## 11 Cost Estimation for Environmental Mitigation Measures and Monitoring

### 11.1 Overview

This section describes the budget plans for the environmental management and environmental monitoring by the Project Proponent. On the other hand, the tenants will take necessary environmental mitigation measures and its expenses for the environmental management not only at the construction and operation phases but also at the closing, termination, and after termination phases in accordance with their ESIA study. However, the budget plan for environmental management of each work cannot be estimated at this stage because there is no certain information on industrial sectors of tenants.

### 11.2 Budget Plan for Environmental Management

Most of the mitigation measures such as preservation and retention of existing canal, construction of ETP, and plans and trainings are already included in the Project cost. Main costs for mitigation measures are shown in the following table. Detailed costs for each mitigation measure are to be calculated at the detailed design stage.

Table 11-1: Cost for Main Mitigation Measures

SN	Item	Budget (per year)	
		Before/During Construction Phase	Operation Phase
1.	Retention of canal	Will be included in the Project cost	Will be included in the Project cost
2.	Construction of river bank protection		
3.	Residential road for the purpose of community accessibility improvement		
4.	Greening area		
5.	Others (sprinkle water, waste disposal, training and education)		

### 11.3 Budget Plan for Environmental Monitoring

In terms of budget for environmental monitoring before/during construction and operation phases, main monitoring cost related with field measurements such as air, water, and noise quality. Annual costs for field measurements in the construction phase by contractor and in

the operation phase by the Proponent are estimated, respectively, as shown in the following table.

Table 11-2: Estimated Annual Costs for Monitoring in the Construction and Operation Phases

SI	Parameters	Est. Number of Samples/Sites (per year)	Unit cost @ (BDT)	Total cost (BDT)/year
1	Ambient air quality (SPM; PM <sub>2.5</sub> ; PM <sub>10</sub> ; SOx; NOx; CO; CO <sub>2</sub> )	28	10,000.00	280,000.00
2	Ground water quality (pH, BOD, COD, TDS, Hardness, Turbidity.)	24	10,000.00	240,000.00
3	Noise level (5 points)	20	5000.00	100,000.00
4	Training of workers regarding occupational health & other industrial safety issues	2	50000.00	100,000.00
5	Establishment of Greenbelt	2000	100.00	200,000.00
<b>Total cost per year</b>				<b>920,000.00</b>

Table 11-3: Estimated Annual Cost for Manpower for Supervising Environmental Management and Monitoring Activities

SI	Designation	Number	Cost BDT. (per month)	Cost BDT. (per year)
1.	Manager (EHS)	1.00	50,000	600,000.00
<b>Total</b>				<b>600,000.00</b>

## **12 Emergency Response and Disaster Management Plan**

### **12.1 Disaster Impact Assessment**

#### **12.1.1 Introduction**

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

#### **12.1.2 Methodology of MCA Analysis**

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

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

Following steps are involved in the MCA analysis:

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

#### **12.1.3 Past Accident Data Analysis**

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

#### **12.1.4 Hazard Identification**

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

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

### **12.1.5 Fire and Explosion Index (FEI)**

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

### **12.1.6 MCA Analysis**

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

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

### **12.1.7 Fire and Explosion Scenarios**

Combustible materials within their flammable limits may ignite and burn if exposed to an ignition source of sufficient energy. On process plants, this normally occurs as a result of a leakage or spillage. Depending on the physical properties of the material and the operating parameters, the combustion of material in a plant may take on a number of forms like jet fire, flash fire and pool fire.

### **12.1.8 Flash Fire**

A flash fire is the non-explosive combustion of a vapor cloud resulting from a release of flammable material into the open air, which after mixing with air, ignites. A flash fire results from the ignition of a released flammable cloud in which there is essentially no increase in combustion rate. The ignition source could be electric spark, a hot surface, and friction between moving parts of a machine or an open fire. Flash fire may occur due to its less vapor temperature than ambient temperature. Hence, as a result of a spill, they are dispersed initially by the negative buoyancy of cold vapors and subsequently by the atmospheric turbulence. After the release and dispersion of the flammable fuel the resulting vapor cloud is ignited and when the fuel vapor is not mixed with sufficient air prior to ignition, it results in diffusion fire burning. Therefore, the rate at which the fuel vapor and air are mixed together during combustion determines the rate of burning in the flash fire.

The main dangers of flash fire are radiation and direct flame contact. The size of the flammable cloud determines the area of possible direct flame contact effects.

Radiation effects on a target depend on several factors including its distance from the flames, flame height, flame emissive power, local atmospheric transitivity and cloud size.

Most of the time, flash combustion lasts for no more than a few seconds.

### **12.1.9 Natural Calamities**

Natural calamities like tropical cyclones, flood, earthquakes etc. can occur within the zone. The project site falls under the earthquake zone II which indicate medium intensity of earthquake.

## **12.2 Disaster Management Plan (DMP)**

### **12.2.1 Approach to Disaster Management Plan**

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

### **12.2.2 Formulation of DMP and Emergency Services**

Proposed **City Edible Oil Captive Power Plant Ltd.** will formulate a Disaster Management Plan for better and safe management of their plants. The DMP is related to the final assessment and it is the responsibility of the plant management document including the following elements.

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

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

### **12.2.3 Need for Disaster Management Plan**

The petroleum and petrochemical complex will produce lot of toxic, highly reactive, explosive or inflammable chemicals which are potentially hazardous not only to the human beings, flora and fauna but also to all forms of property and our environment as a whole. Thus, extreme care is essential in handling such chemicals in any form and at all stages of manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion or sale. Several agencies of the Government are entrusted with the responsibility of ensuring safe handling and management of hazardous chemicals under acts and rules made for the purpose. In spite of these measures, the possibility of accidents cannot be ruled out. Human errors and mechanical, electrical, instrumental or system failures have, on occasions, led to severe disasters. Accidents occurred at Bhopal, Mexico and other parts of the world

have made people concerned with the dangers of chemical accidents. Occurrence of such accidents makes it essential that the Central and State Governments as well as the local authorities are fully prepared to mitigate the sufferings and meet the eventualities resulting from any unfortunate occurrence of chemical accidents in our country.

Following are the general types of Emergency /Disaster which lead to preparation of disaster management plan:

- Fire in tank farm area
- Large oil spillage which may escape outside the plant boundary.
- Major fire / explosion in unit area
- Toxic gas release
- Major Earthquake above 7 Richter Scale
- Tropical Cyclones/Tornado

#### **12.2.4 Objectives of Disaster Management Plan**

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

- Ensure safety of people, protect the environment and safeguard commercial considerations
- Immediate response to emergency scene with effective communication network and organized procedures
- Obtain early warning of emergency conditions so as to prevent impact on personnel, assets and environment
- Safeguard personnel to prevent injuries or loss of life by protecting personnel from the hazard and evacuating personnel from an installation when necessary.
- Minimize the impact of the event on the installation and the environment, by:
  - ✓ Minimizing the hazard as far as possible
  - ✓ Minimizing the potential for escalation
  - ✓ Containing any release
- To provide guidance to help stakeholders take appropriate action to prevent accidents involving hazardous substances and to mitigate adverse effects of accidents that do nevertheless occur.

### **12.2.5 Different Phases of Disaster**

#### **Warning Phase**

Emergencies/disasters are generally preceded by warnings during which preventive measures may be initiated. For example, release of light hydrocarbons, uncontrollable build-up of pressure in process equipment, weather forecast give warning about formation of vapor cloud, cyclones, equipment failure etc. This is the phase when emergency/disaster actually strikes and preventive measures may hardly be taken. However, control measures to minimize the effects may be taken through a well-planned and ready-to-act disaster management plan. The duration may be from seconds to days.

#### **Rescue Phase**

This is the phase when impact is almost over and efforts are concentrated on rescue and relief measures.

#### **Relief Phase**

In this phase, apart from organization and relief measures internally, depending on severity of the disaster, external help should also be summoned to provide relief measures (like evacuations to a safe place and providing medical help, food clothing etc.). This phase will continue till normalcy is restored.

#### **Rehabilitation Phase**

This is the final and longest phase. During which measures required to put the situation back to normal as far as possible are taken. Checking the systems, estimating the damages, repair of equipment's and putting them again into service are taken up. Help from revenue/insurance authorities need to be obtained to assess the damage, quantum of compensation to be paid etc.

#### **Key Elements**

Following are the key elements of Disaster Management Plan:

- Basis of the plan
- Accident/emergency response planning procedures
- On-site Disaster Management Plan
- Off-site Disaster Management Plan

### **12.2.6 Basis of the Plan**

Identification and assessment of hazards is crucial for on-site emergency planning and it is therefore necessary to identify what emergencies could arise in production of various

products and their storage. Hazard analysis or consequence analysis gives the following results.

- Hazards from spread of fire or release of flammable and toxic chemicals from storage and production units.
- Hazards due to formation of pressure waves due to vapour cloud explosion of flammable gases and oil spill hazards.

#### **12.2.7 Emergency Planning and Response Procedures**

Emergency rarely occurs; therefore, activities during emergencies require coordination of higher order than for planned activities carried out according to fixed time schedule or on a routine day-to-day basis. To effectively coordinate emergency response activities, an organizational approach to planning is required. The important areas of emergency planning are Organization and Responsibilities, Procedures, Communication, Transport, Resource requirements and Control Centre. Offsite emergency requires additional planning over and above those considered under onsite plans, which should be properly integrated to ensure better coordination. The emergency planning includes anticipatory action for emergency, maintenance and streamlining of emergency preparedness and ability for sudden mobilization of all forces to meet any calamity.

#### **12.2.8 On-site Disaster Management Plan**

Onsite Emergency/disaster is an unpleasant event of such magnitude which may cause extensive damage to life and property due to plant emergencies resulting from deficiencies in Operation, Maintenance, design and human error, natural calamities like flood, cyclone and earthquake; and deliberate and other acts of man like sabotage, riot and war etc. An Onsite Disaster may occur all of a sudden or proceeded by a major fire. Purpose for the on-site disaster management plan is-

- To protect persons and property of processing equipment's in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them
- To inform authorities including helping agencies (doctors, hospitals, fire, police transport etc.) in advance, and also at the time of actual happening

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings. Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.

In order to handle disaster / emergency situations, an organizational chart entrusting responsibility to various personnel of the plant and showing their specific roles should be available. Following fire protection facilities are available to combat the emergencies and depending upon the type of emergencies any one or combination of the facilities are applied.

- Fire Water System
- Carbon Dioxide System
- Foam System
- First Aid Fire Fighting Equipment
- Mobile Fire Fighting Equipment
- Gas / Fire Detection and Alarm System.

### **Before Crisis**

- Prepare a plan of the storage, handling and pumping stations premises and surroundings showing therein the areas of various hazards like fire, explosion, toxic releases and also location of assembly points, fire station or equipment's room, telephone room, first aid or ambulance room, emergency control room, main gate, emergency gates, normal wind direction, outside fire station, hospital and other services. Mention their distances from proposed activities.
- The fire protection equipment shall be kept in good operating condition at all the time and firefighting system should be periodically tested for people functioning logged for record and corrective action.
- The firefighting training shall be provided to all officers, truck drivers and other employees who are likely to be present in installation
- There should be regular mock fire drills once a month record of such drills shall be maintained
- Every employee or authorized person working in the production shall be familiarized with the fire alarm signal and shall know the location of fire alarm point nearest to place of work
- Assign key personnel and alternate responsible for site safety

- Describe risk associated with each operation conducted.

### **During Crisis**

- Monitor the behavior of entrant for any effects that suggests they should be evacuated
- Evacuate the space if any hazard that could danger the entrant is detected
- Perform no other duties that may interfere with their primary responsibilities
- Notify the attendant if they experience any warning signs or symptoms of exposures or detect a dangerous condition.
- Exit the permit space when instructed by attendant
- Reporting Procedure

In the event of fire from accidental release of flammable gas or liquid, a person seeing the incident will follow the laid down procedure in the plant and report as follows:

- Will dial the nearest telephone
- Will state his name and exact location of emergency
- Will contact affected officers on duty
- People reporting the accident will remain near the location to guide emergency crew arriving at the scene

In case fire emergency person should activate the nearest available push button type instrument which will automatically sound an alarm in fire control room indicating the location of fire.

### **After Crisis**

- Report injuries or blood or body fluid exposures to the appropriate supervisor immediately
- Assembly points:

Assembly points shall be set up farthest from the location of likely hazardous events, where pre-designed persons from the works, contractors and visitors would assemble in case of emergency. Up-to date list of pre-designed employees shift wise must be available at these points so that roll call could be taken. Pre-designated persons would take charge of these points and mark presence as the people come into it.

- Wash wounds and skin sites that have been affected with soap & water
- Workers should be seen as soon as possible by a health professional

- Provide information to the relevant public authority and community including other closely located facilities regarding the nature of hazard and emergency procedure in event of major accident
- Record and discuss the lessons learned and the analysis of major accidents and misses with employees and employee representative

### **12.2.9 Emergency Organization Structure**

Following are the key personnel and the units in the plant which are responsible to take appropriate actions during emergencies.

#### **Site Main Controller**

##### **President/SSM - (the senior most functionary available at site).**

The President/Site Shift Manager (SSM) will be designated as the Site Main Controller at the time of an emergency and report at the Emergency Control Centre (ECC) which will be the Primary Command Post. He will be the Chief Co-coordinator and take overall command of the emergency management. He will be assisted by other coordinators as designated for various functions. The Site Main Controller will provide all decisions support and resources support to the Site Incident Controller at the incident site for initiating appropriate actions for emergency control. He will also liaise with mutual aid members and all outside agencies including Local Crisis Management Committee, District Contingency Plan Committee (District Collector), Police, Civil Defence, Factories Inspectorate, etc. to seek assistance/help and provide necessary information to them. Normally, the SSM is available on round the clock duty at the site to coordinate overall manufacturing activities and management of emergency (if any). In the event of an emergency, the Site Shift Manager (SSM) will assume the charge of the Site Main Controller till the Executive or the President arrives.

#### **Site Incident Controller**

AVP/GM/DGM/Sr. Mgr. /Mgr. - (next lower to the senior most functionary of operation available at site).

The next lower to senior most functionary of operation available at site will be Site Incident Controller. On receiving information about the emergency, he will report at the incident site and take over from the Deputy Incident Controller (shift-in-charge). He will take overall command of the emergency control operation as the Site Incident Controller and will take decisions in

co-ordinations with Site Main Controller for controlling emergency situation. He will co-ordinate with all the key personnel, firefighting and rescue team leaders and other support services and provide necessary information and advice to them for effectively managing control measures / actions.

### **Deputy Incident Controller**

The shift-in-charge is available on round the clock duty in every plant. He is competent for plant operation and responsible for all activities related to production / maintenance including prevention / control of incidents and handling emergencies (if any) in the plant. He will be designated as the Deputy Incident Controller. In the event of an emergency in the plant, he will immediately assume the charge of the site Incident Controller and take decisions in consultation with the Site Main Controller. To initiate immediate actions for controlling/mitigating emergency situation at the incident site till the Site Incident Controller (next senior personnel in production) arrives.

### **Coordinators**

(The senior most functionaries available in the respective services)

The senior most functionaries available at site in the respective services will be the coordinators at the time of an emergency. They will report at the Emergency Control Centre (ECC), known as the Primary Command Post, unless and otherwise instructed by the Chief Coordinator (The Site Main Controller). They will assist and advise the Site Main Controller in all matters for effectively managing control measures and mitigating operations.

### **Emergency Control Centre (ECC) (The Primary Command Post)**

In the event of an emergency, SSM Office will be designated as the Emergency Control Centre, which will be known as the Primary Command Post. If, the SSM office is likely to be affected due to unfavorable wind direction or any other reasons, the Emergency Control Centre will be shifted to the Construction Conference Room which will be having necessary facilities to connect communication links as provided in the SSM Office.

### **Field Command Post (Incident Site)**

- An emergency requires co-ordination of numerous activities beyond spill containment and countermeasure efforts from a safe location at the incident scene. The Field Command Post will be established in the "Cold Zone" for staging deployed apparatus,

resources and equipment with means of communications and manning to effectively co-ordinate control efforts.

### **Assembly Points**

- Two alternate locations for safe assembly points have been earmarked at all the operating plants. These locations are designated for assembling non-essential workers, visitors, and other persons who are not required in the plant site at the time of emergency but they are to be moved to safe places. These locations have been provided with sign boards displaying "Assembly Points" for easy identification.
- The persons required to be assembled at the assembly point should choose safer assembly point out of the two, considering the wind direction at that time. The plant control room will also announce the same on the plant PA system, if possible
- The person assembled at the assembly point shall follow the instruction for evacuation of the plant area and move to safe locations as directed. They should move in the cross wind direction or up-wind direction, whichever is safer.

### **12.2.10 Role and Responsibilities**

#### **Site Main Controller**

The Site Main Controller will be the chief coordinator and shall be assisted by other coordinators (senior most functionaries in the respective disciplines). He will take overall command of the emergency management and his duties and the responsibilities are as below:

He will:

- Report at the Emergency Control Centre as soon as he gets information about the emergency at site and will assume overall responsibility if taking decisions and directing actions as necessary for mitigating the situation and managing the emergency effectively with due consideration and priorities for personnel safety, safety to the company's property and the environment
- Assess the magnitude of the situation in co-ordination with the Incident Controller / Dy. Incident Controller and decide whether major emergency exists or is likely to develop, requiring external assistance. Accordingly, he will decide to inform Local/District emergency Chief and other emergency control groups for help and the nature of help required including assistance from mutual aid members and declare on-site emergency

- Decide the safe route of entry for external assistance/help to reach at site of the incident considering wind direction and the place of the incident and also the place of reporting such assistance. He will also direct the security to guide them properly
- Ensure that the Key Personnel and Co-coordinators are called in
- Ensure that all non-essential workers, visitors, contractors are safely moved to assembly points and direct for search and rescue operation within the affected areas, if necessary
- Be in constant communication with the Site Incident Controller to continuously review and assess the situation and possible developments
- Direct actions for safe shut down of plant(s) or section of the plant and evacuation of plant personnel and other necessary action is in consultation with the other coordinators
- Exercise direct operational control over areas in the complex other than those affected in consultation with other coordinators
- To liaise with the local meteorological office to receive early notification of changes in wind direction and weather conditions
- Liaise with the senior officials of Police, Fire Brigade, Medical and Factories Inspectorate and pass on information on possible effects to the surrounding areas outside the factory premises and necessity of evacuating the area and moving the people to safe places.
- Liaise with various coordinators to ensure that various team are functioning well, casualties are receiving attention and traffic movement within the works is well regulated.
- Arrange for a log of the emergency to be maintained in the Primary Command Post
- Release authorized information to press through the media coordinator
- Control rehabilitation of the affected persons and the affected areas after cessation of the emergency

### **Site Incident Controller**

The Site Incident Controller is the Key Personnel for operations function reporting at the incident site and will take the overall command of actions for emergency control operation on his arrival at the incident site. He will be supported by other key personnel representing various emergency services and initiate emergency control actions under the direction of the

Site Main Controller (Primary Command Post). The duties and the responsibilities of the Site Incident Controller include the following:

He will:

- Report at the incident site immediately after getting information about an emergency. Upon his arrival at the site, he will assess the scale of emergency in consultation with the Deputy Incident Controller and evaluate, if a major emergency exists or is likely to develop and inform Emergency Control Centre (primary Command Post) accordingly asking for assistance and indicating kind of support needed
- Take overall control of handling the emergency at site and take action for isolation of source of containment loss to the extent feasible. Simultaneously, in case of fire organize appropriate fire response in coordination with Key personnel (Fire & Safety) to get the situation under control and to prevent its escalation
- Set up communication point (Field Command Post) and establish contact with Site Main Controller (Primary Command Post) and keep him informed about the development
- Keep on assessing the emergency situation at the site and communicate to the Site Main Controller (Primary Command Post) and keep him informed about the development
- Co-ordinate the activities of other key personnel reporting at the Field Command Post, under his overall command
- Direct all operation with the affected areas giving due priorities for safety of personnel and to minimize damage to environment, plant and property
- Provide advice and information to Firefighting and rescue personnel, external fire services and other emergency services/teams as and when they arrive at the incident site and co-ordinate with them for effective control actions.
- Ensure that all non-essential workers and staff within the affected area are evacuated to appropriate assembly points and that areas are searched for casualties
- Organize rescue teams for search of casualties in the affected areas (if any) and send them to safe areas / medical center for first aid and medical relief
- Seek additional support and resources as may be needed through Primary Command Post.

- Send decision support from the Primary Command Post for decision such as precautionary shut down of neighboring facilities, precautionary evacuation of people in the neighboring facilities, activating mutual aid plan, etc.
- Be in constant liaison with the Site Main Controller and keep him informed about the situation at the incident site
- Preserve all evidences so as to facilitate any inquiry into the cause and circumstances, which caused or escalated the emergency (to arrange photographs, video, etc.)
- Arrange for head count after the emergency is over with respect to the personnel on duty in the affected areas

### **Deputy Incident Controller**

Normally, the Shift-in-charge of a plant being always available at the plant site and well aware of the plant operating conditions at all times will be designated as the Deputy Incident Controller and assume the charge of the Site Incident Controller at the time of an emergency till the Site Incident Controller arrives at the incident site, he will assist the Site Incident Controller on his arrival and work under his direction in emergency control operation.

The responsibilities and duties of the Deputy Incident Controller will be as defined for the Site Incident Controller. In addition he will ensure the following:

He will:

- In the event of an emergency, caused due to any incident in the plant, he will immediately actuate plant level emergency siren (hooter) to warn the field personnel, contractors' employees, etc. and also arrange for announcement about the emergency and necessary instruction for them for assembling at the safe assembly point or evacuation, etc.
- Ensure that the SSM and senior plant personnel have been informed about the emergency

### **Fire Services Personnel**

Main role of Fire Services personnel is firefighting and rescue operations, helping in operations like, prevention of loss of containment of hydrocarbon, spill/leak containment, etc. Their main responsibilities and duties are described specifically as below:

Chief of Fire (or next senior most fire personnel available)

- He will be the Key Personnel for the Fire and Safety Services at the incident scene and coordinating and commanding all the related operations in consultation with the Site Incident Controller
- He will report at the Field command Post (Incident Site) immediately after receiving the information about an emergency at site, contact the Site Incident Controller and the first turn out leader for necessary information/advice to decide control strategies
- He will take overall command of firefighting/rescue operations and other measures as necessary to control and mitigate the situation and lead the firefighting crew including outside / mutual aid firefighting teams.
- He will assess the severity/magnitude of the situation and decide the level of the emergency in consultation with the Site Incident Controller and inform the Site Main Controller (Primary Command Post) at ECC. He will also advise him for declaring on-site emergency (if necessary)
- He will call for additional resources/help from other Depts. (AFS personnel), mutual aid members, etc. through Primary Command Post as necessary and deploy them appropriately for firefighting and rescue operation at the incident scene. He will also co-ordinate with other key personnel
- He will ensure that sufficient personnel protective equipment, masks, Breathing Air sets, Spare Breathing Air, Cylinders etc. are available at the field Command Post for use by the crew members and ensure that no one access the "Hot Zone" without adequate personnel protection. He will call for logistic support (mobilizing additional supplies through Primary Command Post (Site Main Controller/HSE&F Coordinator)
- He will keep constant contact with Primary Command Post and seek decision support from the Site Main Controller in critical matters/operations and also inform him, if other plants in the complex or surrounding population are likely to be affected
- He will co-ordinate with Security Key Personnel for access control and barricading the affected area in order to prevent vehicular movement
- He will assist in rescue and first aid operations

**Shift Fire Officer (Riding Officers)**

- Upon receiving emergency call/alarm, he will quickly prepare for the fire turn out and mount the leading fire tender along with the crew members and rush to the incident site taking a safe route of entry considering the wind direction.

- Report to the Dy. Incident Controller/the Incident Controller and Position the Fire Tender strategically at a location in consultation with the Dy. Incident Controller/the Incident Controller
- He will decide the line of action for firefighting and/or other control actions at the scene in consultation with the Dy. Incident Controller/Incident Controller and take appropriate actions for firefighting and control Measures
- He will guide and lead the firefighting crew in firefighting and rescue operation till the arrival of F&S Key person (the Chief of Fire or next senior most person)
- He will ensure the safety of the crew members and that crew members are fully equipped with necessary personnel protection prior to enter "Hot Zone"
- He will assess the severity of the situation and may call for second turnout/additional help through the Dy. Incident Controller/Incident Controller (Field Command Post)
- He will keep constant contact with the key personnel (F&S) at the Field
- Command Post and inform about the situation and probable developments

### **Firemen on Duty at the Fire Control Room**

The fireman on duty at the Fire Control Room will acknowledge the emergency alarm received on the panel and promptly note the plant area/where the incident occurred

- He will note down the information, if emergency call is received through telephone, hot line or messenger
- He will sound the fire bell to inform the fire crew to get ready and take their positions, simultaneously brief the Shift Fire Officer about the emergency message
- He will intimate the Site Shift Manager and the Security Dept. about the emergency giving short description about the occurrence (if known)
- He will actuate emergency siren after receiving instruction from Primary Command Post (Site Main Controller/HSE&F Coordinator)
- He will ask telephone operator to pass on to the communication about the emergency to the Auxiliary Fire Squad of all the plants/selected plants on receiving the instruction from HSE&F Coordinator/Site Main Controller
- He will always be ready and alert for receiving any message / instructions from Primary Command Post/Field Command Post

### **Auxiliary Fire Squad Members**

AFS Members shall be ready on hearing emergency siren and will report to site incident controller at site (Field Command Post) on receiving message from ECC

- They will do the firefighting under the instruction of Shift Officer. Help to bring firefighting equipment from nearby plants
- AFS Members of the plant under emergency will immediately go to the emergency site and will start first aid firefighting.
- As per the emergency situation they will use the fixed firefighting equipment to protect plant equipment from heat exposure.
- They will guide non-essential personnel in case of evacuation
- They will do monitoring/closing of storm water drains if required
- They will help key personnel for taking action on site. Help to Security Personnel for traffic Control

### **Non-essential Personnel**

The plant employees, contractors' employees, visitors, etc., (other than emergency response personnel) present at the incident site are not required to be present at the incident site during the emergency at the site. In the event of declaration of an emergency in the plant/area, these persons shall quickly assemble at the safe assembly point of the plant/area and shall respond as instructed by the Site Incident Controller.

#### **Instruction to the Non-essential Personnel**

- Do not panic. Ensure that persons in your immediate vicinity are warned
- Remain alert for announcement from the Control Room, such "Proceed to Safe Assembly Point" and act accordingly
- Do not rush to the scene to be a spectator
- Await instructions at the Assembly Point, report your presence to the superiors/ or the Site Incident controller, inform his whereabouts of your colleagues if they have not arrived
- Do not engage telephone/talk back system and other communication channels, unnecessarily
- Do not approach Control Centers without urgent/or important reasons
- If you are not assigned any specific role, move away as directed
- Do not offer non-authentic information/unconfirmed facts/fact/or conjecture

### **Telephone Operator**

At the time of emergency, communications both inwards as well as outward are very essential and telephone operator's swift action becomes very important. He plays very important part in communicating information/messages to the concerned personnel/outside agencies/mutual aid members/staff members etc. and also receiving a large numbers of outside calls. His main responsibilities and duties are as below:

- He will keep the board free to the extent possible for incoming calls
- He will immediately convey message to the "Key Personnel" and the "Coordinator" about the emergency as per the instruction of the Site main controller.
- The telephone operator will follow instructions from the Site Main Controller/or Media Coordinator only, for passing on any information to outside agency about the emergency or direct all such queries to the media Coordinator for appropriate reply.
- As far as possible he should not entertain unknown/unimportant outside calls/inquiries during initial few hours of the emergency

### **HSE & F Coordinator**

- He will report at the Emergency Control Centre (Primary Command Post) immediately after receiving information about the emergency. He will assist the Site Main Controller for taking critical decisions and provide necessary advice and information
- He will co-ordinate with Key Person (Fire & Safety) and will assist the Site Main Controller for providing decision support and resources support to the Key Persons (F&S), as may be necessary
- He will arrange for mobilizing off-duty fire personnel from their residence; and call other members of the staff for assistance
- He will ensure that the AFS members have been called for assistance and liaise with mutual aid members / Fire Brigade for mobilization of additional resources
- He will co-ordinate with the materials/stores Coordinator and mobilize additional resources, viz., spillage containment equipment/firefighting equipment/material, personal protective equipment, spare breathing air cylinders, etc., as may be required at the incident site for control measures
- He will liaise with Factory Inspectorate / Pollution Control authorities in consultation with the Site Main Controller and provide necessary information. He will also ask for the help, if necessary to evacuate neighboring area outside the complex as advised by the Site Main Controller

- He will organize relieving groups for fire fighting
- He will also initiate necessary actions to minimize impact on Environment

#### **Medical Coordinator**

The Chief Medical Officer (or the next in command available at site) will be the Medical Coordinator and perform the following duties:

- He will contact the Site Main Controller immediately after receiving the information about the emergency
- He will report immediately at the Emergency Control Centre (Primary Command Post) or OHC as instructed by the Site Main Controller and contact the Key personnel (Medical) and take stock of the situation
- He will assist and advise the Site Main Controller in all critical decisions in the area of health/medical services to the affected persons and keep constant liaisons with him
- Organize rescue and first aid arrangements for the affected persons at the site in the "cold Zone", as may be necessary with essential staff/equipment and post additional ambulance for transporting seriously injured persons
- Ensure that adequate paramedical staff, equipment and medicines are available at the OHC. He will mobilize additional resources from neighboring industries, if necessary
- To liaise with the Local Medical Authorities and City Hospitals, if the causalities are more and situation demands treatment at additional medical centers
- To co-ordinate with the Transport Coordinator for transporting victims to various hospitals
- To arrange for additional ambulances from other hospitals/ Municipal Corporation
- The Medical Coordinator should ensure the upkeep of agreed medical supplies, antidotes and equipment that should always be kept in stock for treating victims of burns and hazardous chemicals. The medical authorities should be aware of the type of treatment to be administered.
- He will liaise with the media Coordinator for release of news to the press

#### **Security Co-coordinator**

The Chief of Security or the next in command available at site shall be the Security Co-coordinator. He will have the following duties / responsibilities:

- He will instruct and deploy plant security personnel to ensure that the law and order is maintained; and unnecessary gathering of the personnel at the scene of emergency is prevented and ensure control of traffic movement in and out of the factory areas
- He will instruct the security personnel / Security Gates to direct and guide external emergency vehicles (Fire tenders/ambulances etc.) called for assistance/help from neighboring industries/Local administration, to the scene of incident
- He will instruct security personnel who could be spared to assist Site Incident Controller/Key Personnel (fire and Safety) in firefighting and evacuation of personnel, at the Incident Site
- He will take action to regulate traffic movement and prevention of traffic jams inside the works as well as outside the factory gates for proper and speedy movement of the emergency vehicles, ambulances, other vehicles carrying outside resources, etc.
- He will mobilize additional security force for help, as necessary
- He will liaise with the police and other local authorities for external help, a necessary for evacuation of the neighboring areas outside the factory premises in consultation with the Site Main Controller
- If necessary, he will arrange for announcement through the mobile P.A. system for alerting and instructing the population in the surrounding areas as directed by the Site Main Controller

**Engineering Co-coordinator**

- He will report to the Site Main Controller at the Emergency Control Centre
- (Primary Command Post) immediately after receiving information about Onsite emergency.
- He will take stock of the situation and assist/advise the Site Main Controller in deciding control strategies.
- He will mobilize the team from the Maintenance Dept. to assist the Site Incident Controller in control operation at the Field Command Post.
- Arrange isolation of electrical lines from distribution point/substations as required by the Site Incident Controller by calling the Electrical Engineer / Electricians.
- Provide all other engineering support, as may be required.
- Liaise with Key Personnel (Eng. /Maintenance) and co-ordinate with other groups.

**Communication Coordinator**

Communication Coordinator plays very important part at the time of an emergency particularly when extensive disruption of services takes place. He has the following duties and responsibilities:

- To ensure all available communications links remain functional.
- To quickly establish communication links between the Field Command Post and (if this happens to be in remote off site area) and the Primary Command Post.
- To arrange for announcement on the public address system and maintain contacts with congregation points like canteen, main gate, control rooms etc.
- To ensure that previously agreed inventory of various types of communication equipment is maintained in working condition and frequent checks are carried out and records maintained.
- To maintain voice record of significant communications with timings received/passed from the Primary Command Post.
- To provide additional/alternate communication facilities as required at the site.

### **P&A Coordinator**

He will report at the Primary Command Post (ECC) immediately after getting information about an emergency at the site and assist/advise the Site Main Controller in taking important decisions in the matters related to welfare/necessities/of emergency personnel at site, care/needs of the affected persons. His duties and responsibilities include the following:

- He will ensure that a record of affected personnel is prepared with their local/permanent addresses and telephone numbers
- He will ensure that the relatives of the affected personnel have been informed
- Assign officials at the hospitals to look after the needs of the affected personnel under medical treatment
- Co-ordinate with the Finance Coordinator for necessary funds required to cater the needs of affected personnel, emergency purchases and for other requirements
- To arrange for refreshments, snacks, food, and other needs as may be required for the emergency personnel from time to time
- Co-ordinate with the Purchase Coordinator for necessary emergency procurement of necessary items
- Ensure that staff personnel as necessary for assistance and help are informed/called from their residences

- He will co-ordinate with the instruct Key Personnel transport/welfare & canteen for mobilizing additional resources, as may be required
- To co-ordinate with the neighboring industries for additional vehicles/ambulances and other resources as may be required
- To liaise with the Local Administration for additional assistance/help as may be needed

### **Transport Coordinator**

The Transport Coordinator shall perform the following duties, mobilize all available company's vehicles for emergency use along with the drivers:

- Arrange for transport of victims to hospitals/dispensaries
- Arrange for duty rotation of the drivers to meet the emergency situation
- To direct re-fueling of the vehicles
- To co-ordinate with the neighboring industries for additional vehicles / ambulances as may be required
- To co-ordinate with the neighboring industries for additional vehicles / ambulances as may be required
- To arrange for vehicles from outside local transport agencies, if required
- To keep in contact with the Site Main Controller for evacuation of personnel and transportation of victims

### **The Welfare / Canteen Coordinator**

The Welfare Coordinator will have the following responsibilities:

- Ensure that casualties receive adequate attention and arrange additional help (ex-gratia payment etc.), if required with consultation with the Chief Coordinator
- Inform the relatives of the victims
- When emergency is prolonged, he will arrange for relieving personnel and organize refreshment / catering facilities and arrangements for their rest (bedding, and other necessities)
- He will arrange to procure and keep stocks of necessary food items and other necessary supplies as may be required for the personnel working round-the-clock
- He will arrange for hot drinks /snacks and food and other necessary items for emergency response personnel, as required

### **Media Coordinator**

The Media Coordinator will co-ordinate the following under the direction of the Site Main Controller (The Chief Coordinator):

- He will liaise with various media and release written statements to the press through prior concurrence of the Chief Co-ordinate
- He will handle media interview with various media groups make arrangements for televising the information about the incident, the number of casualties, etc.
- He will inform State and Central Government and the statutory bodies of the nature and magnitude of the incident, the number of casualties, etc.
- He will locate himself such that media persons/third parties do not need to go past the complex security gates and that adequate communication links exists.
- Media personnel often insist on visiting incident scene. He will escort media team(s) If such visits are approved by the Chief Coordinator
- He will be in constant contact with the Medical Coordinator, and other coordinators to be aware of latest development and closely liaise with the Chief Coordinator

### **Finance Coordinator**

- He will report at the Emergency Control Centre immediately after getting information about the emergency at site
- He will release finance (cash / checks, etc.) as directed by the Site Main Controller (Chief Coordinator)
- He will assist the Purchase Coordinator for emergency procurement.
- He will liaise with Insurance Company personnel as directed by the Site Main Controller.
- Purchase Coordinator
- The Purchase Coordinator will report at the Emergency Control Centre as soon as he is informed about an emergency at site
- He will assist the Site Main Controller and arrange for emergency purchase of necessary items as may be required during the emergency.
- He will co-ordinate with the Materials Coordinator and other coordinator for necessary emergency items to be procured
- He will mobilize necessary manpower as may be required, etc.

### **Materials Coordinator**

The Materials Coordinator will ensure:

- Availability of the materials required by the Site Incident Controller
- Arrange issues of materials from the General Stores round-the-clock during an emergency
- Arrange emergency procurements from local dealers / vendors or from neighboring industries
- Arrange transportation of materials from General Store to the Incident Site in co-ordination with the Transport Coordinator

### **12.2.11 Off-site Disaster Management Plan**

Emergency is a sudden unexpected event, which can cause serious damage to personnel life, property and environment outside the boundary wall of the refinery as a whole, which necessitate evolving Off-site Emergency Plan to combat any such eventuality. In Offsite disaster management plan, many agencies like Revenue, Public Health, Fire Services, Police, Civil Defence, Home Guards, Medical Services and other Voluntary organization are involved. Thus, handling of such emergencies requires an organized multidisciplinary approach.

Evacuation of people, if required, can be done in orderly way. The different agencies involved in evacuation of people are Civil Administration (both state and central), non Govt. organizations, factory Inspectorate and Police authorities.

#### **Fire**

Effects of fire on population will be mainly due to thermal radiation. In such cases, houses situated to the proximity of disaster need to be evacuated, although a severe smoke hazard due to fire is to be reviewed periodically.

#### **Explosion**

An explosion will give a very little time to warn population and areas affected may be much longer than that in case of fire. The effects of explosion on population will be mainly due to shock waves, flying splinters, collapse of structures and exposure to thermal radiation.

#### **Toxic gas/vapor release**

A toxic gas release will generally threat much larger area and population, exposed to the drifting cloud of toxic gases and vapor's. The time available for warning population will depend on the point of release, wind direction and velocity.

Huge oil spillage may lead to escape of Oil out-side the factory premises and take the route of our effluent discharge channel. People outside the complex may be warned not to collect oil and provide any source of ignition to create fire in the effluent discharge channel.

The purpose of the off-site disaster management plan is:

- To save lives and injuries and to prevent or reduce property losses
- To provide for quick resumption of normal situation or operation
- To make explicit the inter related be suggested if necessary
- To make explicit inter related set of actions to be undertaken in the event of an industrial accident posing hazards to the community
- To inform people and surrounding about emergency and disaster if it is likely to adversely affect machinery will be established for this purpose to guide the people in proper way
- To plan for rescue and recuperation of casualties and injuries. To plan for relief and rehabilitation
- To plan for prevention of harms, total loss and recurrence of disaster. It will be ensured that absolute safety and security is achieved within the shortest time

### **Before Crisis**

This will include the safety procedure to be followed during an emergency through posters, talks and mass media in different languages including local language. Leaflets containing dos/don'ts before and during emergency should be circulated to educate the people in vicinity.

- People in vicinity of hazardous installation, and others who are potentially affected in the event of an accident, should be aware of the risks of accidents, know where to obtain information concerning the installation, and understand what to do in the event of an accident
- Non-governmental Organizations (NGO's) (Such as environmental, humanitarian and consumer group) should motivate their constituents and others, to be involved in risk reduction and accident prevention efforts.
- They should help to identify specific concerns and priorities regarding risk reduction and prevention, preparedness and response activities.
- NGO's should facilitate efforts to inform the public and should provide technical assistance to help the public analyze and understand information that is made available
- Public authorities (at all levels) and management of hazardous installation should establish emergency planning activities/program's for accidents involving the hazardous substance.

- All parties who will be involved in emergency planning process. In this respect public health authorities, including experts from information centers should be involved in relevant aspects of offsite emergency planning
- Emergency warning alert system should be in place to warn the potentially affected public, or there is an imminent threat of an accident.
- The system chosen should be effective and provide timely warning. Suitable warning system could include or a combination of for e.g.: sirens, automatic telephone message, and mobile public address system.

### **During Crisis**

**Central Control Committee:** As the off-site plan is to be prepared by the government a central control committee shall be formed under the chairmanship of area head. Other officers from police, fire, factory, medical, engineering, social welfare, publicity, railway, transport and requisite departments shall be incorporated as members. Some experts will also be included for guidance. The functions of committee should be:

- To work as main co-coordinating body constituted of necessary district heads and other authorities with overall command, coordination, guidance, supervision, policy and doing all necessary things to control disaster in shortest times
- To prepare, review, alter or cancel this plan and to keep it a complete document with all details
- To take advice and assistance from experts in fields to make plan more successful
- To set in motion all machineries to this plan in event of disaster causing or likely to cause severe damage to public, property or environment
- The incident control committee, traffic control committee and press publicity committee will first be informed, as they are needed first.
- **Medical Help, Ambulance and Hospital Committee:** This committee consisted of doctors for medical help to the injured persons because of disaster. Injuries may be of many types. As such doctors are rarely available we have to mobilize and utilize all available doctors in the area.
  - Functions and duties of the committee include:
  - To give medical help to all injured as early as possible
  - Civil surgeon is the secretary who will organize his team

- On receiving information to rush to spot he will immediately inform his team and will proceed with all necessary equipment's.
- First aid and possible treatment shall be provided at the spot or at some convenient place and patients may be requested to shift to hospitals for further treatment.
- All efforts shall be made on war basis to save maximum lives and to treat maximum injuries.
- Continuity of the treatment shall be maintained till the disaster is controlled.
  - Traffic Control, Law and Order: The committee is headed by District Superintendent of Police. Functions and duties of this committee should be:
    - To control traffic towards and near disaster, to maintain law and order
    - To evacuate the places badly affected or likely to be affected
    - To shift the evacuated people to safe assembly points
    - To rehabilitate them after disaster is over.
    - Necessary vehicles, wireless sets and instruments for quick communications shall be maintained and used as per need

### **After Crisis**

At the time of disaster, many people may badly be affected. Injured people shall be treated by medical help, ambulance and hospital committee, but those not injured but displaced kept at assembly points, whose relative or property is lost, houses collapsed and in need of any kind of help shall be treated by this welfare and restoration committee. Functions and duties of this committee are:

- To find out persons in need of human help owing to disastrous effect.
- They may give first aid if medical team is not available
- They will serve the evacuated people kept at assembly points. They will arrange for their food, water, shelter, clothing, sanitation, and guidelines to reach any needful places
- They will look for removal and disposal of dead bodies, for help of sick, weak, children and needy persons for their essential requirements - The team will also work for restoration of detached people, lost articles, essential commodities etc.
- The team will also look after the restoration of government articles
- The team will also ensure that the original activities, services and systems are resumed again as they were functioning before the disaster

### **Police Department**

- The police should assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.
- Co-ordination with the transport authorities, civil defense and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication center
- Fire Brigade
- The fire brigade shall organize to put out fires and provide assistance as required.

### **Hospitals and Doctors**

- Hospitals and doctors must be ready to treat any injuries.
- Co-ordinate the activities of Primary Health Centers and Municipal Dispensaries to ensure required quantities of drugs and equipment's
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies
- Media
  - The media should have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to help avoid confusion
  - Efforts should be made to check the clarity and reliability of information as it becomes available, and before it is communicated to public.
  - Public health authorities should be consulted when issuing statements to the media concerning health aspects of chemical accidents.
  - Members of the media should facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances.

### **Non-governmental organizations (NGOs)**

- NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process. Such tasks could include providing humanitarian, psychological & social assistance to members of community and response personnel.

Duties of NGOs are listed below:

- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons
- Co-ordination with other agencies such as police, medical, animal husbandry, agriculture, electricity board, fire services, home guards and civil defense.
- Establishing shelters for rescue, medical, firefighting personnel.
- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons
- Co-ordination with other agencies such as police, medical, animal husbandry, agriculture, electricity board, fire services, home guards and civil defense.
- Establishing shelters for rescue, medical, firefighting personnel.

### **12.2.12 Mock Drills**

As per the Industrial Major Accident Hazard Rules,

- (a) The occupier shall ensure that a mock drill of the on-site emergency plan is conducted every six months.
- (b) A detail report of the mock drill conducted shall be made immediately available to the concerned authority.

Accordingly, Onsite Disaster Mock Drills are conducted once in six months.

Also, Major Fire and Minor Fire mock drills are conducted once in three months and one month respectively.

#### **Lessons Learned System for Mock Drills**

Performances during the mock drills are reviewed by CEC Coordinators and other involved persons including observers. Observations/shortcomings are reviewed and recommendations are made for improvements which are followed by F&S for compliance. The action points from the mock drill observations should be circulated to all concerned for liquidation.

#### **All Clear / Re-entry Procedures**

Chief Emergency Controller (CEC) will declare “All Clear” after control of the Incident and arrange measures required for post Disaster control period and ask Fire Station to Blow 2 minutes straight run siren.

After incident normalization, CEC would ask Unit in-charge to visit and check the incident site along with representatives of Inspection and F&S and also Maintenance (Electrical / Mechanical / Civil/ Instrumentation/ Rotary) as needed. Standard Checks particular to a unit will be provided by respective Area Managers. Based on feedback of the team, CEC would allow re-entry / resumption of operations at the incident site.

## **Evacuation Plan**

### **Purpose**

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape. Additionally to use available fire appliances provided for controlling or extinguishing fire and safeguarding of human life.

### **Fire Escape Drill Procedure**

- In the event of fire condition or on hearing the fire alarm all the occupants of the building shall immediately leave the work area and proceed towards nearest safe escape route. A care should be taken before leaving the workplace so that the escape route shall not be blocked due to chairs or other similar object.
- Security In-charge will ensure the access control system is defeated for safe evacuation of all the occupants from the affected building.
- The occupants will have to leave the affected area / block / building in a speedy and orderly manner.
- Before leaving the workplace occupants will switch off electrical gadgets such as AC, Computers, Water heaters, etc. The area owner of the building will ensure electric supply cut off to the affected building.
- The emergency exit / normal exit if not affected due to fire and / or smoke shall be used for speedy evacuation.
- All occupants will follow in a row while escaping from the block / building. Unnecessary haste and crowding shall be avoided on the escape route. Panic actions of the occupants will definitely delay the evacuation.
- The occupants having visitors shall ensure the safe evacuation of the visitor along with them to the safe assembly point.
- Efforts shall be made to control or extinguish the fire with the help of available fire extinguishers in that area.

- Building / block in-charge shall ensure the safe escape and orderly evacuation of all the occupants.
- All occupants after being evacuated shall assemble at designate safe assembly point. Block/building in-charge will arrange for head count to ensure that all the occupants have been safely evacuated.
- Security in-charge shall ensure that all the visitors have been evacuated as per visitor entry register/gate pass register. The visitors shall evacuate from the building / block along with the occupants and report to security in charge.
- The missing/suspected trapped occupants will be searched and rescued by the fire crew.
- Upon All-Clear signal from the incident controller, occupants can go back to their work place.

**Do's**

- Leave your workplace immediately and rush through safe escape route.
- Evacuate in a speedy but orderly manner.
- Help elderly and handicapped persons for evacuation.
- Assemble at safe assembly point and report to your floor coordinator.
- Don'ts
- Panic.
- Re-enter in the affected building.

**Training**

On job training to the engineers on various facets of risk analysis would go a long way in improving their horizon which in turn is expected to reflect in the operation of plant, especially from the safety stand point. In order to combat with emergency situations arising out of accident release of hazardous chemicals, it is necessary for industries to prepare an exhaustive offsite and onsite emergency preparedness plan. The fire crew belonging to the firefighting department shall be given intensive training for the use of all equipment and in various firefighting methods for handling different types of fires.

**12.2.13 Checklist for Capability Assessment**

The checklist will help in assessing the preparedness, prevention and response resources capabilities. The points included in the checklist are only indicative and there is a need to closely examine the local requirements while preparing the checklist.

For good control and management of an incident, there are three important requisites.

- Defined Organization
- Effective means
- Trained people

The organization has to be properly structured for routine as well as emergency purposes with clear understanding of duties and responsibilities. The structure has to consider an execution and speedy implementation of the response plans; while at the same time, it should be flexible enough to tune itself to the fast changing situations. All plans and procedures for emergency handling should be established. Checklists in the form of Do's and Don'ts of preventive maintenance, strengthening of HSE, manufacturing utility staff are listed in the subsequent subsections. Work permit check list is described below:

Table 12-1: Work permit check list is described below:

Sl. No.	Precaution to be taken	Yes	No
1	Electrically isolated and fuse removed. Lock out-Tag out (LOTO) followed		
2	Flow isolated by closing valves		
3	De-pressurized – vacuum released		
4	Vessel cooled		
5	Drained fully and drain kept open		
6	Vent kept open		
7	Manhole kept open		
8	Vessel purged with steam		
9	Vessel purged with water		
10	Vessel purged with nitrogen/ air		
11	Vessel free from toxic gases/vapor's/ flammable substances		
12	Gas test shows > 20% oxygen inside vessel		
13	Safety tags card placed wherever required		
14	Personal PPE's provided		
15	Exhaust / ventilation inside vessel is sufficient		
16	Caution boards placed		
17	Tools and tackles checked as per specifications		
18	Head count of the area known to relevant persons		

19	Trained Site supervisor nominated		
20	Safety measures such as hydrant, alarms, sensors checked		

## **13 Conclusion & Recommendation**

### **13.1 Conclusion**

This ESIA, including the ESMP, should be used as a basis for an environmental compliance program and be included as an Appendix to the contract. The ESIA shall be reviewed at the detailed design stage. Therefore, continued monitoring of the implementation of mitigation measures, the implementation of the environmental conditions for work and environmental clearance, and monitoring of the environmental impact related to the project should be properly carried out.

All potential impacts were identified in relation to preconstruction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible; thus, environmental impacts as being due to the project design or location were not significant. However, the social impacts (access disruptions) due to construction activities are unavoidable, as the commercial establishments exist along the project corridor.

Pollution of water from domestic activities and noise pollution was predicted as major impacts. The STP facilities are sufficient to reduce environmental impact. In addition, by implementing all necessary protection and regulatory measures as suggested here in ESIA, the proposed plant is expected to meet the National Environmental Quality Standards.

There, however, would be a number of positive impacts of the project through employment generation, support to local industries, contribution to GDP, benefit to local economy and social upliftment.

The proposed plant will be constructed within an Economic Zone area. So there is no need for land acquisition. Additionally, there is no settlement in this area, and the area is not used for any income generation activities.

Therefore, no population will be displaced and no resettlement will be required; and no loss of income is associated with the proposed project.

During public consultations people welcomed the proposed plant project at North Rupshi. However, they recommended installing a plant of good quality, which will be able to keep anticipated water, air and noise pollution to a minimum level.

Finally, it can be concluded that the location of **City Edible Oil Captive Power Plant Ltd.** is environmentally acceptable and it is expected that **City Edible Oil Captive Power Plant Ltd.**

will follow all environmental compatible steps during construction, operation and maintenance by which it sets a positive example as an environment friendly area.

### **13.2 Recommendations**

The following recommendations have been made for efficient and effective implementation of environmental conservation, health & safety, social responsibilities measure through the lifespan of the proposed resort.

- Abide environmental policy, laws, rules and instructions of the Department of Environment.
- Once ESIA is approved by concerned authorities, strict implementation is essential
- For full and proper implementation of EMP, well understanding and support by resort owner and its administrative authority is deeming necessity
- Fully implement Corporate Social Responsibility (CSR) Plan as an ethical business obligation, so as to be regarded as good neighbor/investor in the neighborhood
- Well experienced and knowledgeable HSE Coordinator and HSE assistants shall be selected and appointed