GOVERNMENT OF THE PEOPLES' REPUBLIC OF BANGLADESH

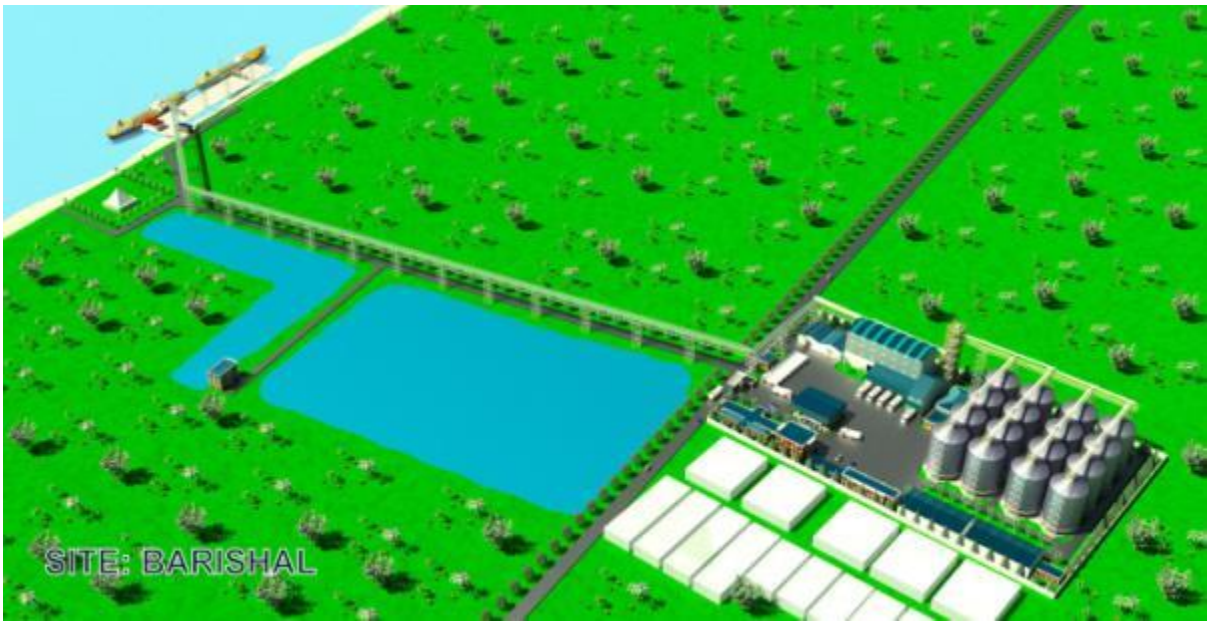
MINISTRY OF FOOD

DIRECTORATE GENERAL OF FOOD

MODERN FOOD STORAGE FACILITIES PROJECT (MFSP)

IDA Credit # 5265-BD

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE CONSTRUCTION OF GALVANIZED CORRUGATED FLAT BOTTOM STEEL SILO WITH RCC FOUNDATION AND IT'S ANCILLARY WORKS AT BARISHAL SILO SITE



PROJECT DIRECTOR

MODERN FOOD STORAGE FACILITIES PROJECT

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ACRONYMS & ABBREVIATIONS

ADB	Asian Development Bank
AEZ	Agro-Ecological Zones
ARIPO	African Regional Intellectual Property Organization
AP	Affected Person
AD	Alluvion Dilluvion
BP	Bank Procedure
BECA	Bangladesh Environmental Conservation Act
BBS	Bangladesh Bureau of Statistics
BMD	Bangladesh Meteorological Department
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BoQ	Bill of Quantities
BNBC	Bangladesh National Building Code
BFIDC	Bangladesh Forest Industries Development Corporation
BADC	Bangladesh Agriculture Development Corporation
CHT	Chittagong Hill Tracts
CoP	Conference of the Parties
CIP	Country Investment Plan
CLAC	Central Land Allocation Committee
DPHE	Department of Public Health Engineering
DG	Directorate General
DoE	Department of Environment
DC	Deputy Commissioner
EIA	Environmental Impact Assessment
ECA	Environmental Conservation Act
ECR	Environmental Conservation Rules
EA	Environmental Assessment
ESIA	Environmental and Social Impact Assessment
ECC	Environmental Clearance Certificate
EMP	Environmental Management Plan
EHS	Environment, Health & Safety
EMF	Environmental Management Framework
ESMP	Environmental and Social Management Plan
ESMoP	Environmental and Social Monitoring Plan
GIIP	Good International Industry Practice
GoB	Government of Bangladesh
GIS	Geographic Information System
GW	Ground Water
HDC	Hill District Councils
HSE	Health, Safety and Environment
HQ	Headquarter
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
IDA	International Development Association
IUCN	International Union for Conservation of Nature
LSD	Least Significant Difference
MoEF	Ministry of Environment and Forest
MFSFP	Modern Food Storage Facilities Project
MDG	Millennium Development Goal
MoL	Ministry of Land

NFP	National Food Policy
NAPA	National Adaption Program of Action
NIOSH	National Institute of Occupational Safety and Health
NGO	Non-Governmental Organization
OP	Operational Plan
O&M	Operation and Maintenance
PPE	Personal Protective Equipment
PoA	Plan of Action
PRSP	Property Reduction Strategy Papers
PIA	Project Influenced Area
RAP	Resettlement Action Plan
SIA	Social Impact Assessment
SRDI	Soil Resources Development Institute
SOD	Standing Orders on Disaster
SMPRF	Social Management and Resettlement Policy Framework
SPM	Suspended Particular Matter
USEPA	United States Environmental Protection Agency
UNFCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
WHO	World Health Organization
WB	World Bank

EXECUTIVE SUMMARY

INTRODUCTION

Bangladesh is the most vulnerable country in the world to natural disasters that are likely to be exacerbated due to climate changes, and 60% of the world-wide deaths caused by natural disasters during the last 20 years were in Bangladesh. Climate change is anticipated to lead to more intense and frequent cyclones, floods, and droughts, as well as sea level rise and associated salinity intrusion in the coastal areas leading to growing pressure on ensuring adequate food security and nutrition. The Directorate General of Food (DG Food) estimates that, by 2020, grain storage requirements would be about 3 million tons for a population of about 170 million people. Based on current and project storage availability, this is expected to result in estimated shortages of grain storage space of about 1.7 million tons by the year 2020.

The modern food storage facilities proposed for construction under this project could considerably improve the efficacy of the government's emergency response and recovery efforts in disaster-prone areas and could enhance the efficiency of its Public Food Distribution System. To respond to the above challenges, GoB seeks to improve its capacity to respond to short and longer-term post-disaster food and nutrition security needs by enhancing its network of food grain storage facilities and building modern food storage facilities; at the same time, it aims to improve the efficacy and accountability of the public food grain system.

METHODOLOGY

The study is based on both primary and secondary data and information. The primary data includes data collected from field observations, survey and secondary data includes review of the Bangladesh statistical and relevant information from Government Departments. Discussions were held with stakeholders including community representatives and local people.

POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

Legislative bases for Environmental Impact Assessment (EIA) in Bangladesh are the Environmental Conservation Act 1995 (ECA'95) and the Environmental Conservation Rules 1997 (ECR'97). Department of Environment (DoE), under the Ministry of Environment and Forests (MoEF) is the regulatory body responsible for enforcing the ECA'95 and ECR'97. It is the responsibility of the proponent to conduct an Environmental and Social Impact Assessment (ESIA) of development proposal and the responsibility to review ESIAs for the purpose of issuing Environmental Clearance Certificate (ECC) rests on the DOEand fulfill the world bank social safe guard issues.The project authority already got the site clearance certificate (SCC) from the DoE.

DESCRIPTION OF THE PROPOSED PROJECT

The location of the Barishal CSD is well known as "Trish Godown" for having its 30 go-downs in it. It is about 2.00 km away from the City Center near the Barishal Medical College and near to the Armed Police Battalion Center. The CSD area having a total area of 10.55 hectares (26.08 acres) was acquired by the Government for use by the CSD in three installments in 1961, 1962 and 1963. Out of the total land, about 13 acres is surrounded by a protection wall and the remaining land of about 5.29 hectares (13.08 acre) consisting of the connecting road (0.11 hectares) between the surrounded place and the river Kirtonkhola and a shallow marshy land (in total 3.78 hectares/9.34 acre) and other marginal lands. The proposed silo site is located within the premises of the existing CSD. There is a road between the proposed silo site and adjacent existing CSD campus. There are boundary walls at three sites of the proposed site except north side which is adjacent to the CSD and road. A boundary wall at the north side of the proposed site needs to be constructed. Currently, the proposed site is vacant after dismantling of the 13 godowns and felling of some trees.

Total project activities were considered in two phases. In the first phase, preparation works like; the boundary wall, site development by earth filling, office building and dismantle of the dilapidated godown etc. has been completed. In the second phase; main construction works like 16 nos. flat bottoms prefabricated steel silo bins and silo related ancillary works will be performed and necessary equipment and machinery will be installed. Design and estimates of the silo bins and ancillary works have been completed. Draft Bidding Document (DBD) is sent to WB through STEP dated on December 11, 2018 for review. After no objection letter (NOL) from World Bank bid would be invited. This study only considered construction of main silo and ancillary activities.

Sixteen units of steel silos will be constructed under this project. Each silos capacity for storage is 3020 MT. There are lot of equipment will be used during silos operation like belt conveyor, bagging station, chain conveyor, chiller etc. The speed control time is 60 t/h. The total capacity of storage will be 48,320 MT.

DESCRIPTION OF THE BASELINE ENVIRONMENT

The project area is located in the South-eastern climatic zone. The region has a tropical climate with three main seasons–the hot and humid summer, the rainy season and the mild and relatively dry winter. The highest average recorded temperature in Barishal weather station was 33.66°C in April and in Patuakhali station the highest average temperature was 33.64°C which was in April too. The lowest average recorded temperature was found in the month of January for both the stations. For Barishal station it was 11.85°C and for Patuakhali it was 13.39°C. Statistical data of 1983 to 2013 shows that the maximum monthly rainfall during April to August varies from 406 mm to 778mm in the Barishal station. At Patuakhali station the precipitation is the lowest in December, with an average of 5 mm. and the maximum falls in June, averaging 420.5mm. The statistical data of humidity from 1983 to 2013 indicates that humidity in the above two stated areas maximized in May to October in the year which is ranges from 83% to 90.5%. On the other hand, humidity falls 75% in February, March and April during the winter season in the considered stations areas. During the month of October

to January the wind speed shows lower value. In this season it shows 0.26 to 0.51 ms^{-1} wind speed and in the month of April to July the wind speed shows 1.61 to 1.86 ms^{-1} in Barishal station. In Patuakhali the maximum wind speed shows up to 2.02 ms^{-1} speed and the lowest speed shows 0.73 ms^{-1}. It is seen that, the cloud coverage of both the stations increase from June to September. The value varies within 5.74 octas to 6.64 octas in Barishal station. The lowest value falls in December to February within the range of 1.05 octas to 1.53 octas in Barishal station. In Patuakhali station the highest wind speed is 6.37 octas and lowest wind speed is 1.07 octas. Noise level has been monitored at inside and outside of the project location during day time. Results of the noise level monitored were within the standard limit of Bangladesh.

The project area falls in the Ganges Tidal Floodplain physiographic unit. On 27th January 2017, groundwater and surface sample was collected by environmental team from a tube well depth about 190 ft and Kirtonkhola River near the project area. The Department of Public Health Engineering (DPHE) analyzed the sample. It is found from the GW quality test result that all the parameters were well within the Bangladesh ground water quality standard set by Department of Environment except BOD_5 and Iron. (The ground water quality result is attached in onsite Appendix D and DPHE laboratory Appendix F). It is also found from the SW quality test result that all parameters were well within the Bangladesh surface water quality standard set by Department of Environment except pH, turbidity, $BOD_5$and DO. (The surface water quality result is attached in onsite Appendix C and DPHE laboratory Appendix E).

The soil near the project area is Hill soils. As per the seismic zone map, project area falls in the zone III of low seismic intensity. According to the bioecological map zones the project area falls in Ganges Floodplain ecological zone. No endangered/ critically endangered or threatened terrestrial or aquatic species were found in the project area. No archaeological but some culturally protected areas were found that would have anticipated impact.

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts assessment was carried out considering present environmental setting of the project area, and nature and extent of the proposed activities. Potential environmental impacts associated with the proposed project activities are classified as: (i) impacts during pre-construction and construction phase and ii) impacts during operation phase.

Here the project has no land acquisition and involuntary resettlement impact. Most of the impact will occur duing construction activities of the silos. The area is, within the existing CSD boundary, free from environmental hotspot, and away from any environmentally sensitive area. The sub-project will not be harmful to the issues like; resettlement, vulnerable group or women. Some anticipated impacts will have to be considered, especially, during construction and operation periods and those are to be well managed, to minimize environmental and social impacts and hazards, as the means of mitigation measures to the probable impacts. For the sustainable development as well as to maintain environmentally friendly infrastructure, measures start from design phase. Barishal silo site, with 13.08 acres of land, is now well protected by boundary wall. Before starting the construction works, good planning is required

to place the laborers' shed, drinking water facility, sanitary latrines, equipment and materials yards, lubricant and fuel keeping facility, temporary drainage facilities, solid waste management facilities etc. The traffic and machineries' movement routes etc. are to be established in the construction site. Essential facilities like; labor-shed with proper living, lighting and cooking arrangement, waste water drainage arrangement from the kitchen area, waste bins and solid waste management facilities, and adequate drinking water supply, sanitary latrine facilities, personal protection equipment and first aid box etc. are to be provided before starting the construction works. The construction materials' yard and place for keeping the prefabricated steel sheets will be fixed in ahead of starting the silo bins' super-structure setting. There is no stone/ brick crushing will be allowed within the silo site. Only pre-fabricated steel sheet will be carried to the construction site and separate areas/ yards will have to be maintained for that. For carrying the construction materials, care should be taken on traffic management. Safety measures will be taken for the local pedestrians, school children, local traffic along with the other traffic movement for existing CSD godowns. In addition to road, the waterway may also be used to carry construction materials.

ALTERNATIVE ARRANGEMENT FOR SETTING SILO BINS AND ANCILLARY FACILITIES

For the environmental and social safeguard compliances, the construction and installation of water supply and sanitation facilities, along with the labor-camp placement, will have to be done very carefully. The areas near the office building along the boundary wall side will be suitable for setting the workers' facilities like labor-shed, toilet and solid waste management. Cleaning of labor-camp site, etc. will have to be accommodated very cautiously, because of the existing CSD facilities, no disturbance will be allowed to the existing CSD godowns and related facilities. Also, the toilet facilities may be accommodated along the boundary wall side. Precaution is to be made on cleaning the living and toiletry facilities, because, the whole works will be commenced within the existing CSD areas. The Supervision Consultant's Engineer and the Contractor will take a careful decision for setting the workers' facilities, material stocking yard etc. within the limited area.

Proper traffic management is necessary during carrying construction materials. The environmental and social safeguard issues have been accommodated with the engagement of people for traffic management during construction and operation periods.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

Environmental Management Plan has been developed for addressing all adverse impacts pertaining to the implementation of the project. The plan presented in tabular form includes impacts, their sources of occurrence, their mitigation measures, actors responsible for implementation of mitigation measures and their responsibilities.

Environmental Monitoring Plan has incorporated key environmental components and parameters to be monitored their indicators, frequency, timing and locations of monitoring and also the actors responsible for carrying out such monitoring.Grievance Redress Mechanism,

Institutional Arrangement, Environmental Safeguard Compliance cost etc. has been incorporated in the Environmental Management and Monitoring chapter.

GRIEVANCE REDRESS MECHANISM

A grievance can be defined as an actual or perceived problem that might give grounds for complaint. As a general policy, DG-Food along with the MFSP will work proactively towards arising and minimizing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. The Grievance redress mechanism (GRM) sets out the information and communications strategy to ensure that PAPs and communities are fully informed about their rights to offer suggestions and make complaints, and the different mechanisms through which they can do so, including grievances through creating more sounds during construction, pollution through improper solid waste management, traffic disturbance during the movement of more vehicles during construction and operation phases etc. This will be the responsibility of the PMU, CSC, and contractors and persons designated to be responsible for stakeholder liaison.

INSTITUTIONAL ARRANGEMENT FOR PROJECT IMPLEMENTATION AND OPERATION PHASES

A Project Management Unit (PMU) has been established under the DG Food for day–to-day implementation and monitoring of the project activities. The PMU is headed by a Project Director who is assisted by; (i) Deputy-Project Director; (ii) technical specialists (Civil, Mechanical and Electrical); (ii) Senior Procurement Specialist, and Procurement Analyst; (iii) Senior Financial Management Specialist, and accountant and a book keeper; (iv) Senior Environmental Specialist, (v) Senior Social Specialist, and (vi) Senior Communication Specialist. Each Silo site is headed by the Project Coordinator for coordination with the contractors, consultants and local administration as well as with communities, along with a Technical Specialist.

The PMU has a Senior Environmental Specialist (SES) to ensure implementation of EMP and other environmental management responsibilities. The SES maintaining liaison with WB safeguards team, regulatory agencies, and other stakeholders during the Project implementation. The SES will also coordinate with the environmental staff of the Construction Supervision Consultants.

The construction contractors will have dedicated properly qualified, trained and experienced, site-based Environment Supervisors (ESs)/Safety Officer at each construction site. The ESs will be responsible to implement various aspects of the EMP particularly the mitigation measures to ensure that the environmental impacts of the construction works remain within acceptable limits. The ESs will maintain coordination with the EMs at the site level. The ESs will also be responsible to conduct environmental trainings and safety tools for the construction crew. The ES should be a graduate preferably in environmental science/engineering with at least 3 years' experience in the related field.

The construction contractors will have dedicated properly qualified and experienced, site-based Environment Supervisors (ESs) at each construction site. The ESs will be responsible to

implement various aspects of the EMP particularly the mitigation measures to ensure that the environmental impacts of the construction works remain within acceptable limits. The ESs will maintain coordination with the EMs at the site level. The ESs will also be responsible to conduct environmental trainings for the construction crew. The EM needs to be a graduate preferably in environmental science/engineering with at least 3 years' experience in the related field.

The (Health, Safety and Environment) HSE function will be a key element of the operation and maintenance arrangements at each of the silo facility. Dedicated HSE personnel will be part of the O&M staff and will be responsible to prepare and then implement the relevant parts of the Operations Manual for ensuring health and safety during project operation.

TRAINING PLAN

A series of training programs has been proposed under the MFSP Silo project to enhance the skills of the MFSP as well as contractor staff in environmental aspects especially Environmental Management Plan (EMP) and Environmental Safeguard arrangements. The Environmental and Social consultants (PMU and Construction Supervision consultants) will be responsible for imparting training to the engineers and supervisors engaged in construction and operation works. The following training programs are to be included for effective implementation of environmental safeguard issues during construction period and operation stages:

- ✓ Implementation of Environmental Management Plan (EMP)
- ✓ Overall safeguard requirements of the Project
- ✓ Internal and external communications
- ✓ Internal audit

PUBLIC CONSULTATIONS

Four consultation meetings were held during January 2017 at the project areas. The consultation meetings were conducted with different level of local people. Total 58 (fifty-eight) participants, different level of people like; local representatives, businessmen, day laborers, farmers, shop keepers etc. were in the meetings. In consultation meetings; environmental and social issues were examined. The main focus was to dig out the mental supports from different level of stakeholders regarding the new concept of food storage facilities, i.e. the silo construction works in lieu of the traditional food storage facilities. The issue on potential impact of construction works has also been raised.

Most of participants appreciated because of the benefit from the proposed project. They also discussed about noise, water and soil pollution issue that are evolving because of existing project and the future possibilities. They expect improved technology to minimize the problem.

The outcomes of the consultation meetings were as follows:

- ✓ There should be effective mitigation measures in order to reduce noise pollution during construction period. Improved technology and proper management plan would help to mitigate the noise pollution.
- ✓ Surface water and soil pollution should be controlled by monitoring the runoff of waste materials to the surroundings.
- ✓ Air pollution from the construction materials and emission from machineries might create problem. Contractor should spray water during material transportation and use cover for air pollution sources if possible.
- ✓ It will generate more employment in terms of using more laborers, more rice mills will be established, transport business will boost, poultry farming will enrich further and so on. The local people requested that local labor should be used during construction and operation.

CONCLUSION AND RECOMMENDATION

On the basis of the analysis, it may be concluded that the project stands environmentally sound and sustainable when the recommended mitigation measure and environmental management processes are adopted properly.

Seasonal weather conditions would have an impact on the construction activities. The construction activities may even have to be stopped during these periods. So it is recommended that commencing construction in early winter season may help to reap the benefit of full dry spell of the season. It is also recommended that more people should be engaged in different works simultaneously if applicable especially in the winter season for advancing of the physical progress.

In order to enhance the occupational health and worker safety during the construction period, construction equipment would have to be kept in good order. Adequate safety measures should be taken and safety related equipment including personal protective and safety equipments (PPE), firefighting equipment etc. must be provided in order to reduce the potential accidents.

Solid waste will be generated during the construction period from excavation and refuse from construction camps and that would be under control management.

The major issue is the need to minimize disturbance to the local population in the areas of construction.

A positive policy of employing local people during the construction phase should be adopted.

Since, the implementation of the proposed project will bring benefit through helping to meet the food security, certain minor environmental impacts of the associated project will have to be compromised for the better interest of the country. However, the anticipated impacts are mostly of short duration and relatively minor in nature.

To ensure compliance with the EMP the contractor should deploy an environmental specialist to monitor and report project activities throughout the project construction phase.

In view of the above considerations and the fact that the executing agency will maintain standard quality of implementation of the program with due consideration to other standing rules and regulations including but not limited to the ECA 1995 (amended 2010) and ECR 1997 the project is recommended for implementation.

1. INTRODUCTION

1.1. Background

Bangladesh is the most vulnerable country in the world to natural disasters that are likely to be exacerbated due to climate changes, and 60% of the world-wide deaths caused by natural disasters during the last 20 years were in Bangladesh. Climate change is anticipated to lead to more intense and frequent cyclones, floods, and droughts, as well as sea level rise and associated salinity intrusion in the coastal areas leading to growing pressure on ensuring adequate food security and nutrition. Growing climate variability and natural disaster risks is anticipated to increase pressure on the Government of Bangladesh to effectively distribute food packets and food aid as a part of its post-disaster recovery

programs. During the 2007 floods and the subsequent Cyclones Sidr and Aila (in 2007 and 2009, respectively), crop losses were estimated to be over one million tons each. However, while floods typically cause damage to crops and food stocks (both household and government stocks), post-flood crop yields are typically higher than average ("bumper crops") because of rich silt deposited on the topsoil, leading to high production that has often served to replace stock shortages. In the case of cyclones, it is not only the losses during the cyclone but production is also severely hampered in the years to follow because saline sea water from storm surges is often deposited on agricultural lands, resulting in food stock shortages for at least two years.

The Directorate General of Food (DG Food) estimates that, by 2020, grain storage requirements would be about 3 million tons for a population of about 170 million people. Based on current and project storage availability, this is expected to result in estimated shortages of grain storage space of about 1.7 million tons by the year 2020. However, given the current implementation capacity of the DG Food, and in order to avoid overstocking, it is recommended that the expansion of storage facilities occur in a phased approach.

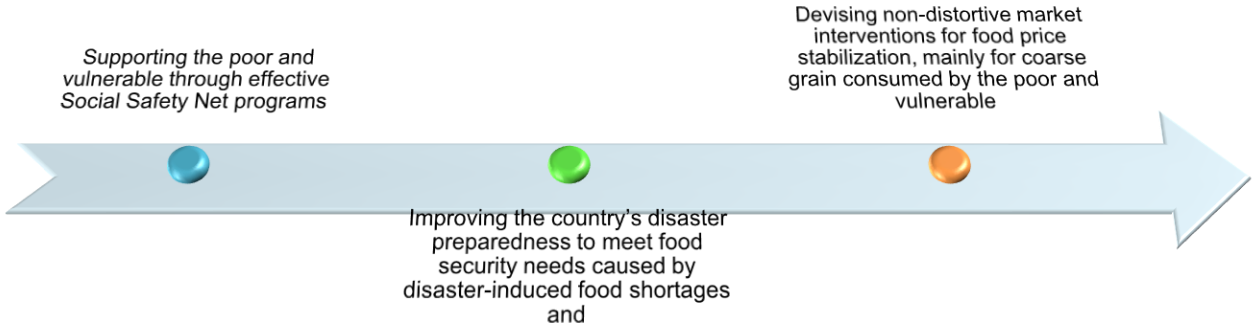
Government of The People's Republic of Bangladesh has received an IDA credit toward the costs of the Modern Food Storage Facilities Project (MFSP), being implemented by the Directorate General of Food, Ministry of Food. Bangladesh experiences frequent catastrophic weather events resulting in heavy losses in lives and property. Because of these weather-related challenges, the Government of Bangladesh is implementing programs aimed at minimizing loss and expediting recovery from these events.

The modern food storage facilities proposed for construction under this project could considerably improve the efficacy of the government's emergency response and recovery efforts in disaster-prone areas and could enhance the efficiency of its Public Food Distribution System. To respond to the above challenges, GoB seeks to improve its capacity to respond to short and longer-term post-disaster food and nutrition security needs by enhancing its network of food grain storage facilities and building modern food storage facilities; at the same time, it aims to improve the efficacy and accountability of the public food grain system.

1.2. Objectives of the Project

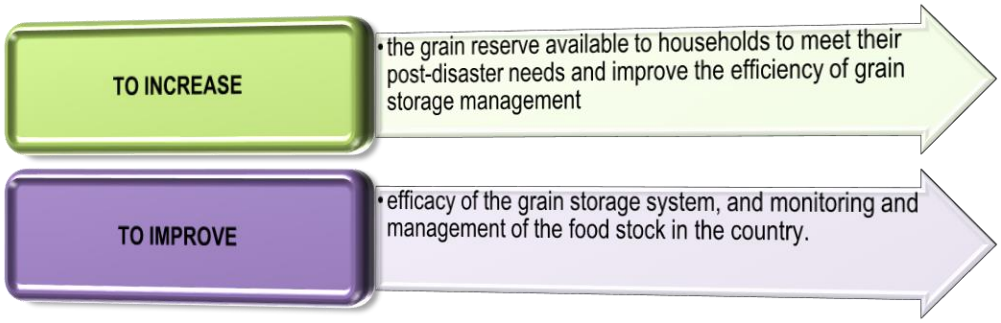
1.2.1 Strategic Objectives

Modern storage facilities proposed for construction under this project in different strategic locations across the country will allow grain to be kept in bulk for up to two to three years in better conditions relative to the godowns used currently, with reduced grain losses and enhanced nutritional value of the grain distributed. With strengthened capacity for improving stock management in the modern silos, and comprehensive analyses for enhancing the overall policy framework on strategic grain reserves, GoB will be in a position to make sound and informed decisions as it reconciles the three strategic objectives that impact the domestic food market:



1.2.2 Specific Objectives

The specific objectives of this project are:



1.3. Key Results

The key results are expected from the project as follows:

- ✓ Increased availability of grain stocks immediately after a major disaster,
- ✓ Increased food grain facilities to more disaster-prone households,
- ✓ Change in cost per ton in storing grain relative to pre-project cost,

- ✓ Reduced loss in grain stocks relative to pre-project losses,
- ✓ Better monitoring, and improved governance and management of food stocks.

1.4. Scope of Study

The scope of environmental and social impact assessment (ESIA) study associated with the silo construction and ancillary facilities comprise with the acts like; to present a general description of the project activities, describing the baseline environment, outlining the socio-economic environment around, suggesting the plan for managing the socio-environmental impacts during implementation and operation, and finally estimating the cost for environmental and social safeguard compliance issues involved during construction and operation phases. The scope of the ESIA included:

- ✓ Identify the activities are to be done under Barishal Silo sub-project, with ancillary works associated in Barishal silo site,
- ✓ Explore the present environment and socio-economic condition of Barishal and surrounding areas,
- ✓ Finding the probable socio-economic and environmental impacts associated with Barishal silo and surrounding areas,
- ✓ Investigating the future benefits of the people around Barishal or grievances among them if any, due to the implementation of such new storage facilities like silo,
- ✓ Investigating the public opinion of Barishal areas, on the issues of silo construction,
- ✓ Categorize the pollutions, may come out during construction and operation phases, in Barishal and surrounding areas,
- ✓ Come across the solutions to the probable evolved problems and impacts during implementation and operation phases in the Barishal silo areas (both in the silo campus and surrounding areas),
- ✓ Finding the optimum solutions to every impact during implementation and operation phases at Barishal silo site,
- ✓ Assessment of institutional aspects, and development of Environmental Management and Monitoring Plan,
- ✓ Estimating the environmental and social safeguard costs to be involved with the construction cost of Barishal silo and ancillary works.

1.5. Approach and Methodology

The ESIA study was carried out using reconnaissance survey, field visits, consultation with stakeholders, household survey, review of existing data, assessment to identify adverse impacts and preparation of EMP and post-project Environmental Monitoring Program. Physical assessments were made for entire project site with respect to terrestrial and aquatic aspects.

The task of preparing the ESIA report consisted of the following sequential components:

- ✓ Identification and screening of the environmental parameters relevant to the proposed project through a scoping process;
- ✓ Assessment of the magnitude of the potential negative impacts for relevant environmental parameters;
- ✓ Formulation of avoidance/mitigation measures to address the potential negative impacts, and preparation of a monitoring program during the period of project implementation;

Scoping and field visits to the project sites identified the environmental parameters/components (relevant to the project actions) which are susceptible to be affected. The field visit also included participatory approach, which involved discussions with local people in order to determine the perceptions and priorities of the stakeholders in the Project area. Apart from the local people, information was also obtained from the local school teacher and local government. Information were also derived from secondary sources like different reports, journals, Satellite Image Analysis, research papers, NGO, government officials etc. The Location of Sample Collection Map is shown in Figure 1.1.

Figure 1.1: Location of Sample Collection

1.6. Structure of the Report

The report fulfills the requirements of ESIA under ECR, 1997 and has been prepared in accordance with the TOR provided by the Department of Environment (DOE). The report contains ten chapters and the chapter details are discussed below:

- ✓ Chapter 1 describes the background information of Barishal silo site and selection of silo site (strategic location), objectives of the sub-project (silo bins and ancillary works to be done), key results to be achieved after silo construction at Barishal site, scope of ESIA study and approach and methodology for the ESIA study associated with the Barishal silo and ancillary works,
- ✓ Chapter 2 is on policy, legal and administrative framework describing the relevant policy and legal frameworks for the ESIA process, including the process of obtaining environmental clearance from the competent authorities.
- ✓ Chapter 3 contains detailed project description along with all the sub-project interventions are to be constructed and implemented.
- ✓ Chapter 4 describes environmental and social baseline condition with details on physical environment, land resources, agricultural resources, fisheries, ecosystem, socio-economic condition and social characteristics of the area.
- ✓ Chapter 5 describes Social Management and resettlement policy framework, emphasizing the inclusion and integration of society people in all activities.
- ✓ Chapter 6 presents the impacts assessment and mitigation measures for minimizing the adverse impacts and enhancing the benefits of the project and specific works to be done during design, construction and operation phases.
- ✓ Chapter 7 describes the alternative arrangements for setting different type of interventions (silo bins, office, residential arrangement etc.) associated with the sub-project within the specified allocated area, along with the setting of environmental safeguard interventions within the sub-project area.
- ✓ Chapter 8 describes the environmental and social management plan (ESMP) and monitoring plan along with the monitoring indicators.
- ✓ Chapter 9 describes public consultation discussion with local stakeholders with their ideas, views about the project through knowledge sharing,
- ✓ Chapter 10 concluding the ESIA report along with the recommendations.

1.7. Limitation of the Study

The present ESIA Report has been prepared based on the primary field investigations / assessment, and secondary data collected from various government departments, climatic data has been used from Bangladesh Meteorological Department (BMD), Department of Environment, Bangladesh (DoE) and published journals, and books, public consultation with local stakeholders and site observations. 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 ESIA Report.

1.8. The ESIA Study Team

A multidisciplinary team of ESIA experts having experience of conducting Environmental and Social Impact Assessment of large scale industrial and infrastructural development projects. Table 1.1 presents the professionals' names with their positions.

Table 1.1: The ESIA Study Team

No.	Name	Position
1	Mr. S. M. Sanaul Kafi	Environmental Specialist
2	Mr. Md. Shafiqur Rahman	Social Safeguard Specialist
3	Ms. Tanzia Sharmin	Junior Environmental Engineer-1
4	Mr. Masfiq Bashir	Junior Environmental Specialist-1
5	Ms. Mafia Mostafa	Junior Environmental Specialist-2
6	Md. Atiqur Rahman	Junior Social safeguard Specialist-2
7	Mr. Madhu Shudan Das	GIS Expert
8	Mr. Abdul Malek	Surveyor-1
9	Mr. Liton	Surveyor-2
10	Mr. Shahidul Islam	Surveyor-3
11	Mr. Bappy Rahman	Surveyor-4

2. POLICY & REGULATORY FRAMEWORK

The Environmental and Social Impact Study (ESIA) has been performed in accordance with the rules, laws and regulations governed by the Bangladesh Government and according to the operation policy of the World Bank.

The laws, rules and regulations, adapted by the government of Bangladesh, for overall environmental improvement and to provide environmental and social safeguards, during implementation and operation of any physical infrastructure, considered during the ESIA study for Barishal Silo site, are; National Environment Action Plan, 1992, Bangladesh Environment Conservation Act, 1995, Environment Conservation Rules, 1997, National Water Policy, 1999, National Fisheries Policy, 1996, Standing Orders on Disaster, 2010, National Integrated Pest Management Policy, 2002, National Adaption Program of Action (NAPA), Bangladesh Country Investment Plan (CIP), 2011, Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009, Bangladesh Labor Act, 2006, Bangladesh National Building Code, 2006 (for demolition of Structure and for Occupational Health & Safety), National Agricultural Policy, 2010, National Food Policy, 2006 etc. As per criterion set forth in the ECR 1997, Barishal silo sub-project is under Orange-B category.

On the other hand, as the sub-project is associated with the World Bank' s investment, the Bank's Operation Policy (OP)/ Bank Procedure (BP) are involved with the ESIA study, and those are; Environmental Policies like, (OP/BP 4.01-Environmental Assessment, OP/BP 4.04-Natural Habitats, OP/BP 4.09-Pest Management, OP/BP 4.11-Physical Cultural Resources, OP/BP 4.36-Forests and OP/BP 4.37-Safety of Dams, Social Policies like, OP/BP 4.10-Indigenous Peoples and OP/BP 4.12-Involuntary Resettlement and the Legal Policies like, OP/BP 7.50-International Waterways and OP/BP 7.60-Disputed Areas, were carefully observed during the study. According to World Bank OP/BP the project has been considered as a Category B project.

2.1. National Environmental Laws

2.1.1. General Description

A wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. The most important of these are the Bangladesh Environment Conservation Act, 1995 (ECA, 1995), and the Environment Conservation Rules (ECR, 1997). In addition to the Bangladesh Environmental Conservation Act and Rules, there are a number of other policies, plans and strategies which deal with the water sector, agricultural development, coastal area, protected area disaster management and climate change. These are the National Water Policy, 1999; the Forest Act 1927 (last modified 30th April 2000); National Forest Policy, 1994; the National Conservation Strategy1992; National Environmental Management Action Plan (NEMAP), 1995; National Agricultural Policy, 2010; National Food Policy 2006; National Food Policy Plan of Action, 2008-2015; Food Grain Movement Policy, 2008; Bangladesh Country Investment Plan (CIP), 2011; National Fisheries Policy, 1996; Standing Orders on Disaster, 1999 (revised in 2010); Bangladesh Climate Change Strategy and Action Plan, 2009; National

Plan for Disaster Management, 2010-2015. Some of these policies and legislations are described in this chapter for reference

2.1.2. Bangladesh Environment Conservation Act, 1995

The national environmental legislation known as Environmental Conservation Act, 1995 (ECA'95) is currently the main legislative document relating to environmental protection in Bangladesh, which replaced the earlier environment pollution control ordinance of 1992 and has been promulgated in Environmental Conservation Rules, 1997 (ECR'97). This Act is amended in 2000, 2002 and 2010. The main objectives of ECA'95 are: i) conservation of the natural environment and improvement of environmental standards; and ii) control and mitigation of environmental pollution.

Department of Environment (DoE) implements the Act. DoE is under the Ministry of Environment and Forest and is headed by a Director General (DG). The Act states that *before beginning new development project, the project proponent must obtain Environmental Clearance from DoE*. The procedures to obtain such clearance are in place. Failure to comply with any part of ECA'95 may result in punishment by a maximum of 10 years imprisonment or a maximum fine of BDT. 1000,000 or both.

2.1.3. Environment Conservation Rules, 1997

The Environment Conservation Rules, ECR 1997, provide a first set of rules under the Environment Conservation Act 1995, further amended in 2002 and 2010. These provide, amongst others items, standards and guidelines for:

- ✓ Categorization of industries and development projects
- ✓ Procedure for obtaining environmental clearance
- ✓ Environmental quality standards in relation to water pollution, air pollution and noise, as well as permitted discharge/emission levels of water and air pollutants and noise by projects

The Rules incorporate "inclusion lists" of projects requiring varying degrees of environmental investigation. The Government is also empowered to specify which activities are permissible and which restricted in the ecologically critical area. Under this mandate, MoEF has declared Sunderban, Cox's Bazar-Tekhnaf Sea Shore, Saint Martin Island, Sonadia Island, Hakaluki Haor, Tanguar Haor, Marzat Baor and Gulshan-Baridhara Lake as ecologically critical areas and accordingly has prohibited certain activities in those areas. Four rivers respectively Buriganga, Balu, Turag and Dhaleshwari of surrounding Dhaka city have also declared as ecologically critical area.

Environmental Conservation Rules (1997) classifies industrial units and development projects into four categories for the purpose of issuance of Environmental Clearance Certificate (ECC). These categories are: (i) Green (ii) Orange-A (iii) Orange-B and (iv) Red.

Green Category projects are considered relatively pollution-free and hence do not require initial environmental examination (IEE) and EIA. An environment clearance certificate (ECC)

from the Department of Environment (DoE) is adequate. **Orange Category** projects fall into two categories. Orange A projects are required to submit general information, a feasibility report, a process flow diagram and schematic diagrams of waste treatment facilities along with their application for obtaining DoE environmental clearance. Orange B projects are required to submit an Initial Environmental Examination (IEE) report, along with their application and the information and papers specified for Orange B projects. **Red** Category projects are those which may cause 'significant adverse' environmental impacts and are, therefore, required to submit an EIA report. It should be noted that they may obtain an initial site clearance on the basis of an IEE report, and subsequently submit an EIA report for obtaining environmental clearance along with other necessary papers, such as feasibility study reports and no objections from local authorities. As per ECR '97 all existing industries and projects in Orange B and Red category require an Environmental Management Plan (EMP) to be prepared and submitted along with other necessary papers while applying for environmental clearance.

2.1.4. Bangladesh Climate Change Strategy and Action Plan 2009

The Government of Bangladesh prepared the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008 and revised in 2009. This is a comprehensive strategy to address climate change challenges in Bangladesh. It is built around the following six themes:

- ✓ **Food security, social protection and health** to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change. All programs focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.
- ✓ **Comprehensive disaster management** to further strengthen the country's already proven disaster management systems to deal with increasingly frequent and severe natural calamities.
- ✓ **Infrastructure** to ensure that existing assets (e.g., coastal and river embankments) are well maintained and fit for purpose and that urgently needed infrastructures (cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.
- ✓ **Research and Knowledge management** to predict that the likely scale and timing of climate change impacts on different sectors of economy and socioeconomic groups; to underpin future investment strategies; and to ensure that Bangladesh is networked into the latest global thinking on climate change.
- ✓ **Mitigation and low carbon development** to evolve low carbon development options and implement these as the country's economy grows over the coming decades.
- ✓ **Capacity building and Institutional strengthening** to enhance the capacity government ministries, civil society and private sector to meet the challenge of climate change.

2.1.5. National Environment Action Plan, 1992

The National Environment Action Plan recommended sector specific action plan to achieve the objectives and implement the policy recommendations of the National Environment Policy. The followings are sector relevant key recommended actions:

Agriculture

- ✓ Use of chemical insecticides and pesticides has to be regulated. Production, import and use of those chemical insecticides and pesticides, which have a long-term residue and keep on accumulating in the environment, have to be phased out gradually.
- ✓ Proper and regulated use of chemical fertilizers will be ensured. Use of organic fertilizers will be increasingly emphasized.
- ✓ Imported seeds, seedlings and plants will be properly quarantined to exercise necessary caution against probable adverse environmental impact.
- ✓ Natural methods of pest control will be encouraged through ensuring protection and safety.
- ✓ Steps should be taken to establish an agricultural system based on local ecosystem, rate of population growth and demand of national economy.

2.1.6. National Water Policy, 1999

The National Water Policy was promulgated in 1999 with the intention of guiding both public and private actions to ensure optimal development and management of water in order to benefit both individuals and the society at large. The policy aims to ensure progress towards fulfilling national goals of economic development, poverty alleviation, food security, public health and safety, a decent standard of living for the people and protection of the natural environment. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation and maintenance) will have to enhance environmental amenities and ensure that environmental resources are protected and restored while executing their activities. Environmental needs and objectives will be treated equally with the resource management needs. The policy has several clauses related to the protection and conservation of the natural environment to ensure sustainable development. The strategy of the policy to conserve environment and resource can be summarized as:

- ✓ Promoting modern eco-friendly technology and infrastructure for a safe and sustainable future;
- ✓ Biodiversity conservation and sustainable land & water management;
- ✓ Restricting the conversion of agricultural land for non-agricultural purposes.

2.1.7. Standing Orders on Disaster, 2010

The 'Standing Orders on Disaster, 2010' is a substantial improvement over the previous edition (English 1999) New features introduced in this edition include, among others, the following: i) an outline of disaster management regulative framework, ii) an introduction of core groups for emergency response at various levels, iii) multi-agency disaster incident management system, iv) risk reduction roles and responsibilities for all committees and agencies, v) new outlines for local level plans, vi) revised storm warning signals, vii) a report on cyclone shelter design. Conceptually, this edition follows a comprehensive approach emphasizing risk reduction as well as emergency responses relating to all hazards and all sectors.

The Standing Order is designed to enhance capacity at all tiers of government administrative and social structures for coping with and recovering from disasters. Provision of emergency water, food, sanitation and shelter space for livestock during such periods should also be considered for future construction of shelters.

The Standing Orders on Disaster (SOD) specifically focuses on community vulnerability and capacity development of the community to adapt disaster (cyclone, tidal surge, tsunami, earthquake, tornado, flood, water logging, salinity, high tide, cold wave) resistant features like disaster resistant agriculture and other livelihood options. The SOD also delineates the activity of different administration at pre, during and post disaster period.

2.1.8. National Integrated Pest Management Policy, 2002

The objective of the policy is to enable farmers to grow healthy crops in an increased manner and thereby increase their income on a sustainable basis while improving the environment and community health. Maintaining ecological balance is the first priority of the IPM policy. In order to reduce misuse of agro-chemicals that could easily lead to ecological disturbance threatening the sustainability of agricultural production, the policy suggests for the following measurers:

- ✓ Efforts will be made to conserve and augment populations of bio-control agents in crop fields through the adoption of the principles and practices of IPM; and
- ✓ Priorities will be given to the management of pests through the use of parasitoids, predators, insect pathogens, appropriate cultivation techniques, pest tolerant varieties, mechanical control measures, crop diversification, botanical products and bio-pesticides.

2.1.9. National Fisheries Policy, 1996

The National Fisheries Policy, 1996 recognizes that fish production has declined due to environmental imbalances, adverse environmental impact and improper implementation of fish culture and management programs. The policy suggests following actions:

- ✓ To conserve fish habitats from damage, appropriate care should be taken during the implementation of all development activities such as flood control, irrigation and drainage projects, agriculture, industries, road and development projects.

- ✓ Shrimp and fish culture will not be expanded to the areas which damage mangrove forest in the coastal region
- ✓ Biodiversity will be maintained in all natural water bodies and in marine environment. Chemicals harmful to the environment will not be used in fish and shrimp farms
- ✓ Breeding ground of fish and fresh water giant prawn will be conserved
- ✓ Environment friendly shrimp culture technology will be used
- ✓ Control measures will be taken against activities that have a negative impact on fisheries, resources and vice-versa
- ✓ Laws will be formulated to ban the disposal of any untreated industrial effluents into the water bodies

2.1.10. National Adaption Program of Action (NAPA)

In 2005, the Ministry of Environment and Forest (MoEF), Government of the People's Republic of Bangladesh has prepared the National Adaptation Program of Action (NAPA) for Bangladesh, as a response to the decision of the Seventh Session of the Conference of the Parties (CoP7) of the United Nations Framework Convention on Climate Change (UNFCCC). The basic approach to NAPA preparation was along with the sustainable development goals and objectives of the country where it has recognized necessity of addressing climate change and environmental issue and natural resource management. The NAPA is the beginning of a long journey to address adverse impacts of climate change including variability and extreme events and to promote sustainable development of the country. There are 15 adaptation strategies have been suggested for Bangladesh to address adverse effects of climate change. Among the 15 adaptation strategies the following strategies have taken for the coastal region for reducing climate change induced vulnerability.

- ✓ Reduction of climate change hazards through coastal afforestation with community participation
- ✓ Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise
- ✓ Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains
- ✓ Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future
- ✓ Promoting adaptation to coastal crop agriculture to combat increased salinity
- ✓ Promoting adaptation to coastal fisheries through culture of salt tolerant fish special in coastal areas of Bangladesh.

2.1.11. Bangladesh Labor Act, 2006

The Bangladesh Labor Act, 2006 provides the guidance of employer's extent of responsibility and workmen's extent of right to get compensation in case of injury by accident while working. Some of the relevant Sections are:

- ✓ **Section 150. Employer's Liability for Compensation:** (1) If personal injury is caused to a workman by accident arising out of and in the course of his employment, his employer shall be liable to pay compensation in accordance with the provisions of this Act; and (2) Provided that the employer shall not be so liable - (a) in respect of any injury which does not result in the total or partial disablement of the workman for a period exceeding three days; (b) in respect of any injury, not resulting in death or permanent total disablement, caused by an accident which is directly attributable to - (i) the workman having been at the time thereof under the influence of drink or drugs, or (ii) the willful disobedience of the workman to an order expressly given, or to a rule expressly framed, for the purpose of securing the safety of workmen, or (iii) the willful removal or disregard by the workman of any safety guard or other device which he knew to have been provided for the purpose of securing the safety of workmen.
- ✓ **Section 151.** (1) Amount of Compensation**:** Subject to the provisions of this Act, the amount of compensation shall be as follows, namely :- (a) where death results an amount equal to fifty from the injury cent of the monthly wages of the deceased workman multiplied by the relevant factor; or an amount of fifty thousand rupees, whichever is more; (b) where permanent total an amount equal to disablement results from sixty the injury per cent of the monthly wages of the injured workman multiplied by the relevant.

2.1.12. Bangladesh National Building Code, 2006

2.1.12.a. Demolition of Structure

BNBC sets guideline for demolition of structure. The highlights of the guideline are as follows:

- ✓ At planning stage, detailed survey and study shall be carried out before demolishing the structure.
- ✓ A written notice will be delivered to the adjoining property holder.
- ✓ Required pedestrian precaution should be taken into account before commencing the demolition
- ✓ All utility lines will be disconnected and the sequence of demolition will be maintained as mentioned in the BNBC
- ✓ The owner will provide compensation for all damages and loss of life.

2.1.12.b. Occupational Health & Safety

Bangladesh National Building Code-BNBC (Part-7, Chapter-1) clearly sets out the constructional responsibilities according to which the relevant authority of a particular construction site shall adopt some precautionary measures to ensure the safety of the workmen. According to section 1.2.1 of chapter 1 of part 7, "In a construction or demolition work, the terms of contract between the owner and the contractor and between a consultant and the owner shall be clearly defined and make written document. These however will not absolve the owner from any of his responsibilities under the various provisions of this Code and other applicable regulations and bye-laws. The terms of contract between the owner and the contractor will determine the responsibilities and liabilities of either party in the concerned matters, within the provisions of the relevant Acts and Codes (e.g.) the Employers' Liability Act, 1938, the

Factories Act 1965, the Fatal Accident Act, 1955 and Workmen's Compensation Act 1923". (After the introduction of the Bangladesh Labor Act, 2006, these Acts have been repealed).

Section 1.4.1 of chapter-1, part-7 of the BNBC, states the general duties of the employer to the public as well as workers. According to this section, "All equipments and safeguards required for the construction work such as temporary stair, ladder, ramp, scaffold, hoist, run way, barricade, chute, lift etc shall be substantially constructed and erected so as not to create any unsafe situation for the workmen using them or the workmen and general public passing under, on or near them".

Part-7, Chapter-3 of the Code has clarified the issue of safety of workmen during construction and with relation to this, set out the details about the different safety tools of specified standard. In relation with the health hazards of the workers during construction, this chapter describes the nature of the different health hazards that normally occur in the site during construction and at the same time specifies the specific measures to be taken to prevent such health hazards. According to this chapter, exhaust ventilation, use of protective devices, medical checkups etc. are the measures to be taken by the particular employer to ensure a healthy workplace for the workers.

To prevent workers falling from heights, the Code in section 3.7.1 to 3.7.6 of chapter 3 of part 7 sets out the detailed requirements on the formation and use of scaffolding. According to section 3.9.2 of the same chapter, "every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended. Every floor hole shall be guarded by either a railing with toe board or a hinged cover. Alternatively, the hole may be constantly attended or protected by a removable railing. Every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides except at entrance to stairway. Every ladder way floor opening or platform shall be guarded by a guard railing with toe board except at entrance to opening. Every open sided floor or platform 1.2 meters or more above adjacent ground level shall be guarded by a railing on all open sides except where there is entrance to ramp, stairway or fixed ladder the above precautions shall also be taken near the open edges of the floors and the roofs".

The major challenge is the proper implementation of the Code as section 2.1 of chapter 2 of part 1 duly states that, "The Government shall establish a new or designate an existing agency responsible for the enforcement of this Code with a given area of jurisdiction. For the purpose of administering and enforcing the provisions of the Code, the enforcing agency shall have the authority of the Government and shall herein be referred to as the Authority."

Part 9, 1.2.1 states that if the land is changed and the occupants of the area are against the change, no change in use of an existing building will be allowed.

2.1.13. National Agricultural Policy, 2010

The overall objective of the National Agriculture Policy is to make the nation self-sufficient in food through increasing production of all crops including cereals and ensure a dependable food security system for all. One of the specific objectives of National Agricultural Policy is to take necessary steps to ensure environmental protection as well as 'environment-friendly sustainable agriculture' through increased use of organic manure and strengthening of the

integrated pest management program. The policy identifies that the available technologies for agricultural production is not sufficient to cope with the unfavorable environment (climate change, flood, drought, storm, salinity, pest and diseases, river erosion). The policy also suggests creating awareness so that the chemical fertilizers and pesticides used for increased crop production do not turn out to be responsible for environmental pollution. Water logging and salinity are identified as one of the serious problems in some parts of the country including the coastal areas for agricultural activities and environmental damage. The policy recommends for crop rotation and salt tolerant crop varieties.

2.1.14. National Food Policy, 2006

The goal of the food policy is to ensure a dependable food security system for all people of the country at all times. The objectives of the food policy are:

Objective-1: to ensure adequate and stable supply of safe and nutritious food;

Objective-2: to enhance purchasing power of the people for increased food accessibility; and

Objective-3: to ensure adequate nutrition for all (especially women and children).

Policy 1.2.2.1 of National Food Policy, 2006 states the Development of private sector food grain storage and movement system. The storage facilities presently available in the private sector are not suitable for long-term storage of grain and other food commodities. For this, construction of warehouses of scientific standard specifications is necessary. The government policy should be to encourage the process by amending and simplifying banking regulations on credit facilities to private sector entrepreneurs for construction of appropriate commodity specific warehouses, cold storages and acquiring transportation vehicles for freightage. To promote development of storage and movement system of food commodities in the private sector, the Government will:

- ✓ allow unrestricted movement of foodstuff in the country; and
- ✓ ensure credit facilities to develop storage structures in appropriate places.

Under the Public food grain stock (Policy 1.3.2) the stated major objective of the public food distribution system is to supply required quantity of grain to the food-assisted development and income transfer programs for the poor, who are unable to purchase minimum required quantity of food from the market at prevailing market prices. In addition to maintaining working stock of food grains to operate various food-based safety net programs, the Government also maintains a security reserve to cope for emergency needs during disasters. In order to handle uncertainties of import arrival and emergency off take requirements, the Government has decided to maintain a public stock of 1.0 million tons of food grains.

Policy 2.1 Transitory shock management highlights on emergency preparedness. Emergency preparedness is needed to alleviate the transitory food insecurity caused by floods, cyclones and other natural disasters that often occur in Bangladesh. Emergency relief programs are operated to mitigate the distress of the affected people. To satisfy the emergency distribution needs public food grain stocks equal to three months of emergency demand along with a relief system to distribute food, clean water, medicines and other essentials are being maintained. In

addition, the required level of minimum public food grain stocks should be reviewed annually considering the changing situations in domestic and global markets coupled with disaster proneness.

According to 2.1.2, Emergency distribution from public stock, to provide for the emergency food needs of households in the disaster-affected areas, the policy of the Government is to:

- ✓ ensure quick distribution of food in affected households in times of disaster;
- ✓ hold enough food grain stocks to cover at least three months of emergency distribution need in addition to its normal working stock needed for the regular food-based programs;

Strategy 3.5: Safe, quality food supply focuses on ensuring the quality of food at all levels of marketing (e.g. assembling, cleaning, sorting, processing and packaging). The following programs will be undertaken to ensure supply of safe and quality food through formulating new regulations by proper amendments of the existing ones and through encouraging the private sector initiatives:

- ✓ formulation of uniform arrangement, development of testing techniques, setting of standards and their application and compulsory enforcement;
- ✓ investment in development of packing or packaging and safe storage facilities;
- ✓ increase laboratory facilities and impart practical knowledge for development of the quality of food and food products;
- ✓ training for concerned officials and institutions in protecting the grades and standards of food products;
- ✓ campaign for nutrition enhancing quality and safe food; and
- ✓ develop and enforce appropriate regulatory mechanism to control indiscriminate use of harmful additives, preservatives and toxic elements in production and in the marketing chain for foodstuffs.

2.1.15. National Food Policy Plan of Action, 2008-2015

The National Food Policy Plan of Action (PoA) translated the provisions of the National Food Policy, 2006 towards achieving its three core objectives into 26 strategic area of intervention, priority actions to be undertaken in the short, medium and long term over the period 2008-2015. The policy mentioned that strengthened efforts to raise productivity and efficiency in food grain production, to support agricultural commercialization and diversification, in due consideration of environmental impacts (agricultural conservation), will be paramount. Actions are needed on many fronts, including agricultural technology development, input (seeds, fertilizers, irrigation, and machinery) supply and access expansion, and, critically, rural financing, which currently stands far below rural producers' needs, especially those of small and marginal farmers. In line with **MDG7 (Ensure environmental sustainability),** environmental sustainability has been effectively mainstreamed into the NFP agricultural policy agenda for enhancing food supply and also biodiversity.

2.1.16. Bangladesh Country Investment Plan (CIP), 2011

The Bangladesh Country Investment Plan provides a coherent set of priority investment programs to improve food security and nutrition in an integrated way. It is a comprehensive plan, builds on the existing framework**,** reflects the Government's investment priorities and aims to: (i) plan and invest resources in a coordinated way; (ii) increase convergence and alignment of budget and external sources of funding, and; (iii) to mobilize additional resources. Proposed investments relate to strengthening physical, institutional and human capacities in the field of agriculture, water management, fisheries, livestock, agricultural marketing, food management, safety nets, and nutrition and food safety.

2.2. World Bank's Environmental Safeguard Policies

The World Bank's environmental and social safeguard policies are a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The World Bank has ten environmental, social, and legal safeguard policies. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. This policy is considered to be the umbrella policy for the Bank's environmental "safeguard policies" which among others include: Natural Habitats (OP 4.04), Forests (OP 4.36), Pest Management (OP 4.09), Physical Cultural Resources (OP 4.11), and Safety of Dams (OP 4.37). Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. The complete list of policies is given below, and the Environment and Social policies are discussed.

Environmental Policies

- ✓ OP/BP 4.01 Environmental Assessment
- ✓ OP/BP 4.04 Natural Habitats
- ✓ OP/BP 4.09 Pest Management
- ✓ OP/BP 4.11 Physical Cultural Resources
- ✓ OP/BP 4.36 Forests
- ✓ OP/BP 4.37 Safety of Dams

Social Policies

- ✓ OP/BP 4.10 Indigenous Peoples
- ✓ OP/BP 4.12 Involuntary Resettlement

Legal Policies

- ✓ OP/BP 7.50 International Waterways
- ✓ OP/BP 7.60 Disputed Areas

In addition to the 10 safeguard policies, BP 17.5 exists as the Bank Disclosure Policy, which also relates to safeguards. Bank disclosure Policy supports decision making by the Borrower and Bank by allowing the public access to information on environmental and social aspects of projects. The policy requires disclosure in both English and Local language before project appraisal and must meet the World Bank standards.

2.2.1 OP/BP 4.01 Environmental Assessment

Environmental Assessment is the umbrella safeguard policy to identify, avoid, and mitigate the potential negative environmental and social impacts associated with Bank lending operations. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted.

EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples and physical cultural resources); and trans-boundary and global environmental aspects. The borrower is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements.

The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.

Category B: The proposed project's potential adverse environmental impacts on human population or environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than Category A projects.

Category C: The proposed project is likely to have minimal or no adverse environmental impacts.

2.2.2 OP/BP 4.04 Natural Habitats

The conservation of natural habitats is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

2.2.3 OP/BP 4.09 Pest Management

To manage pests that affect either agriculture or public health, the Bank supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. In Bank- financed projects, the borrower addresses pest management issues in the context of the project's environmental assessment. In appraising a project that will involve pest management, the Bank assesses the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management. As necessary, the Bank and the borrower incorporate in the project components to strengthen such capacity. The Bank uses various means to assess pest management in the country and support integrated pest management and the safe use of agricultural pesticides: economic and sector work, sectoral or project-specific environmental assessments, participatory IPM assessments, and investment projects and components aimed specifically at supporting the adoption and use of IPM.

In Bank-financed agriculture operations, pest populations are normally controlled through IPM approaches, such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended user. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification (Geneva: WHO 1994-95).

2.2.4 OP/BP 4.11 Physical Cultural Resources

Physical cultural resources are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Their cultural interest may be at the local, provincial or national level, or within the international community. Physical cultural resources are important as sources of valuable scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower

addresses impact on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

2.2.5 OP/BP 4.36 Forests

Forest is defined as an area of land of not less than 1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10 percent that have trees with the potential to reach a minimum height of 2 meters at maturity *in situ*. A forest may consist of either closed forest formations, where trees of various stories and undergrowth cover a high proportion of the ground, or open forest. The definition *includes* forests dedicated to forest production, protection, multiple uses, or conservation, whether formally recognized or not. The definition *excludes* areas where other land uses not dependent on tree cover predominate, such as agriculture, grazing or settlements. In countries with low forest cover, the definition may be expanded to include areas covered by trees that fall below the 10 percent threshold for canopy density, but are considered forest under local conditions. The Bank's forests policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. The Bank assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services.

2.3 Environment, Health & Safety Guidelines

The Environment, Health, and Safety (EHS) Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities or project by existing technology at reasonable costs. These Guidelines will be applicable to the Project particularly with respect to air emissions, ambient air and noise quality standards, waste water quality, hazardous material and waste management, and occupational and community health and safety management. They contain performance levels and measures that are considered to be achievable in new facilities at reasonable costs using existing technologies. Table 2.1 shows the EHS guidelines of World Bank.

Table 2.1: EHS Guidelines of World Bank

Environmental Health and Safety Guidelines	The Environment, Health, and Safety (EHS) Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities or project by existing technology at reasonable costs.	These Guidelines will be applicable to the Project particularly with respect to air emissions, ambient air and noise quality standards, waste water quality, hazardous material and waste management, and occupational and community health and safety management.
Environmental, Health, and Safety Guidelines PORTS, HARBORS, and TERMINALS	The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. The EHS Guidelines for Ports, Harbors, and Terminals are applicable to commercial ports, harbors, and terminals for cargo and passengers transfer. Shipping (including repair and maintenance of ships), fuel terminals, or railways are addressed in separate industry sector EHS Guidelines, specifically the EHS Guidelines for Shipping, Crude Oil and Petroleum Product Storage, Railways, respectively.	Relevant as the project includes provision of improved navigation routes and terminal facilities. MP section of the ESIA report has been dedicated to mitigate adverse impact due to the proposed intervention.
The EHS Guidelines for Shipping	The EHS Guidelines for Shipping include information relevant to the operation and maintenance of ships used for the transport of bulk cargo, and goods. Cargo handling, vessel maintenance, and other in-port activities are covered under the EHS Guidelines for Ports and Harbors while issues specific to the transfer and storage of bulk fuels are covered in the EHS Guidelines for Crude Oil and Petroleum Product Terminals.	Broadly applicable as the project provides improved navigation routes and terminal facilities. The EMP is prepared to address mitigation measures due to proposed interventions.

2.4 Social Policies & Legislation of Bangladesh

2.4.1 General Description

Infrastructure development projects using lands in Bangladesh is designed and implemented under the legislative and regulatory framework to compensate the affected persons due to land acquisition using the power of eminent domain. Whenever it appears to the Government that any property in any locality is needed or is likely to be needed for any public purpose or in the public interest, the property is acquired using power of eminent domain. Land acquisition is governed by the Acquisition and Requisition of Immovable Property Ordinance, 1982 (Ordinance II of 1982). The ordinance supersedes earlier laws including the Land Acquisition Law of 1894 and others that have been in force between 1947 and 1982. In addition to the Ordinance, acquisition of any land or forest area, in Chittagong Hill-Tracts (CHT) districts require consent under the Chittagong Hill-Tracts (Land Acquisition) Regulation 1958, the CHT Regional Council Act 1998 and the Forest Act (1927). There is no national policy in Bangladesh governing social effects of infrastructure development projects on the project area communities. However, the Constitution of Bangladesh and the national development strategy (Poverty Reduction Strategy Paper 2005-2009) provides some rights to the affected persons, communities and groups those are not upheld in the Ordinance II of 1982, the instrument followed for land acquisition. The active instruments under the legislative and regulatory framework in Bangladesh are discussed hereunder.

2.4.2 Constitution of Bangladesh

The fundamental rights under the Constitution indicate the general guidelines for a policy on resettlement/rehabilitation of citizens adversely affected (whatever be the mechanism) due to any activity of the State. Article 40 of the constitution states categorically that every citizen has the right to practice any lawful occupation which implies that anything that impedes such right (a) should not be done or (b) there should be supplementary measures to make good the losses incurred by the citizen. Resettlement and rehabilitation of adversely affected people due to infrastructure projects very clearly falls within this requirement for supplementary measures. However, as per Article 42, sub-clause 2, no law with provision of compensation for acquisition of land can be challenged in a court on the ground that such compensation has been inadequate.

2.4.3 Acquisition and Requisition of Immovable Property Ordinance, 1982

This Ordinance is the basic instrument governing land acquisition in Bangladesh. It is restricted to “legal” owners of property as supported by records of ownership such as deeds, title or agreements to compensating for land as well as any business, structure, trees and crops on the land. The owners of acquired land receive cash compensation at market value with a premium of 50 per cent on the assessed price. The law specifies methods for calculation of market value of property based on recorded prices obtained from relevant Government departments such as Registrar (land), Public Works Department (structures), Department of Forest (trees), Department of Agriculture (crops) and Department of Fisheries (fish stock).

The Ministry of Land (MOL) is authorized to deal with land acquisition. The MOL delegates some of its authority to the Commissioner at Divisional level and to the Deputy Commissioner at the District level. The Deputy Commissioners (DCs) are empowered by the MOL to process land acquisition under the Ordinance and pay compensation to the legal owners of the acquired property. Khas (government owned land) lands should be acquired first when a project requires both khas and private land. If a project requires only khas land, the land will be transferred through an inter-ministerial meeting following the acquisition proposal submitted to DC or MOL as the case may be. The DC is empowered to acquire a maximum of 50 standard bigha (6.75 ha) of land without any litigation where the Divisional Commissioner is involved for approval. Acquisition of land more than 50 standard bigha is approved from the central land allocation committee (CLAC) headed by the chief executive of the Government of Bangladesh proposed by the MOL.

The land owner needs to establish ownership by producing record-of-rights in order to be eligible for compensation under the law. The record of rights prepared under Section 143 or 144 of the State Acquisition and Tenancy Act 1950 (revised 1994) are not always updated and, as a result, legal land owners have faced difficulties trying to “prove” ownership. The affected person (AP) has also to produce rent receipt or receipt of land development tax, but this does not assist in some situations as a person is exempted from payment of rent if the area of land is less than 25 bighas (3.37 ha).

2.4.4 The East Bengal State Acquisition and Tenancy Act, 1950

The State Acquisition and Tenancy Act (Sections 86 & 87) also define the ownership and use right of alluvion (payosti or reformation in situ or original site) and diluvion land (nadisikosti) in the country. In legal terms, eroded lands (sikosti) inside the alluvion-diluvion (AD) line (i.e. including submerged land or underwater land) are considered khas land once declared by concerned Deputy Commissioner (DC) demarcating the AD Line. However, the "original" owner(s) can claim the land if it reappears through natural process within 30 years. The original private owners cannot claim any eroded land if developed by the government through land filling for use in public purpose.

2.4.5 Constitutional Right of the Tribal Peoples Rights

In the context of People’s Republic of Bangladesh, the Constitution of Bangladesh does not mention the existence of the cultural and ethnic minorities in Bangladesh. The only protective provision for the ethnic minorities that the policy makers often refer to in the context is Article 28 (4) which states that: Nothing shall prevent the state from making special provision in favour of women and children or for the advancement of any backward section of the citizens. The above provision is an ambiguous one and it does not define who or what constitutes "backward". However, the Government recognizes existence of “tribal peoples” and the need for special attention and in general tribal people are essentially viewed as backward, poor and socio-economically & culturally inferior. Towards this end a special program was initiated in 1996-97 by the Prime Minister’s Secretariat aimed at improving the socio-economic situation of the indigenous people of Bangladesh, resident outside the Chittagong Hill Tracts.

2.4.6 The Chittagong Hill Tracts Regulation, 1990

The Chittagong Hill Tracts Regulation, 1900 (Regulation I of 1900) is the regulatory framework for State sovereignty over the traditional rights of the tribal peoples living in the Chittagong Hill Tracts (CHTs) region.4 They are governed through Revenue Circle Chiefs5 who are local revenue collectors vide an amalnama (authorization by the Government). The Deputy Commissioner and the Commissioner from the Central Government reserve the authority to settle land to the hill-men or non-hill residents or lease out land (non-transferable) for rubber plantation or establishing industries in the CHTs. The regulation provides the right to possessing plough cultivable land up to 5 acres by hill men or non-hill residents. The headman is responsible for the conservation of the resources of his mouza through exercising his authority to (i) prohibit the removal of forest produces by residents of respective mouzas other than for their domestic purposes or by non-residents for any purpose, (ii) exclude any area or areas in his mouzas from the jhuming (shifting cultivation), (iii) prevent new comers from cutting jhums in his mouza, and (iv) prevent a person from grazing cattle in his mouza.

2.4.7 The Chittagong Hill Tracts (Land Acquisition) Regulation, 1958

The Chittagong Hill Tracts (CHT) region has been enjoying the status of a special region since British period. Most of the land in CHT belongs to the Government either as reserve forest or as unclassified state forest. The CHT Regulation I of 1900 was the sole legal instrument for the governance and administration of the Hill Tracts. Under the regulation, the DC could resume land even though settlement of the same might have been given earlier. The rule prescribed payment of compensation for various interests as in the case of land acquisition. It was expedient to provide for the acquisition of land in CHT the Government made the Chittagong Hill-Tracts (Land Acquisition) Regulation, 1958. This regulation has provision for payment of compensation for requisitioned property. The compensation may be fixed by agreement or by rules framed on this behalf.

2.4.8 The CHT Regional Council Act, 1998

The National Parliament of Bangladesh in 24 May 1998 passed the Peach Accord 1997 as the "Chittagong Hill Tracts Regional Council Act, 1998 (Act 12 of 1998). In addition to re-establishing peace, the Accord recognized the ethnic people's right to land, culture, language, and religion. The Accord set out detailed provisions for strengthening the system of self-governance in the CHT, and redressing the most urgent land-related problems including resolution of land disputes by a commission on land, the transfer of authority for land administration to the hill district councils (HDCs), the cancellation of lease granted to non-residents during the conflict period, the distribution of land to ethnic or "tribal" villages, and the strengthening of customary land rights.

Within the meaning of the Act 12 of 1998, no lands, hills and forests within the control and jurisdiction of the HDCs shall be acquired or transferred by the government without consultation and consent of the Regional Council. No law will be executed in the region which is not developed and enacted in consultation and agreement with the tribal peoples in CHT. A ministry on CHT Affairs was established by appointing a Minister from among the tribal

communities of hill districts. An Advisory Council from the CHT region assists this ministry. However, there is a demand for extending the scope of the CHT Affairs Ministry to include the tribal peoples in other areas of the country.

2.4.9 Ethnic Minority Rights in PRSP, 2005

Relevant strategic suggestions in the PRSP 2005 to preserve the cultural, social and economic identity and interests of the ethnic populations in and outside CHT are as follows:

- Effective recognition of ethnic minority communities and their specific needs in all relevant government policies and programs towards improving the socio-economic conditions of these communities.
- Proper actions for protecting the rights of ethnic minority people, particularly their rights to land and forests.
- Transfer of land administration in CHT to the hill districts councils in accordance with the 'Hill District Councils Acts of 1989'.
- Provide education to ethnic minority people with a curriculum that allows learning in their own language at the primary level.
- Strengthen their competence in job markets through affirmative action's at higher levels of education and skill training to promote their inclusion in mainstream economic life.
- Scale-up efforts to provide health care, clean water and sanitation facilities to ethnic minority areas in general and to the more disadvantaged groups among them in particular.
- Increase and utilize property the fund available in the Prime Minister's office for the development of the ethnic minority people of the plane lands.
- Provide wider access to electrification and telecommunications for ethnic minority communities, particularly in the Hill Tracts.

2.4.9.1 GOB Laws and Land Acquisition

The principle legal instrument governing land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Ordinance, 1982(Ordinance II of 1982 with amendments up to 1994) and other land laws and administrative manuals relevant to land administration in Bangladesh. According to the Ordinance, whenever it appears to the Government of Bangladesh that any property in any locality is needed or is likely to be needed for any public purpose or in the public interest, the Government can acquire the land provided that no property used by the public for the purpose of religious worship, graveyard and cremation ground. The 1982 Ordinance requires that compensation be paid for (i) land and assets permanently acquired (including standing crops, trees, houses); and (ii) any other damages caused by such acquisition. The Deputy Commissioner (DC) determines (a) market value of acquired assets on the date of notice of acquisition (based on the registered value of similar property bought and/or sold in the area over the preceding 12 months), and (b) 50% premium on the assessed value (other than crops) due to compulsory acquisition. The 1994 amendment made provisions for payment of crop compensation to tenant cultivators. Given that people devalue land during title transfer to minimize tax payment, compensation for land paid by DC including premium largely remains less than the actual market price.

2.5 World's Bank Social Safeguard Policy

2.5.1 Involuntary Resettlement (OP 4.12)

The WB's experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguards to address and mitigate these impoverishment risks. The overall objectives of the Policy are given below.

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.

Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

2.5.2 Indigenous People (OP 4.10)

For purposes of this policy, the term "Indigenous Peoples" is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:7 The tribal peoples living in the Chittagong Hill Tract districts and some scattered in the plain districts as well are indigenous peoples as per their cultural distinction. The OP defines the process to be followed if the project affects the tribal people. The tribal peoples are indigenous as they have

- self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- an indigenous language, often different from the official language of the country or region.

2.6 Implication of National Policies and Legislations on this Project

The Categorization list mentioned in ECR'97 is performed based on the activity. There is no direct mention of the category for Modern Food Grain Silo in ECR'97. However, cold storage is categorized as "Orange B" under ECR'97. Therefore, the project is considered as "Orange B". The project is aimed to construct modern food grain which will involve demolishing of existing structure and construction of silo during the construction period and chiller & nitrogen use during operation period. DG Food is responsible for carrying out Initial Environmental Examination, developing Environmental Management Plan and obtaining No Objection Certificate, site clearance and environmental clearance certificate.

2.7 Implication of Environmental Safeguard Policies of WB on the Project

The project has been considered as a Category B project, due to the risk associated with the extent of foundation construction, construction of super structure from prefabricated steel sheet, knocking down of existing godowns, environmental and occupation health and safety during project operation. The Project has triggered only one environmental safeguard policy for environmental assessment (OP/BP 4.01). The Silo will introduce modern cooling facilities which will reduce the existence of rodents and insecticides. Chiller system may be used during the operation phase of the Silo for temperature control and Nitrogen gas for disinfection. Nitrogen gas (in between emptying and uploading the bins) may cause some breathing irritation to the workers. The workers shall use mask during use of nitrogen gas for disinfection. As per Bank requirement, the borrower needs to consult project-affected groups and local nongovernmental organizations about the project's environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them.

2.8 Implication of Social Safeguard Policies of WB on the Project

The legislative and regulatory framework is not adequate to deal with the adverse impacts associated with land acquisition and involuntary displacement of peoples for project purpose. The law does not cover project-affected persons without title and does not ensure replacement value of the property acquired. The law does not initiate any measure for restoration of livelihoods of the affected persons. As a result, land acquisition potentially diminishes productive base of affected farm families which is against the spirit of the Bank policy on involuntary resettlement (OP 4.12).

Specific to the project, no land will need to be acquired and no resettlement will need to be carried out in the first phase construction. However, in subsequent construction phase(s), the government may like to acquire private land and/or public land from private uses. The acts therefore, trigger the Bank OP 4.12 on involuntary resettlement. No tribal people are existent in and around the sites reviewed for the project. Therefore, the Bank OP 4.10 is not triggered to the project. However, if such groups are identified during the detailed engineering design, the proponents will select to drop the site from construction.

3. PROJECT DESCRIPTION

3.1. Location of the Project

The location of the Barishal CSD is well known as “Trish Godown” for having its 30 go-downs in it. It is about 2.00 km away from the City Center near the Barishal Medical College and near to the Armed Police Battalion Center. The CSD area having a total area of 10.55 hectares (26.08 acres) was acquired by the Government for use by the CSD in three installments in 1961, 1962 and 1963. Out of the total land, about 13 acres is surrounded by a protection wall and the remaining land of about 5.29 hectares (13.08 acre) consisting of the connecting road (0.11 hectares) between the surrounded place and the River Kirtonkhola and a shallow marshy land (in total 3.78 hectares/9.34 acre) and other marginal lands. The proposed silo site is located within the premises of the existing CSD. The location of the site is at the coordinate of N22°40′50′′ and E90°21′41′′.There is a road between the proposed silo site and adjacent existing CSD campus. There are boundary walls at three sites of the proposed site except north side which is adjacent to the CSD and road. A boundary wall at the north side of the proposed site needs to be constructed. Currently, the proposed site is vacant after dismantling of the 13 godowns and felling of some trees.

The silo was constructed in the sight taking in to consideration the advantage of its linkage with other parts of the country, particularly, Dhaka, Chittagong and north east part of the country through river and rail transport. The location of proposed Barishalsilo site in Google earth is shown in Figure 3.1.The location map of proposed Barishalsilo site in GIS is shown in Figure 3.2.

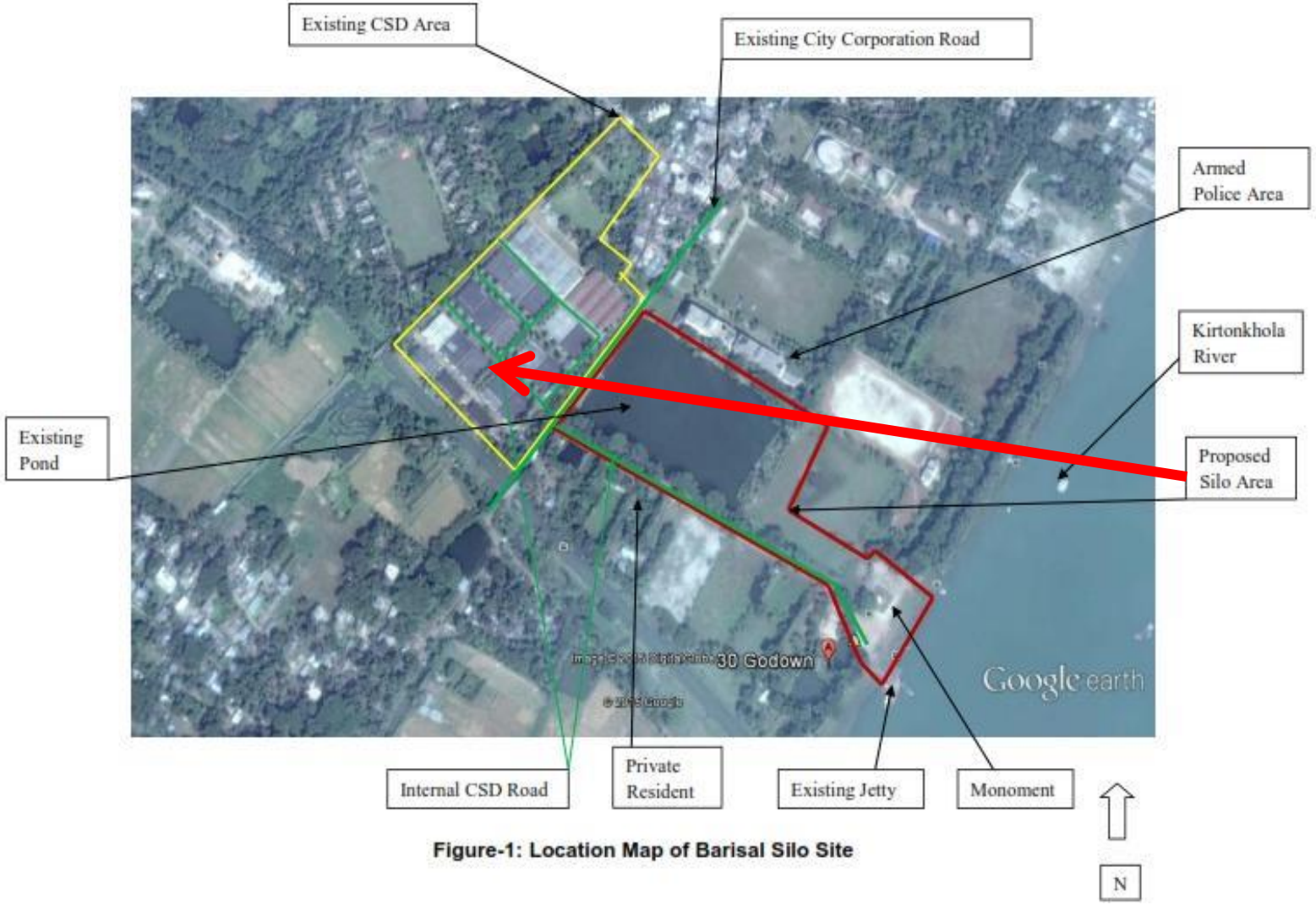


Figure 3.1: Location Map of the Barishal Silo Site in Google Earth

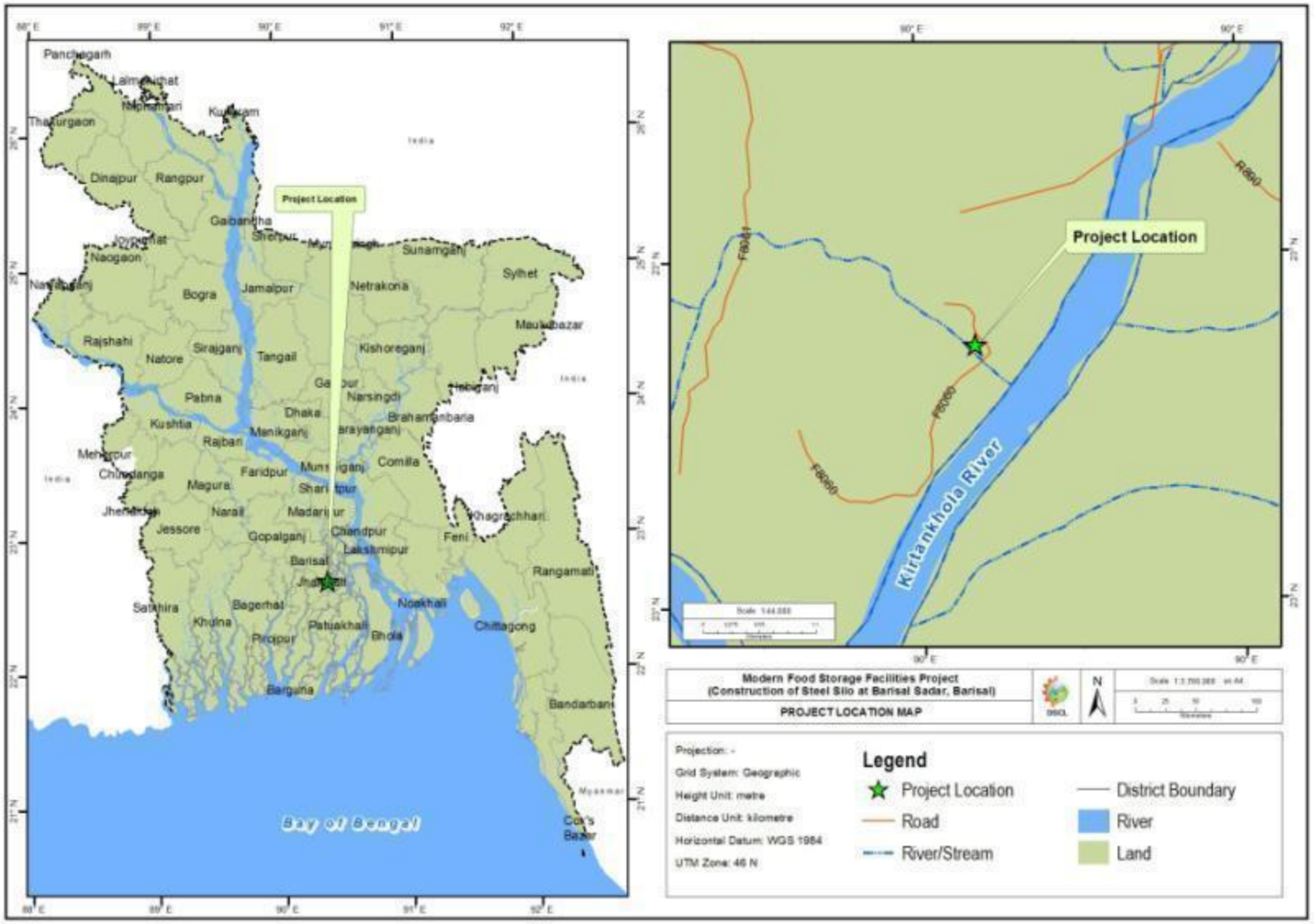


Figure 3.2: Location of Barishal Silo Site

3.2. Description of Project Works

Total project activities were considered in two phases. In the first phase, preparation works like; the boundary wall, site development by earth filling, office building and dismantle of the dilapidated godown etc. has been completed. In the second phase; main construction works like 16 nos. flat bottoms prefabricated steel silo bins and silo related ancillary works will be performed and necessary equipment and machinery will be installed. Design and estimates of the silo bins and ancillary works have been completed. Draft Bidding Document (DBD) is sent to WB through STEP dated on December 11, 2018 for review. After no objection letter (NOL) from World Bank bid would be invited. This study is considered construction of main silo and ancillary activities.

A preliminary layout plan is given in Figure 3.3.The following interventions will be constructed under Barishal sub-project.

1. Main gate & sub gate
2. Guard house (4x5.5m)
3. TSLW house (17x18m)
    - 3.1. Truck scale
    - 3.2. Sampling house
    - 3.3. Laboratory house
    - 3.4. Weight control
4. 8 trucks parking
5. Bulk truck receiving (8x28m)
6. Control room (9.5x11.2m)
7. Bucket elevator tower (6x8.4m)
8. 16 steel silos 3,000mt (d18.29m, h17.12m)
9. Bagging & loading house (24x48m)
10. Fortified kernel receiving & buffer bin d4m (included in item 9)
11. Empty gunny bag godown (15x18m)
12. Work shop cum store (14x30m)
13. Scarp godown (14x30m)
14. Substation (10x20m)
15. Silo office (6x25.65m)
16. Car parking (6x12m)
17. Public toilet (5x8 m)
18. Firefighting pump house (5x10m)
19. Firefighting water tank 200m3 (10x10m)
20. Steel structures support for conveyors
21. Jetty (Access bridge: 12.5x17m, loading bridge: 20x120m)
22. Sampling & laboratory house on jetty (8x12m)
23. Ansars barrack 24 person (18.8x35.5m)
24. Inspection bungalow (14.4x16.8m)
25. Unloader substation (5x10m)
26. Running water deep drill well (5x5m)

ITEMS	COORDINATES				ITEMS	COORDINATES			
	X-1	Y-1	X-2	Y-2		X-1	Y-1	X-2	Y-2
1	198410	200815	198880	208502	14	102809	159124	97138	180753
2	197756	194626	192604	199065	15	102559	249782	128894	250376
3	145201	198238	166326	211150	16	128718	244281	147568	246449
4					17	189890	172195	196429	178995
5	105277	151228	118867	176983	18	36256	259860	28528	271704
6	97211	182535	108812	191541	19	36257	259861	28528	271704
7	91503	151746	99110	158733	20				
8	18765	171949	78398	159432	21	647008	0	667008	120482
9	164626	154540	114572	149738	22	652507	111848	664677	119894
10					23	164812	224113	200640	231704
11	163058	139549	183759	150525	24	148439	230857	164608	239720
12	36719	255561	68957	263089	25	634866	108452	624866	113434
13	68036	248977	100273	256505	26	170045	235645	166333	241652

LEGEND

1. MAIN GATE & SUB GATE
2. GUARD HOUSE (4x5.5m)
3. TSLW HOUSE (17x18m)
   - 3.1. TRUCK SCALE
   - 3.2. SAMPLING HOUSE
   - 3.3. LABORATORY HOUSE
   - 3.4. WEIGHT CONTROL
4. 8 TRUCKS PARKING
5. BULK TRUCK RECEIVING (8x28m)
6. CONTROL ROOM (9.5x17.2m)
7. BUCKET ELEVATOR TOWER (8x8.4m)
8. 16 STEEL SILOS 3,000MT (D18.29m, H17.12m)
9. BAGGING & LOADING HOUSE (24x48m)
10. FORTIFIED KERNEL RECEIVING & BUFFER BIN D4m (Included in item 9)
11. EMPTY GUNNY BAG GODOWN (15x18m)
12. WORK SHOP CUM STORE (14x30m)
13. SCAMP GODOWN (14x30m)
14. SUBSTATION (10x20m)
15. SILO OFFICE (6x25.65m)
16. CAR PARKING (6x12m)
17. PUBLIC TOILET (5x8 m)
18. FIRE FIGHTING PUMP HOUSE (5x10m)
19. FIRE FIGHTING WATER TANK 200M3 (10x10m)
20. STEEL STRUCTURES SUPPORT FOR CONVEYORS
21. JETTY
    (Access bridge: 12.5x17m, loading bridge: 20x120m)
22. SAMPLING & LABORATORY HOUSE ON JETTY (8x12m)
23. ANSARS BARRACK 24 PERSON (16.8x35.5m)
24. INSPECTION BUNGALOW (14.4x16.8m)
25. UNLOADER SUBSTATION (5x10m)
26. RUNNING WATER DEEP DRILL WELL (3x3m)

GENERAL LAYOUT

Figure 3.3: Layout Plan of Barishal Silo Site

3.3. Current Condition of the Proposed Silo Site

The proposed silo site is located within the premises of the existing CSD. The existing CSD campus has a total of 28 go-downs for food grain storage. Beside this, the campus has an office building, managers' quarter, 8 other residential quarters for officials and staff members, 6 guard sheds, one barrack, one garage, one pump house and one mosque.

The proposed site is flat and the natural drainage pattern of the site towards the River Kirtonkhola. The site has no experience of water logging during monsoon. There are boundary walls at three sites of the proposed site except north side. A boundary wall at the north side of the proposed site needs to be constructed. Currently, the proposed site is vacant after dismantling of the 13 godowns and felling of some trees. The existing condition of the proposed silo site and its surrounding area are shown in Figure 3.4.

Road by the side of Barishal CSD and proposed site

Low land within the influence area of the proposed silo site

Existing Monument at the bank of the River Kirtonkhola (within the influence area of the proposed silo site)

Existing Pontoon for CSD **Location of jetty construction for new silo**

Figure 3.4: Existing Condition of the Proposed Silo Site and its Surrounding Area

The site is vacant except some trees (coconut tree) which need to be cut down prior to the construction works to be started. There are plants, bush, shrub, and hubs at the site which also need to be cut down for site clearing works. During earth filling and construction of office building& boundary wall, a small temporary semi-pucca site office was constructed which also may demolish and or renovated for further use. The current situation of the proposed silo site is shown in Figure 3.5.

Figure 3.5: Current Situation of the Proposed Silo Site

3.4. Construction of Steel Silos

There are sixteen nos. of steel silos will be constructed under this project. Each silos capacity for storage is 3020 MT. There are lot of equipment will be used during silos operation like belt conveyor, bagging station, chain conveyor, chiller etc. The speed control time is 60 t/h. The total capacity of storage will be 48,320 MT.A preliminary steel silos design is shown in Figure 3.6.

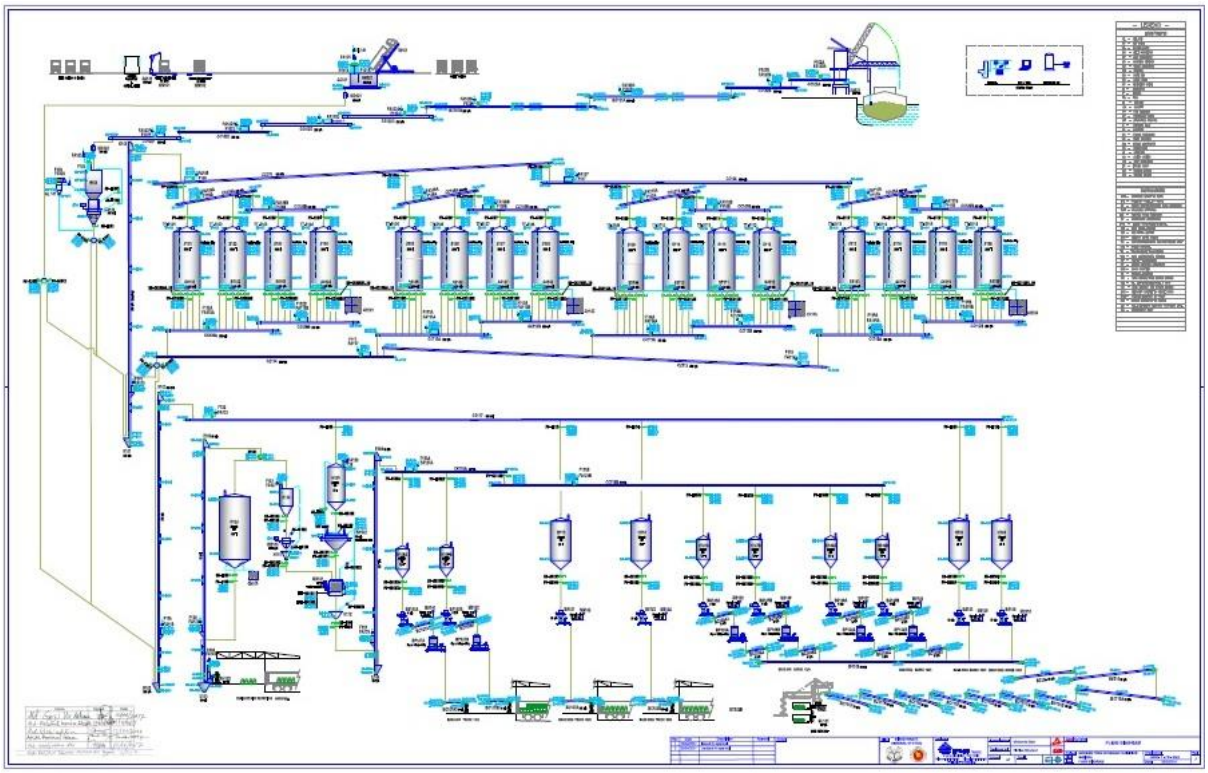


Figure 3.6: Preliminary design of steel silos (Flow Diagram)

3.5. Implementation Schedule

DG Food is now intending to proceed with the implementation of the construction of silos project with the financial assistance of World Bank in order to meet the increasing food demand in Bangladesh.

The Project Implementation Schedule that the Study Team has assumed is shown below.

Sl. no.	Activities	Year-1 (months)			Year-2		
		1-4	5-8	9-12	1-4	5-8	9-12
1	Design, drawing, bid documents tendering, contractor selection etc.						
2	Foundation works for silos and ancillary works						
3	Superstructures and all other ancillary works						
4	Post operation testing and commissioning						

Design and estimates of the silo bins and ancillary works have been completed. Draft Bidding Document (DBD) has been prepared and sent to World Bank for review. After getting clearance from World Bank, bid would be invited.

4. DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Environment

4.1.1 Climate

Bangladesh can be divided into seven climatic zones (Rashid 1991). According to the classification, the project area is located in the South-Eastern climatic zone (Figure 4.1).

South-eastern zone (A): It comprises the Chittagong sub-region and a strip of land extending from southwest Sundarbans to the south of Comilla. The hills over 300m in height have north-eastern zone climate. The rest of the area has a small range of temperature, rarely goes over a mean of 32°C and below a mean of 13°C. Rainfall is heavy, usually over 2,540 mm. In winter dew fall is heavy.

Like other parts of the country, the project area is heavily influenced by the Asiatic monsoon, and it has these three distinct seasons:

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

The pre-monsoon hot season is characterized by high temperatures and thunderstorms. April is the hottest month in the country with mean temperatures ranging from 27°C in the east and south, to 31°C in the west-central part of the country. After April, increasing cloud-cover reduces the temperature. Wind direction is variable during this season, especially during the early part. Rainfall, mostly caused by thunderstorms, at this time can account for 10 to 25 percent of the annual total.

The rainy monsoon season is characterized by southerly or south-westerly winds, very high humidity, heavy rainfall and long periods of consecutive days of rainfall. The monsoon rain is caused by a tropical depression that enters the country from the Bay of Bengal. About 80% of the annual precipitation occurs during the five-month monsoon season from May to September.

The cool dry season is characterized by low temperatures, cool air blowing from the west or northwest, clear skies and meager rainfall. The average temperature in January varies from 17°C in the northwest and north-eastern parts of the country to 20°C to 21°C in the coastal areas. Minimum temperatures in the extreme northwest in late December and early January reach between 3°C to 4°C.

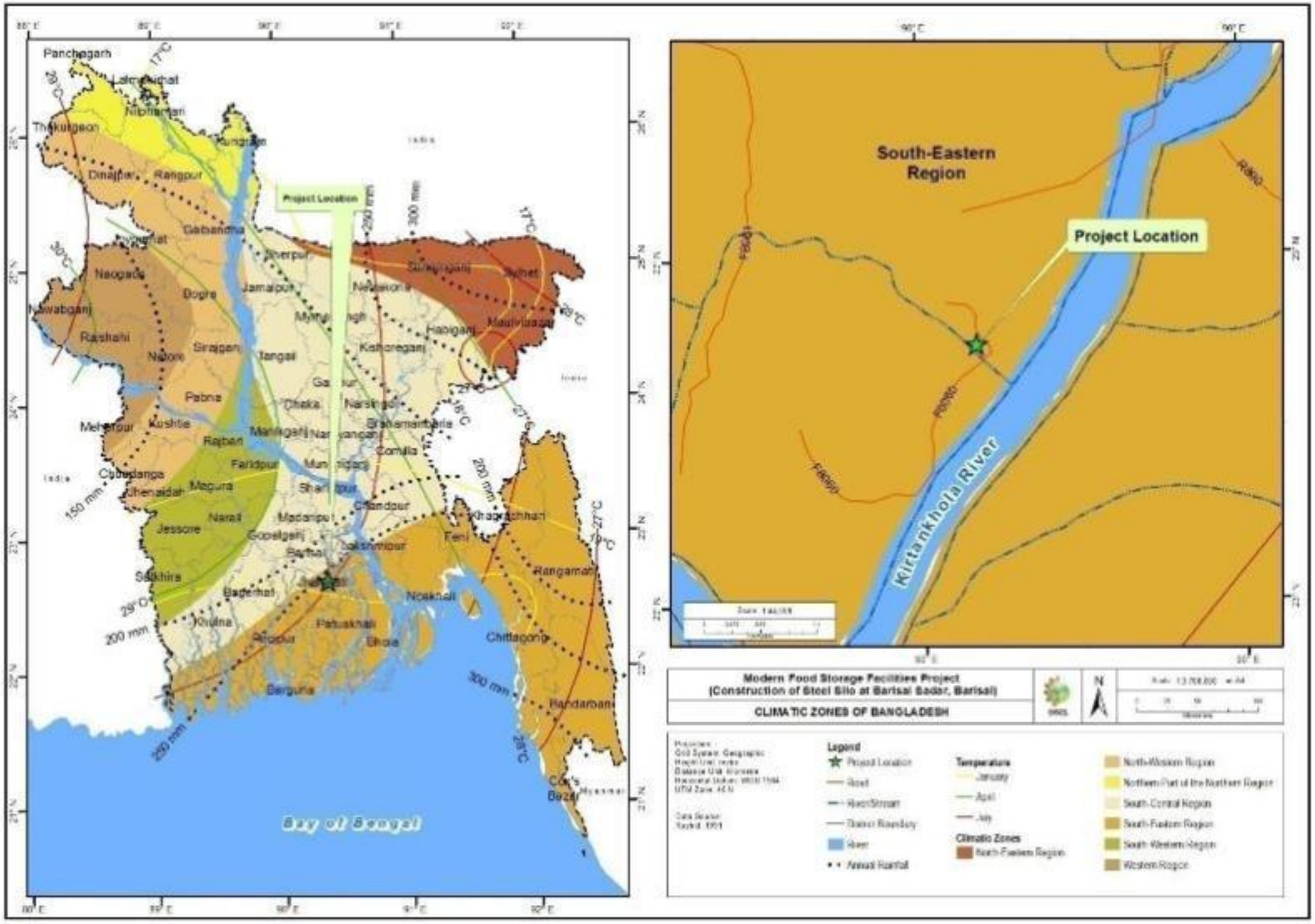
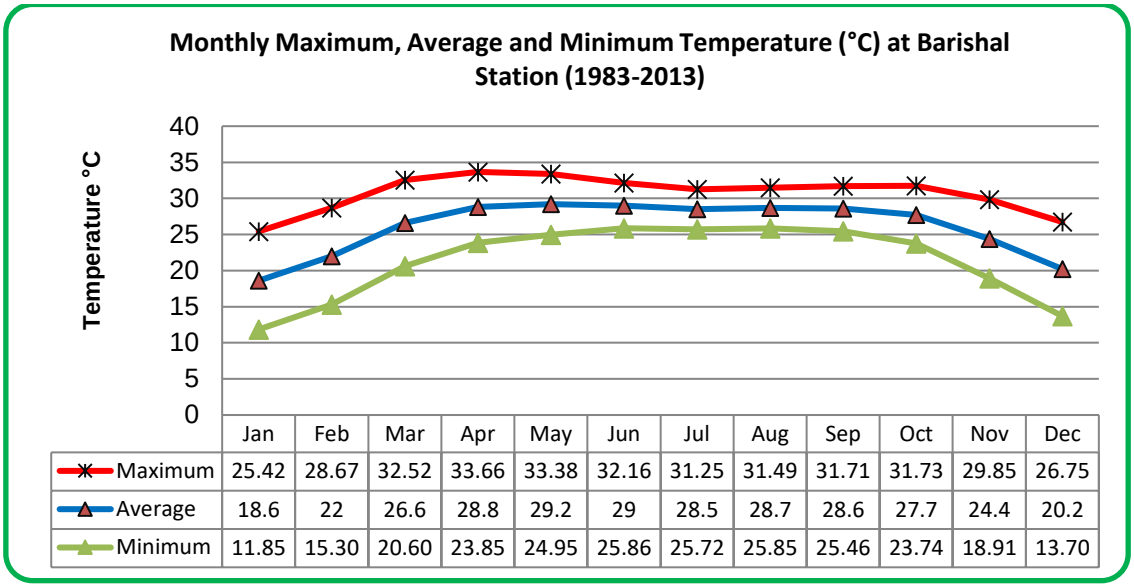


Figure 4.1: Climatic Zones of project area

4.1.1.1. Temperature

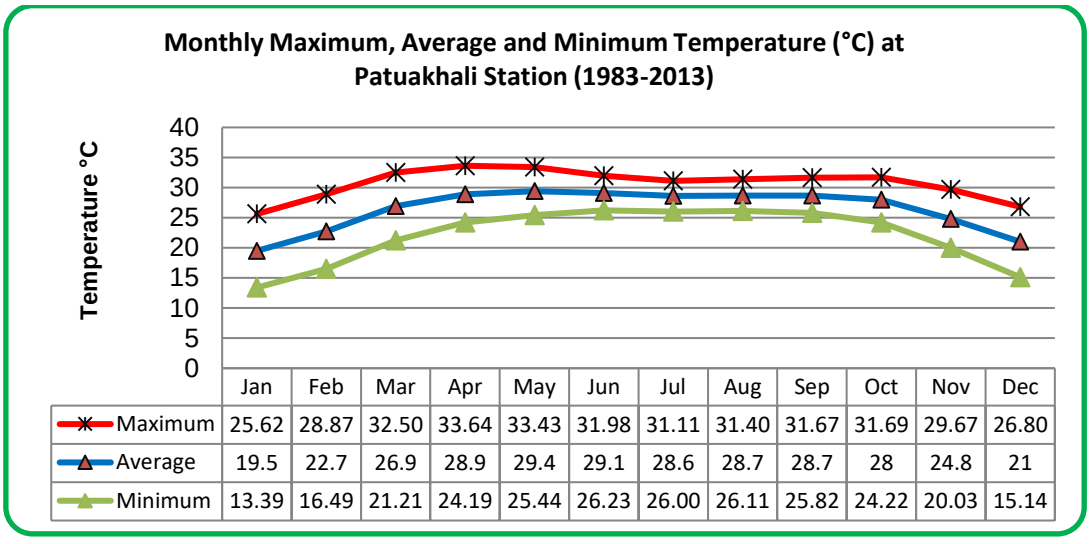
The study area falls in Barishal area and this area is under Barishal and near to Patuakhali meteorological station. The monsoon starts in April or May and continues till September to October. During the monsoon, the temperature varies between 31°C and 34°C. The temperature falls below 12°C in winter which is spread over December and January and may well include November and February. The highest temperature is felt during April–May period, when the temperature may be as high as 33.66°C. These values of temperature are derived from the temperature data from 1983 to 2013 of Bangladesh Agricultural Research Council. Figure 4.2shows the variation of maximum, average and minimum temperature of Barishal station which can represent the temperature of the study area.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	25.42	28.67	32.52	33.66	33.38	32.16	31.25	31.49	31.71	31.73	29.85	26.75
Average	18.6	22	26.6	28.8	29.2	29	28.5	28.7	28.6	27.7	24.4	20.2
Minimum	11.85	15.30	20.60	23.85	24.95	25.86	25.72	25.85	25.46	23.74	18.91	13.70

Figure 4.2: Average Monthly Maximum & Minimum Temperature

On the other part, the climatic pattern of Patuakhali is similar to the climate of the project area as it is close to Barishal. In Patuakhali the maximum temperature occurs in April which is 33.64°C, January is the coldest month, with temperature averaging 13.39°C (Figure 4.3).

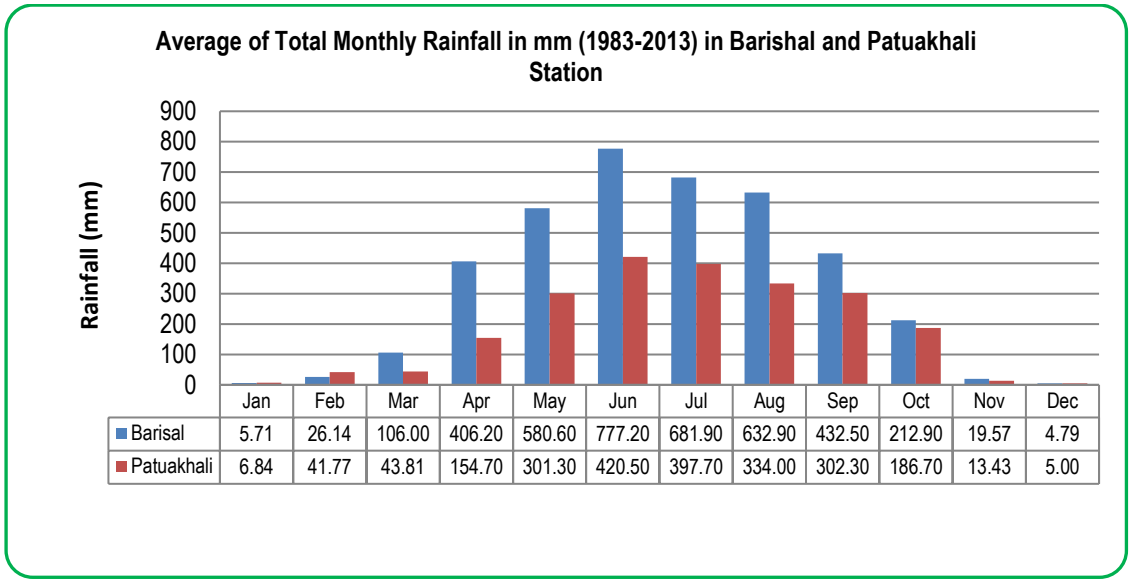


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	25.62	28.87	32.50	33.64	33.43	31.98	31.11	31.40	31.67	31.69	29.67	26.80
Average	19.5	22.7	26.9	28.9	29.4	29.1	28.6	28.7	28.7	28	24.8	21
Minimum	13.39	16.49	21.21	24.19	25.44	26.23	26.00	26.11	25.82	24.22	20.03	15.14

Figure 4.3: Variation of Monthly Surface Air Temperature at Patuakhali Station

4.1.1.2. Rainfall

Figure 4.4 represents the Monthly accumulated rainfall at Barishal and Patuakhali station. The monsoon starts in May or June and continues till August in both o the stations. The maximum monthly rainfall during April to August varies from 406 mm to 778mm in the Barishal station. At Patuakhali station the precipitation is the lowest in December, with an average of 5 mm. and the maximum falls in June, averaging 420.5mm.

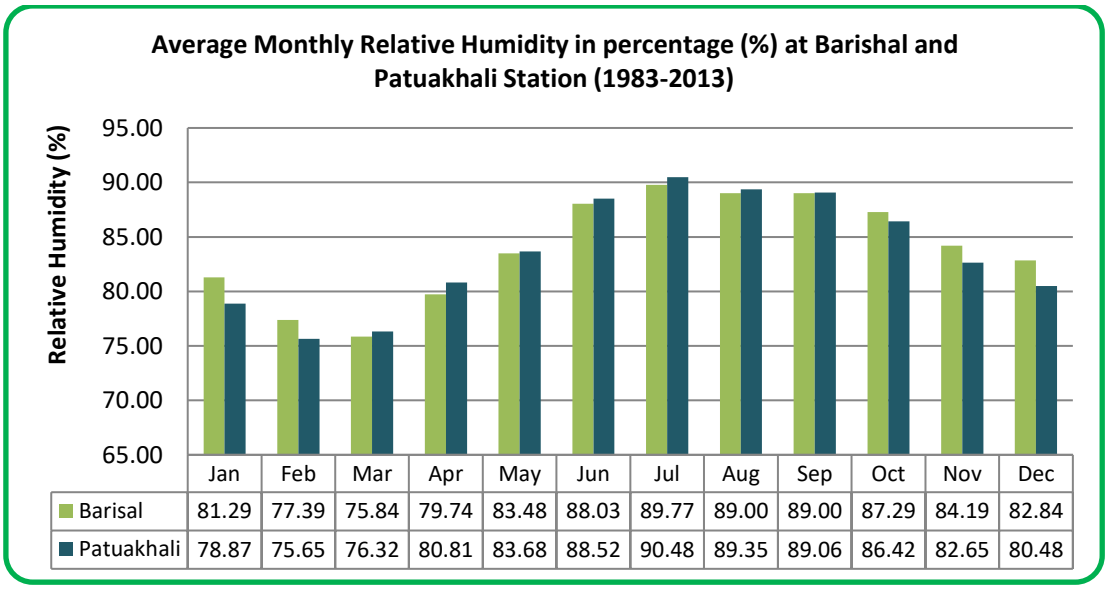


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barisal	5.71	26.14	106.00	406.20	580.60	777.20	681.90	632.90	432.50	212.90	19.57	4.79
Patuakhali	6.84	41.77	43.81	154.70	301.30	420.50	397.70	334.00	302.30	186.70	13.43	5.00

Figure 4.4: Average Monthly Accumulated Rainfall at Barishal and Patuakhali Station

4.1.1.3. Humidity

Humidity remains high in summer and comparatively low in winter season. The statistical data of humidity from 1983 to 2013 indicates that humidity in the above two stated areas maximized in May to October in the year which is ranges from 83% to 90.5%. On the other hand, humidity falls 75% in February, March and April during the winter season in the considered stations areas (Figure 4.5).

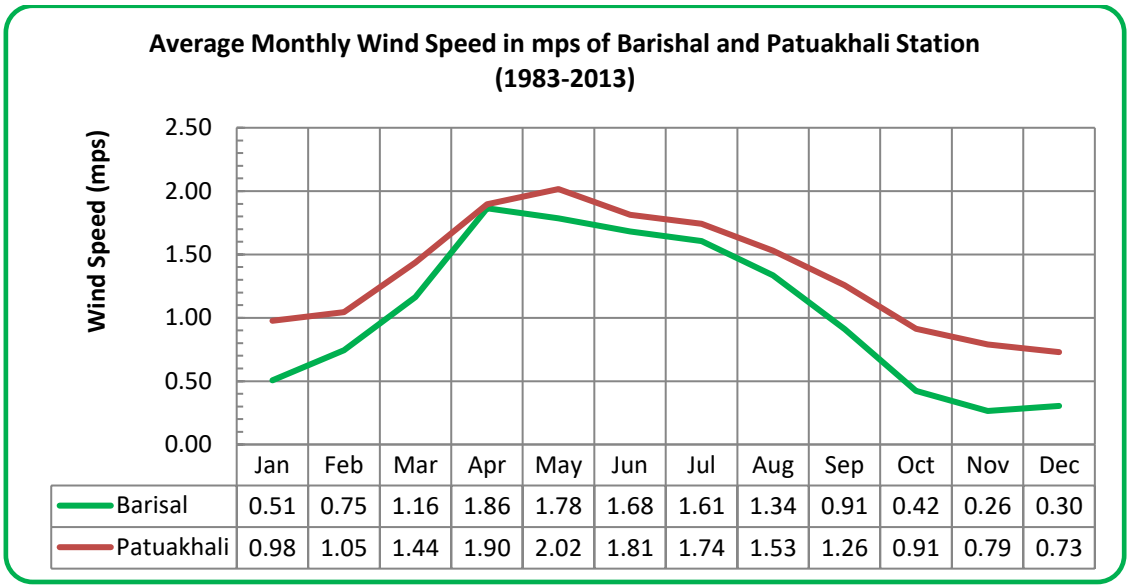


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barisal	81.29	77.39	75.84	79.74	83.48	88.03	89.77	89.00	89.00	87.29	84.19	82.84
Patuakhali	78.87	75.65	76.32	80.81	83.68	88.52	90.48	89.35	89.06	86.42	82.65	80.48

Figure 4.5: Average Monthly Relative Humidity in Barishal and Patuakhali Station

4.1.1.4. Wind Speed

Figure 4.6 shows the average wind speed from 1983 to 2013 at Barishal and Patuakhali stations. Wind speed in the study area represents seasonal variation between the dry season (October to January) and the monsoon season (April to August) in both stations. During the month of October to January the wind speed shows lower value. In this season it shows 0.26 to 0.51 ms^{-1} wind speed and in the month of April to July the wind speed shows 1.61 to 1.86 ms^{-1} in Barishal station. In Patuakhali the maximum wind speed shows up to 2.02 ms^{-1} speed and the lowest speed shows 0.73 ms^{-1}.

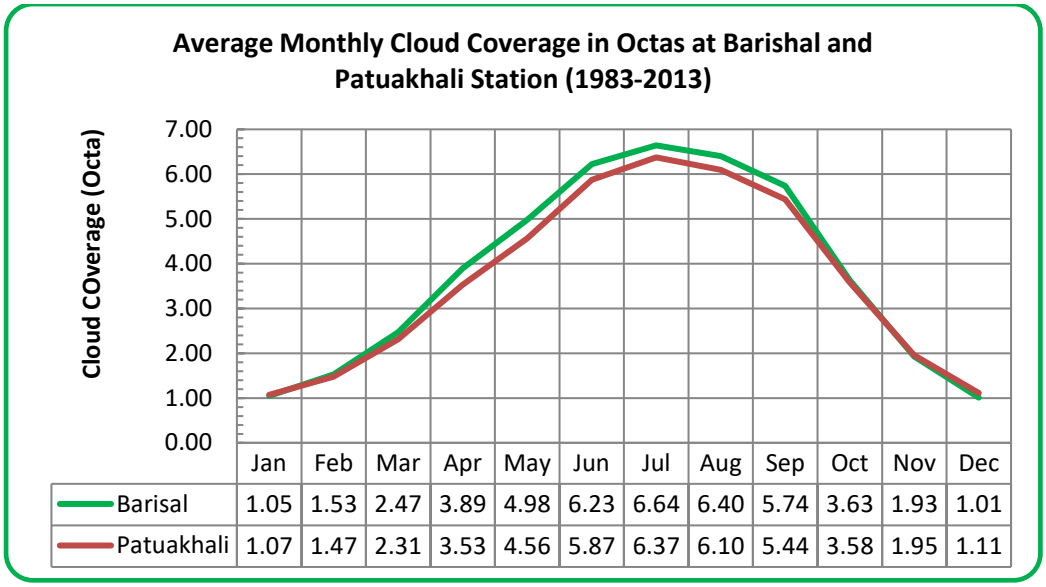


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barisal	0.51	0.75	1.16	1.86	1.78	1.68	1.61	1.34	0.91	0.42	0.26	0.30
Patuakhali	0.98	1.05	1.44	1.90	2.02	1.81	1.74	1.53	1.26	0.91	0.79	0.73

Figure 4.6: Average Monthly Wind Speed at Barishal and Patuakhali Station

4.1.1.5. Cloud Coverage

Figure 4.7 shows the average monthly cloud coverage of Barishal and Patuakhali Station. From the figure it is seen that, the cloud coverage of both the stations increase from June to September. The value varies within 5.74 octas to 6.64 octas in Barishal station. The lowest value falls in December to February within the range of 1.05 octas to 1.53 octas in Barishal station. In Patuakhali station the highest wind speed is 6.37 octas and lowest wind speed is 1.07 octas.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barisal	1.05	1.53	2.47	3.89	4.98	6.23	6.64	6.40	5.74	3.63	1.93	1.01
Patuakhali	1.07	1.47	2.31	3.53	4.56	5.87	6.37	6.10	5.44	3.58	1.95	1.11

Figure 4.7: Average Monthly Cloud Coverage in Barishal and Patuakhali Station

4.1.2 Noise Level

Excessive noise is a potential issue for both human and biological receivers and can potentially cause a range of negative issues, from mild annoyance and moderately elevated levels of aggression to significant disturbance of behavioral patterns and in severe cases temporary or permanent hearing loss. According to World Health Organization's Guidelines for Community Noise (1999), daily sound pressure levels of 50 decibels (dB) or above can create discomfort amongst humans, while ongoing exposure to sound pressure levels over 85 dB is usually considered the critical level for temporary hearing damage.

Results of the noise level monitored along with details of the sampling locations (Figure 4.8) have been showed in Table 4.1. The results show that time weighted average value of the sound monitored at inside and outside of the project area did not exceed the standard fixed for the respective areas.

Figure 4.8: Noise Level Monitoring in the Project Area

Table 4.1: Noise Level at Different Locations of Project Area

ID	Sampling Location	GPS Location	Zone*	Noise Level Day dB (A)	Bangladesh Standard at Day dB (A)**	Remarks
NM-01	Project Site	22.68061° N 90.36077°E	Commercial Area	46.91	70	Good
NM-02	Project Site	22.68115 N 90.36019°E	Commercial Area	43.39	70	Good
NM-03	Project Site	22.68113°N 90.36078° E	Commercial Area	44.72	70	Good
NM-04	Project Site	22.6818°N 90.36076° E	Commercial Area	43.90	70	Good
NM-05	Project Site	22.6812°N 90.3615°E	Commercial Area	45.85	70	Good

Note:

** According to Environmental Quality Standard 1997 and subsequent amendment in 2006.*

*** Bangladesh Standard for Noise Level at different types of areas (as per Noise Pollution (Control) Rules, 2006).*

The sound level standards for silent area are 45 dBA, for residential area 50 dBA and for commercial area 70 dBA at day time. The sound level standards for silent area are 35 dBA, for residential area 40 dBA and for commercial area 60 dBA at night time.

Abbreviation:

NM- Noise Measurement, dB- decibel

4.1.3 Physiography

In the context of physiography, Bangladesh can be divided into three broad categories based on topography, physical features, and geological history (Brammer, 1996):

1. Floodplains
2. Terraces
3. Hills

Within these 3 broad categories, a number of authors have further divided the land surface into a series of Physiographic Units based on a combination of topographical/landscape features, underlying geology and surface soils (Brammer, 1996, Rashid, 1991, Morgan and McIntyre, 1959). The most recent study was undertaken by the Soil Resource Development Institute (SRDI) who further refined the previous classifications into 26 Physiographic Units (20 primary units and 6 sub-units) based on an assessment of more recent and detailed data (SRDI, 1997).

The project area falls in the Ganges Tidal Floodplain physiographic unit (Figure 4.9)

***Ganges Tidal Floodplain*:** The boundary between this unit and the Ganges river floodplain is traditional. The tidal landscape has a low ridge and basin relief crossed by innumerable tidal rivers and creeks. Local differences in elevation generally are less than 1m compared with 2-3m on the Ganges floodplain. The sediments are mainly non-calcareous clays but are silty and slightly calcareous on riverbanks and in a transitional zone in the east adjoining the lower Meghna. This unit covers most of Satkhira, Khulna, Bagerhat, Pirojpur, Barishal, Patuakhali,

Bhola and the whole of the Jhalokati and Barguna districts, but excludes Khulna Sundarbans in the southwest.

The rivers carry fresh water throughout the year in the northeast and east, but saltwater penetrates increasingly further inland towards the west, mainly in the dry season. In the northeast, there is moderately deep flooding in the monsoon, mainly by rainwater ponded on the land when Ganges distributaries and the lower Meghna are at high flood levels. Elsewhere, there is mainly shallow flooding at high tide, either throughout the year or only in the monsoon, except in the extensive areas where tidal flooding is prevented by embankments. Within embankments, there is seasonal flooding with accumulated rainwater. The soils are non-saline throughout the year over substantial areas in the north and east, but they become saline to varying degrees in the dry season in the southwest.

Sundarbans: South of the Ganges tidal floodplain, there is a broad belt of land, barely above sea level with an elevation of only 0.91m. This very low land of some 4,827 sq km area, contains the Sundarbans forest and the Sundarbans reclaimed estates (cultivated land) - classified as Sundarbans unit. There are two possible causes for the existence of such a large very low estuarine area - insufficient deposition by the Ganges distributaries or subsidence. The main distributaries of the Ganges never flowed through this region, and the small ones that did last a few centuries at the most. The building up of this estuarine area is consequently not complete. On the other hand, it is possible that subsidence has played a major part in depressing this area. There is much evidence of this, such as large ruins in the heart of the swampy estuarine areas, e.g. at Shekertek and Bedkashi, and the presence of human artifacts and tree stumps, buried in the alluvium many feet below sea level.

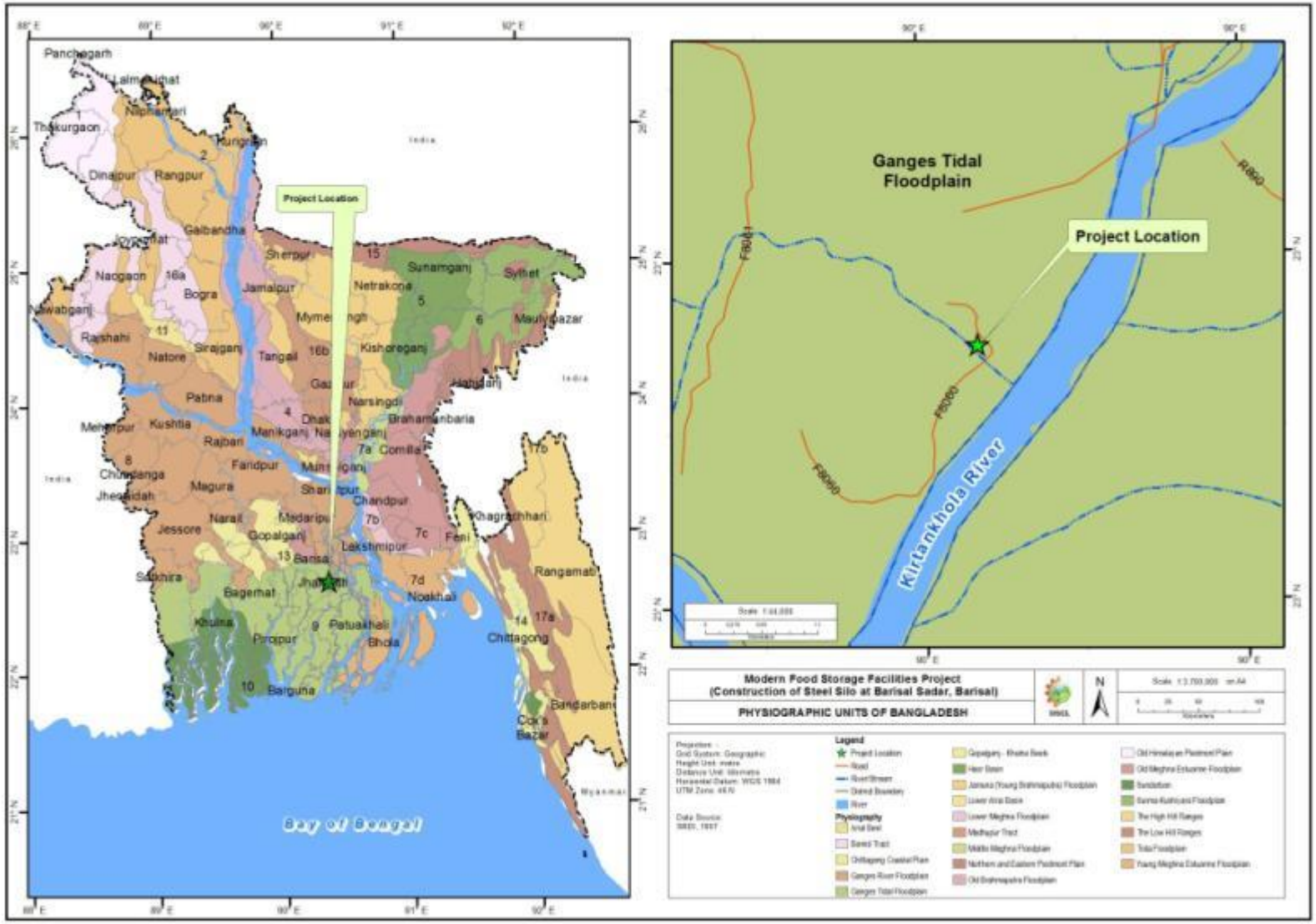


Figure 4.9: Physiographic Units of Project area

4.1.4 Topography

Topography 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. On the south, a highly irregular deltaic coastline is of about 600 km by many estuarine rivers and channels flowing into the Bay of Bengal. The alluvial plain is part of the larger plain of Bengal, which is sometimes called the Lower Gangetic Plain. Elevations of the plains are less than 10m above the sea level; elevation furthers decline to a near sea level in the coastal south.

The general topography of the project area is relatively flat. The topography of the specific project location is -20-6.96m a.m.s.l (Figure 4.10).

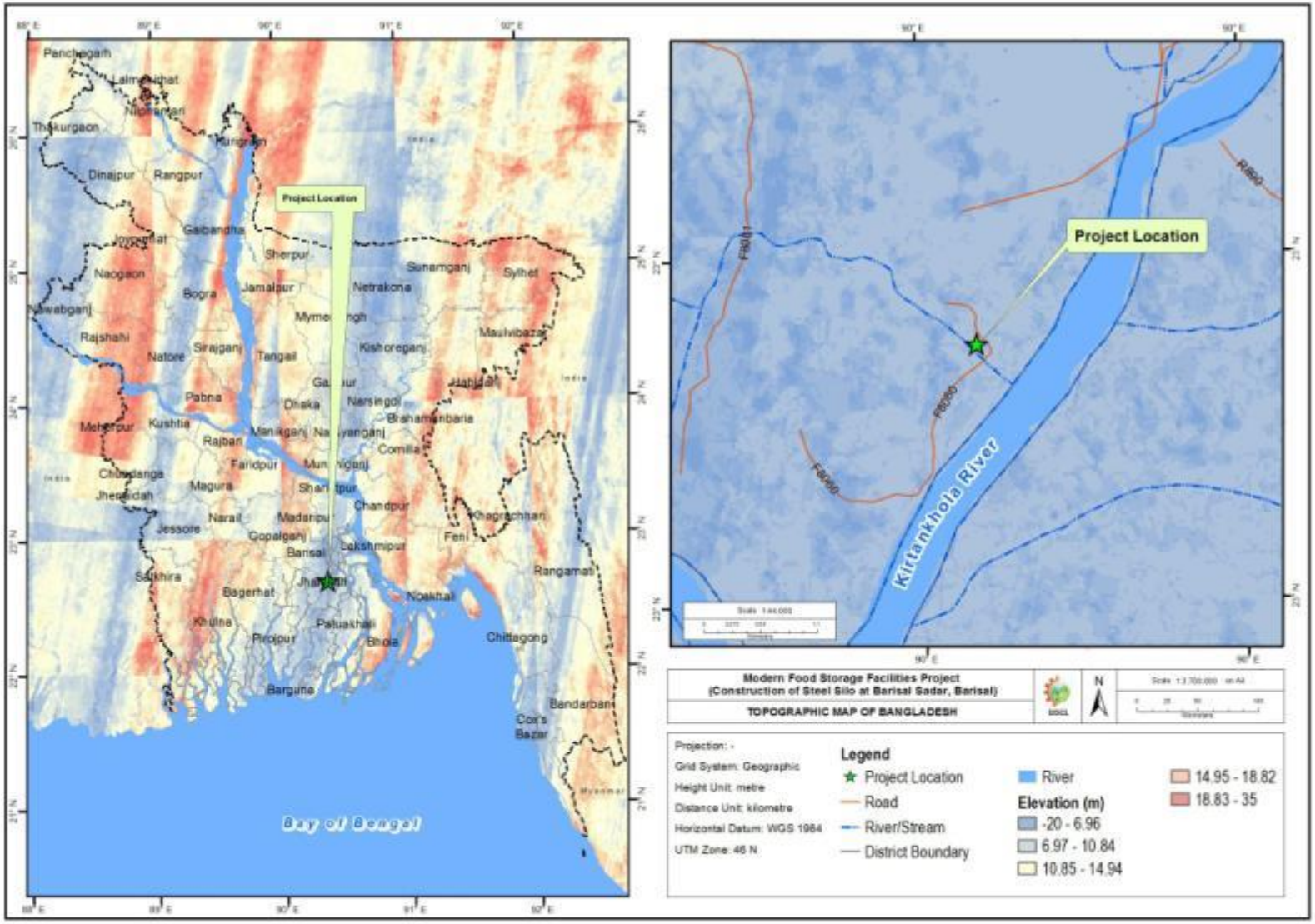


Figure 4.10: Topographic Map of Bangladesh

4.1.5 Geology

Bangladesh is situated to the east of the Indian sub-continental plate. Nearly 85% of Bangladesh is underlain by deltaic and alluvial deposits of the Ganges, Brahmaputra, and Meghna river systems. The Hinge Zone is a narrow strip of about 25 km wide complex flexure zone, which separates the Bengal Foredeep from the shelf zone. It trends approximately N 30' E along the Calcutta-Pabna-Mymensingh gravity high and extends upto the western tip of Dauki fault. This zone is characterized by the sharp change in the dip of the basement rocks associated with deep-seated displacements in faults and is reflected on the gravity and magnetic anomalies. The Eocene limestone dips at about 20 in this zone as compared to 2-3 in the shelf zone. The seismic interpretation shows that the depth of the Sylhet Limestone - a strong seismic reflector - increases from 4000m to 9000m within a narrow zone of 25-km. During the subsurface interpretation of the south-eastern part of the West Bengal in India, a zone of flexure in the top of the Sylhet limestone was recognized which is the extension of the Hinge Zone in India.

Bengal Foredeep occupies the vast area between Hinge Line and ArakanYoma Folded System and plays the most important role in the tectonic history of Bengal Basin. Tectonically, Bengal Foredeep can be divided into two major regions- (a) Western Platform Flank and (b) Eastern Folded Flank. The Western Platform flank is further subdivided into (a) Faridpur Trough (b) Barishal-Chandpur High (c) Hatiya Trough (d) Madhupur High and (e) Sylhet Trough.

Barishal-Chandpur High interpreted as a gravity and magnetic anomaly caused by a magmatic body at great depth. This zone is located between Faridpur trough and Hatiya trough of the Bengal Foredeep. The width of the zone is about 60 km and apparently corresponds to an uplift of the sedimentary cover. A number of gravity anomalies are spread over this zone. A paleo-high stretching from Barishal-Chandpur High in the NE direction has been presumed and the ridge was interpreted to turn south of Barishal-Chandpur High in north-south direction merging with the Ninety East Ridge. There is no definite evidence for existence of such a ridge dividing the Bengal Foredeep into two parts. Patharghata, Muladi, Chandpur, Lakshmipur' [Lakshmipur], Munshiganj, Kamta and Daudkandi are the main anticlinal structures of this zone. Muladi wells failed to yield positive result in respect of commercial accumulation of hydrocarbons due to lack of northern closure. This zone has not been sufficiently investigated by seismic surveys (Figure 4.11).

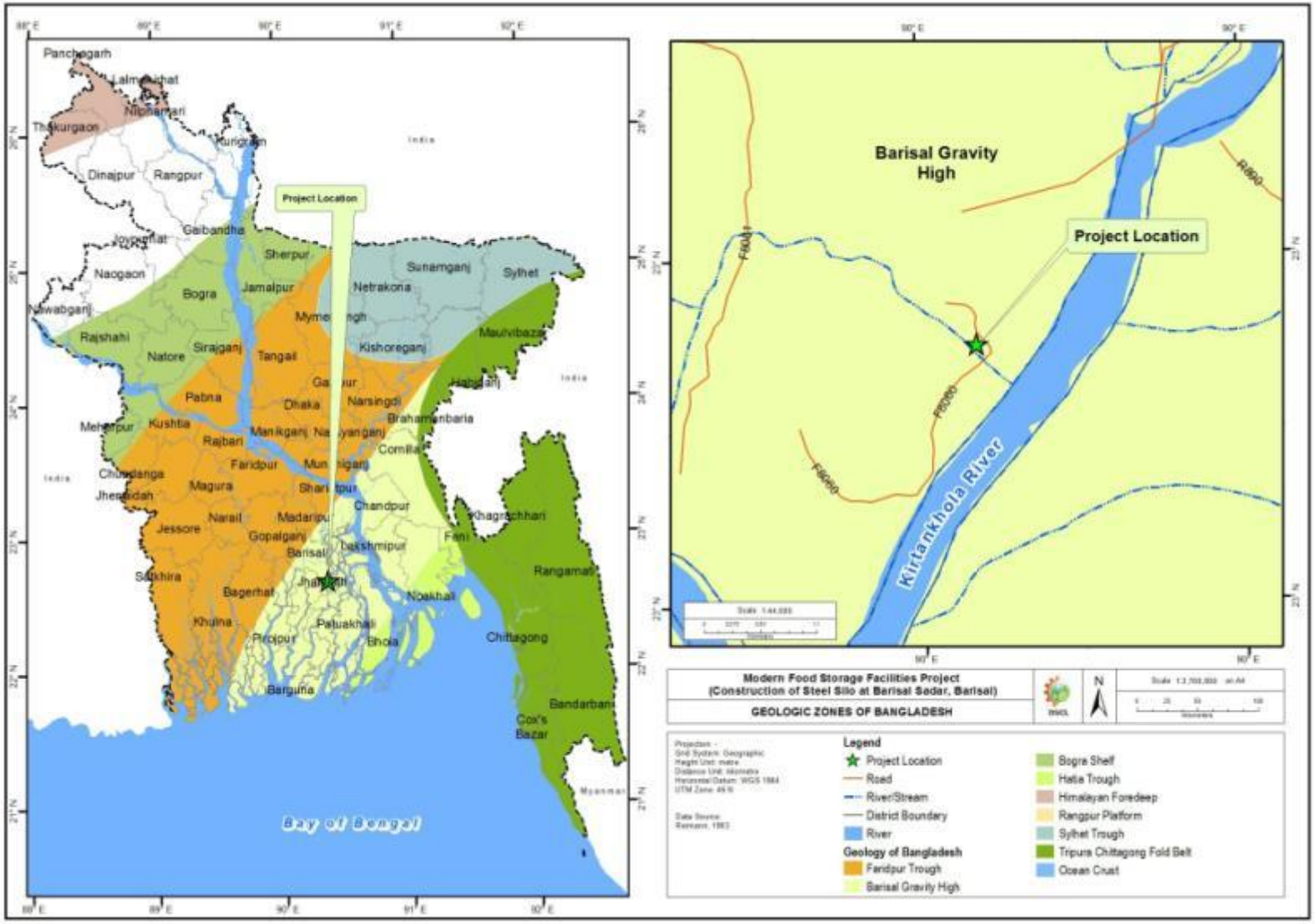


Figure 4.11: Geology of Project area

4.1.6 Air quality

There is no official record of secondary air quality data due to non-availability of a regular air quality monitoring program for ambient conditions or emissions. The main sources of air pollutant emissions are the dust from food grains while handling, limited number of heavy trucks that carry food grains in the CSD. Now the activity is observed very minimum. Air quality was measured under this project during preparation of ESAMF. The samples were collected at the boundary of the north and south side of the proposed area during the period of preparation of Environmental and Social Assessment Management Framework (ESAMF). The condition of the air quality is presented in the following Table 4.2 (Source: ESAMF of MFSP). From the test results, it is found that SPM, CO, SOx and NOx of the ambient air in the sampling points are far below the atmospheric environmental standards of Bangladesh for the industrial and mixed areas.

Table 4.2: Air Quality Monitoring Data

Date dd/mm/yy	Sampling point	Duration	SPM µg/m^3	CO µg/m^3	SOx µg/m^3	NOx µg/m^3
09/12/12	North end	8 hours	265	675	27	38
09/12/12	South end	8 hours	235	625	35	44
Bangladesh Standard for Industrial and Mixed			**500**	**5000**	**120**	

4.1.7 Water Resources

Bangladesh is located over a subsiding basin of tectonic origin overlain with a great thickness of sedimentary strata. This sedimentary stratum is an unconsolidated alluvial deposit of recent age overlaying marine sediments. The recent delta and alluvial plains of the Ganges, Brahmaputra and the Meghna Rivers constitute the upper formation. The near surface Quaternary alluvium contains good aquifer characteristics (transmission and storage coefficients). The groundwater (GW) storage reservoir has three divisions: upper clay and silt layer, a middle composite aquifer (fine to very fine sand) and a main aquifer consisting of medium to coarse sand. Drinking water is generally taken from deep tube wells with strainers set between depths of 200 meters to around 400 meters (DPHE, 2011). The Ground water level is at or very close to the surface during the monsoon; whereas, it is at maximum depth during the months of April and May (Banglapedia, 2014). The river network map is shown in Figure 4.12.

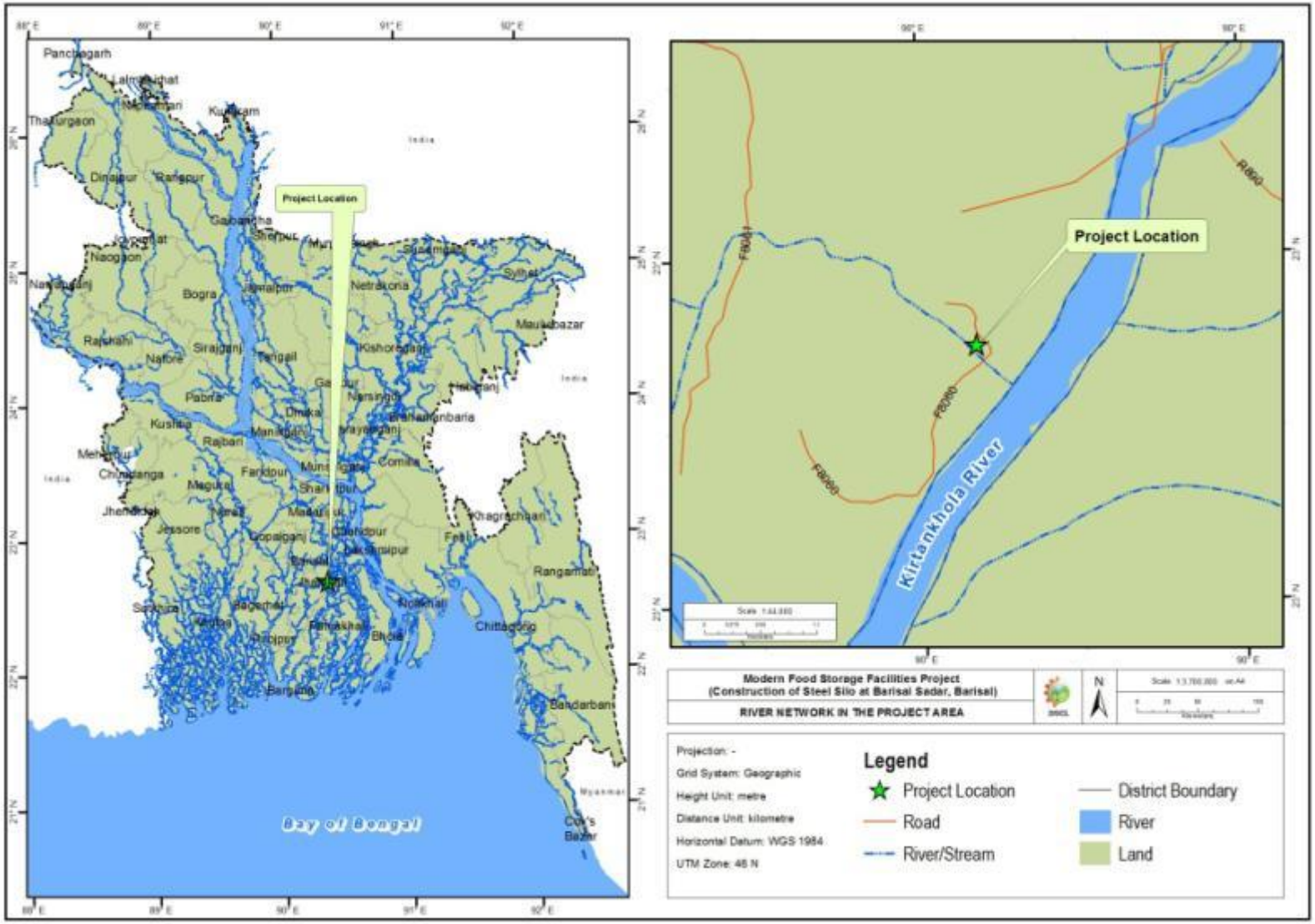


Figure 4.12: Water Body and River Network Map

4.1.7.1 Ground Water

Though, arsenic is a problem in large part of Bangladesh ground water. The project area has no Arsenic problem in ground water. During consultation meeting with the local people, no arsenic affected person was identified. Arsenic contained in the soil as soluble form, it may contaminant any time in the ground water. That's why the consultant addressed arsenic for this project. Figure4.13 shows the water sample collection of ground water from an installed deep tube well about 190 ft' in the project area. Figure 4.15 shows (the map showing the arsenic contaminated areas throughout) that the Arsenic contamination is there in the project area.

On 27thJanuary 2017, groundwater sample was collected by environmental team from a tube well depth about 190 ft near the project area. The Department of Public Health Engineering (DPHE) analyzed the sample. The result (see Appendix D and F) of the groundwater sample and the GoB standards for drinking water (ECR, 1997) are shown in Table 4.3. The concentration levels of all parameters are within the drinking water quality standard set by DoE except $BOD_5$and Iron.

Figure 4.13: Ground Water Sampling and On-site Testing in the Project Location

Table 4.3: Results for Groundwater quality

Parameter	Unit	Test value of the sample collected dated on December, 2012	Test value of the sample collected dated on January, 2017	Bangladesh Standard	Remark
Temperature	°C	Not tested during screening.	25.2	20-30	Ok
Turbidity	NTU		1.3	<10	Ok
Color	TCU		1.1	<15	Ok
pH	--		8.5	6.5-8.5	Ok
TDS	mg/l		42	<1000	Ok
DO	mg/l		6.5	>5	Ok
BOD_5	mg/l		1.0	0.2	Not ok
Fe	mg/l		1.91	0.3-1	Not ok
Zn	mg/l		<LOQ	5	Ok
Al	mg/l		0.062	0.2	Ok

Source: On site test and Lab Analysis by DPHE

4.1.7.2 Surface Water

The project area is surrounded by the mighty river Kirtonkhola. There are also significant numbers of natural water bodies around the project location. Most of the water bodies become dry during dry period or contain minimum amount of water and full of water in rainy season. People use the water from the river and ponds for washing, bathing and irrigation purposes. In the wet season, substantial amount of the land in the area is inundated due to flood. Figure 4.14 shows the surface water sample collection in the CSD pond and on-site test.

The overall quality of surface water around the project site and its surroundings varies throughout the year. Typically, water quality improves during the monsoon due to the influx of fresh rainwater and worsens during the dry season as water evaporates and the concentration of contaminants increases.

On 27thJanuary 2017, surface water sample was collected by environmental team from a pond near the project area. The Department of Public Health Engineering (DPHE) analyzed the sample. The result (see Appendix C and E) of the surface water sample and the GoB standards for fishing water (ECR, 1997) are shown in Table 4.4. The concentration levels of all the parameters for surface water were within the acceptable limit set by the DoE, GoB, except pH, turbidity, $BOD_5$and DO.

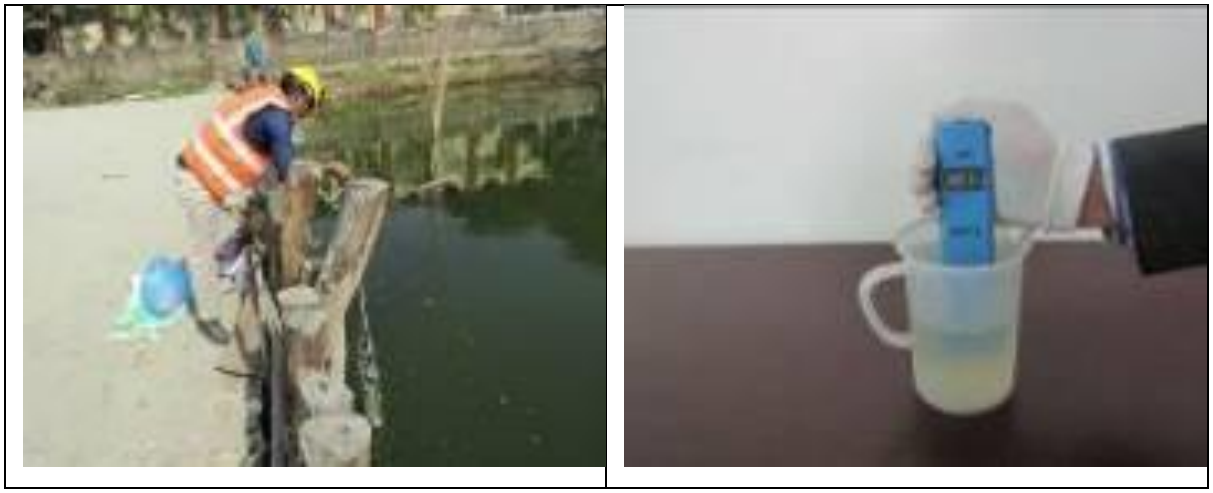


Figure 4.14: Surface Water Sampling and On-site Testing in the Project Location

Table 4.4: Results for Surface Water quality

Parameter	Unit	Test value of the sample collected dated on December, 2012 (Kirtonkhola River)	Test value of the sample collected dated on January, 2017 (Nearby Pond)	Bangladesh Standard	Remark
Temperature	°C	22.3	25.4	20-30	Ok
Turbidity	NTU	10	21	<10	It is higher in pond sample rather than river sample
Color	TCU	18	2.7	<15	It is higher in the river sample
pH	--	6.8	9.2	6.5-8.5	It is higher in pond sample

					rather than river sample
TDS	mg/l	650	29	<1000	Ok
DO	mg/l	7.2	4.12	>5	It is not ok in the pond sample
BOD_5	mg/l	3.2	12	<6	It is not ok in the pond sample
Fe	mg/l	0.2	<LOQ	2	Ok
Zn	mg/l	2.5	0.09	5	Ok
Al	mg/l	0.1	0.221	-	No standards were set by the DoE

Source: Onsite test, Lab Analysis by DPHE and Environmental Screening Report, Dhaka, February 2015

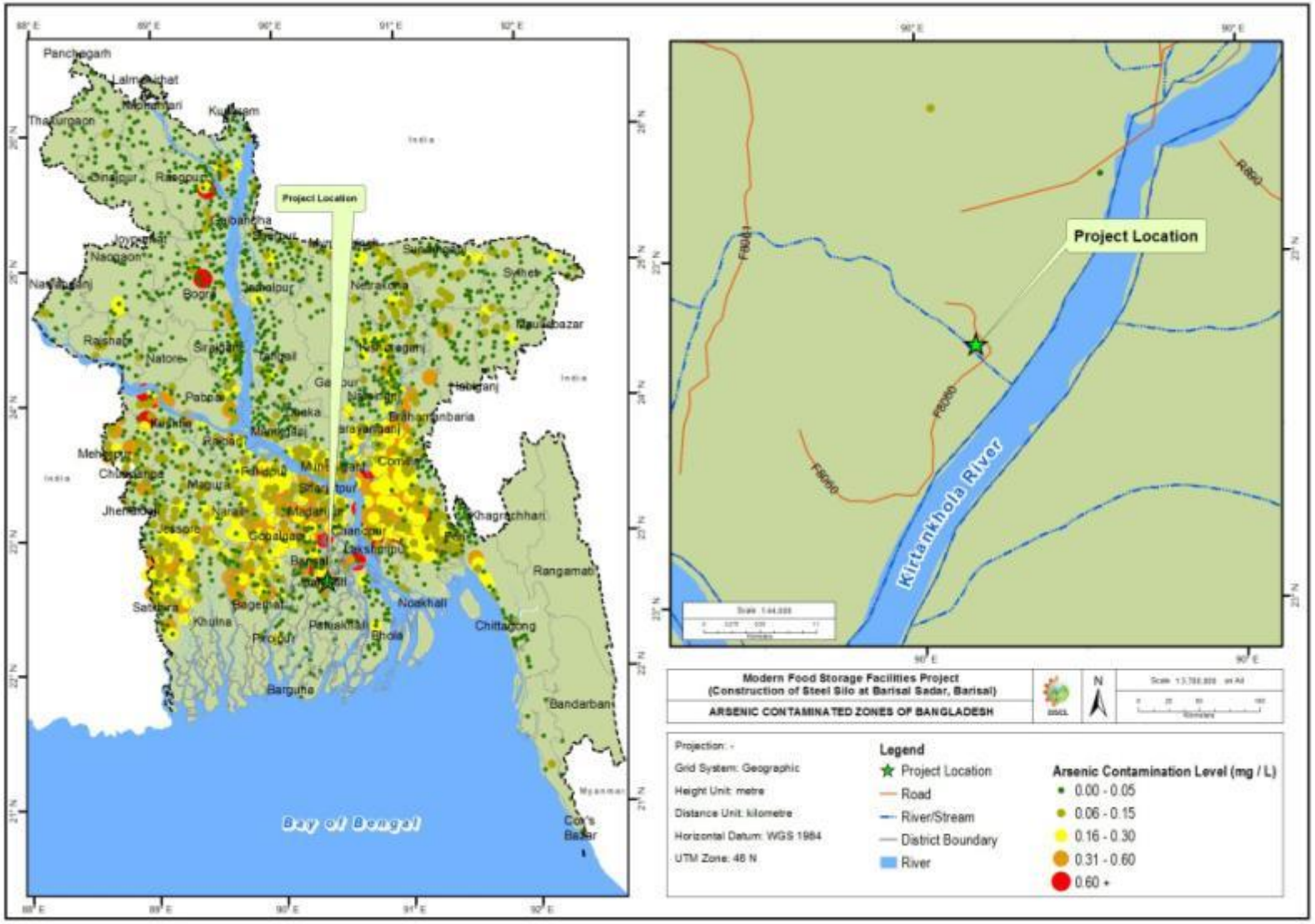


Figure 4.15 Arsenic Contaminated Zones of Bangladesh

4.1.8 Soil Quality

The soil of the project area is yet not classified and does not fall any of the category of Bangladesh soil types. However, there are two categories of soil near the project location which includes the following (Figure 4.16)

- ***Hill soils (Brown Hill soils)*** Occupy gentle to very steep slopes of northern and eastern hills. These soils have been developed over consolidated or unconsolidated rocks, which are imperfectly to excessively drained. In most of the cases, they have Cambic or Argillic B-horizon. But some of them are very shallow soils overlying rock or iron pan at less than 25 cm depth. Generally, the subsoils are yellow to strong brown, friable, porous, sandy loam to sandy or silty clay loam, very strongly to extremely acidic. In shallow soils there are rock fragments or soft-bedded structure. The majority of these soils are Dystric Cambisols and Haplic and Ferric Alisols.

From the field and laboratory test results of soil it can be found that the sub-soil formation encountered at the proposed site is homogeneous. The sequence of lithological composition as well as consistency of the soil at different depths has been depicted in the bore logs.

However; we enclosed the allowable bearing capacity of soil at different depth and length. Considering the magnitude of the structure, the structural designer selects the suitable type of foundation. The details of the soil investigations results are given in the sub-soil investigations report at Barishal prepared by GERICO, France.

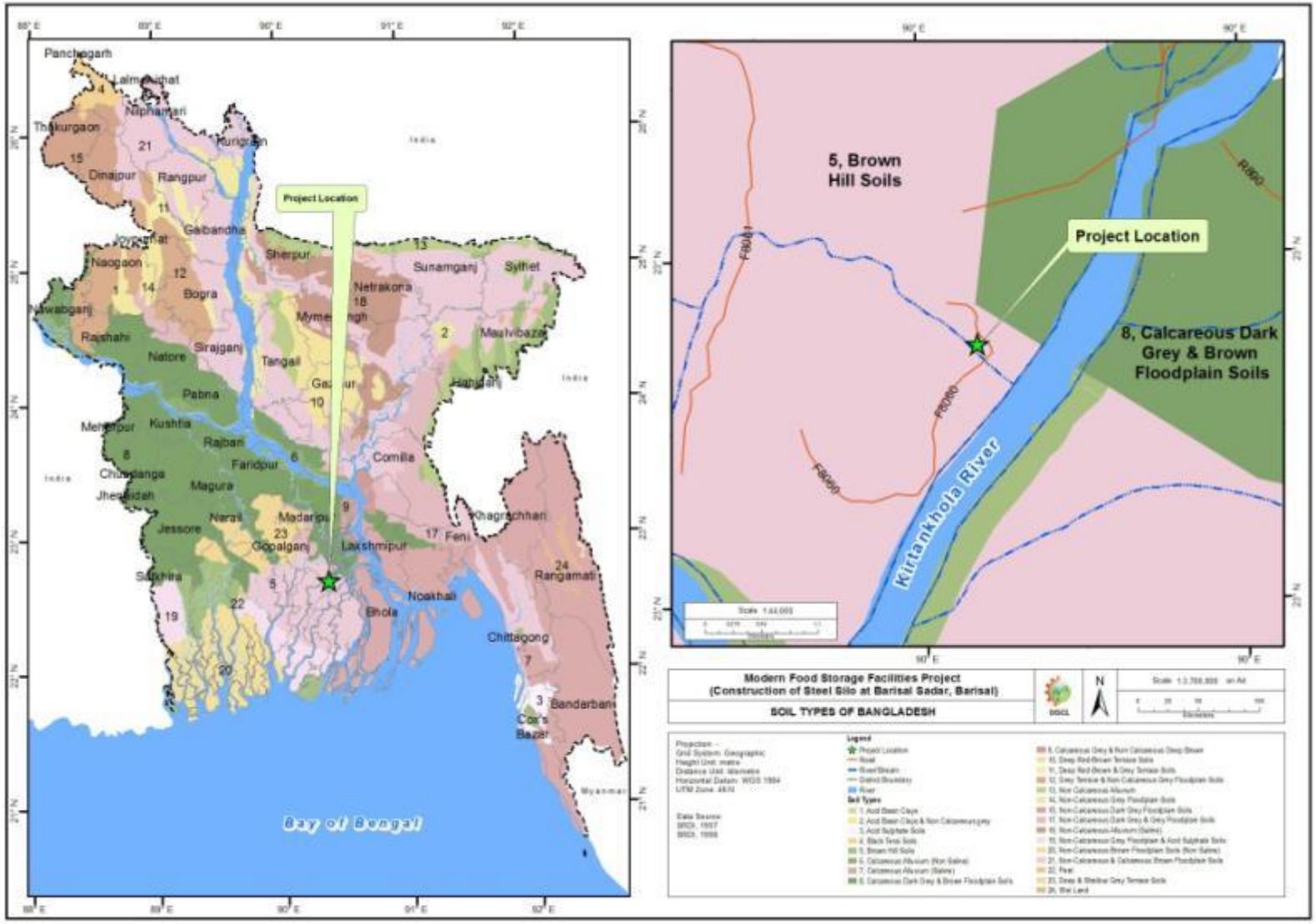


Figure 4.16: Soil Types of Bangladesh

4.1.9 Agro-Ecological Zones within the Project Area

A 1988 study carried out by the United Nations Development Program (UNDP) classified Bangladesh into a series of Agro-ecological Zones (AEZs) based on an assessment of commonalities in characteristics such as physiography, soil types, climate and drainage. In total, 34 regions were identified and characterized, however this information has been updated and further refined on numerous occasions since the original study was undertaken.

The purpose of assessing the AEZs within the project area is to establish a broad overview of expected soil conditions which can be compared against more detailed, Upazila-level data sources.

The most recent assessment was completed by the Soil Resource Development Institute (SRDI, 1998) which classified Bangladesh into 30 AEZs. The project area contains the below AEZs (refer Figure 4.17), namely:

***Ganges Tidal Floodplain (17,066 sq km)*:** This region occupies an extensive area of tidal floodplain land in the southwest of the country. The greater part of this region has smooth relief having large areas of salinity. Riverbanks generally stand about a meter or less above the level of adjoining basins. Non-calcareous grey floodplain soil is the major component of general soil types. Acid Sulphate soil also occupies a significant part of the area, where it is extremely acidic during the dry season. Most of the topsoil is acidic and subsoil is neutral to mildly alkaline. Soils of the Sundarbans area are alkaline. General fertility level is high, with medium to high organic matter content.

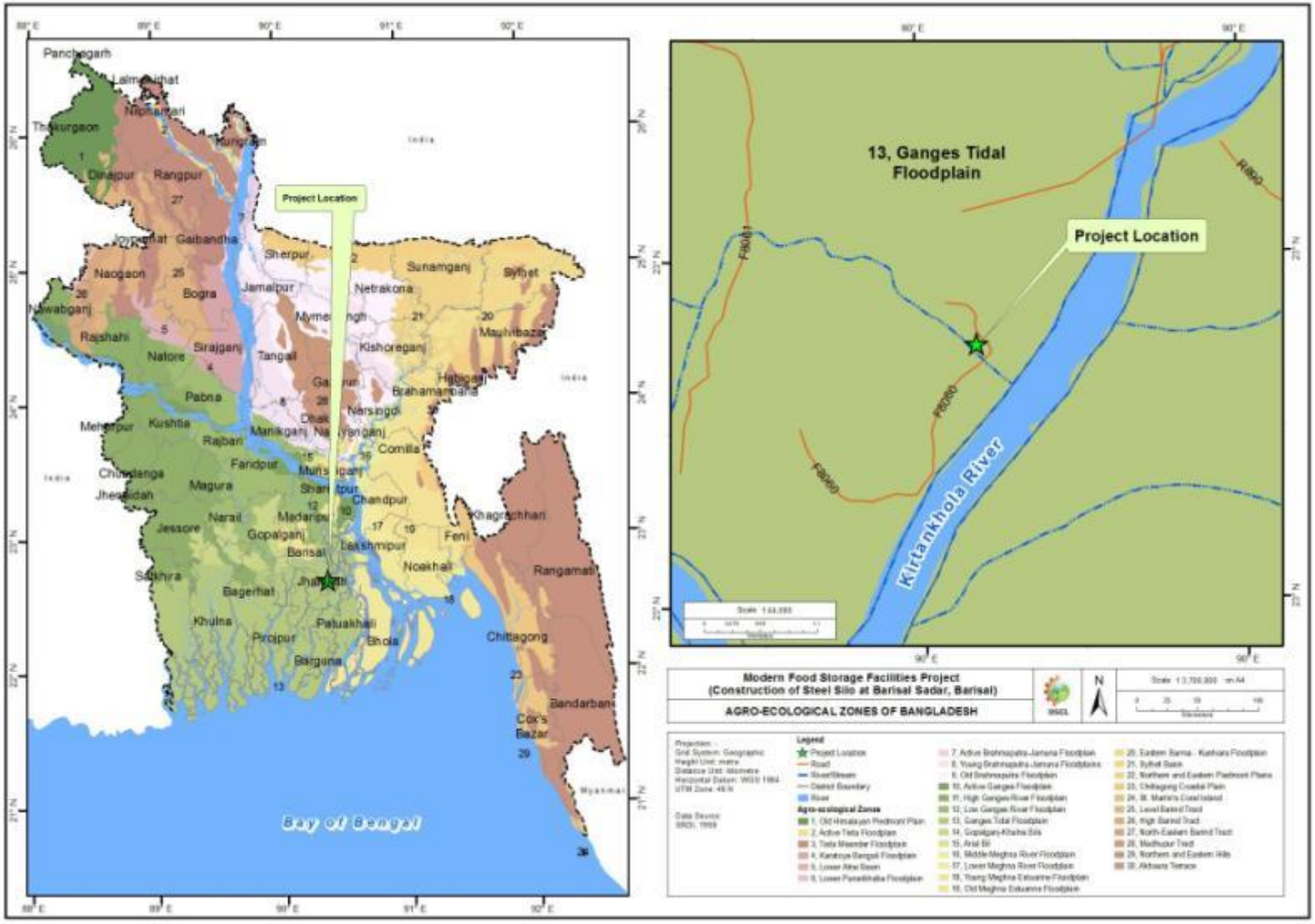


Figure 4.17: Agro-ecological Zones of Bangladesh

4.1.10 Seismicity

Bangladesh is situated in one of the most tectonically active regions in the world where three major plates meet (the Indian Plate, the Tibet Sub-Plate, and the Burmese Sub-Plate). The project area is located over the Indian Plate, which is moving north. However due to the location of relevant plates, fault lines and hinge zones, Bangladesh itself is divided into three seismic zones (Table 4.5), based on the ranges of the seismic coefficient (*note: the seismic coefficient is a measure of how strong an earthquake has the potential to be based on a combination of the mass of the plate and the seismic forces acting on it, as well as how frequently these quakes are likely to occur*). As per the seismic zone map (Figure 4.18), project area falls in the zone III. It means the project area is prone to low seismic intensity. The Zone-III seismic coefficient has been considered during the design works for the sub-structures and super-structures though there is no evidence of major earthquakes in the project areas in the recent past.

Table 4.5: Seismic Zonation of Bangladesh

Zoning	Area Mercalli Scale	Bask Seismic Coefficient
I	North and eastern regions of Bangladesh (Seismically most active)	0.08
II	Lalmai, Barind, Madhupur Tracts, Dhaka, Comilla, Noakhali and western part of Chittagong Folded belt.	0.05
III	Khulna division S-E Bangladesh (Seismically relatively quiet)	0.04

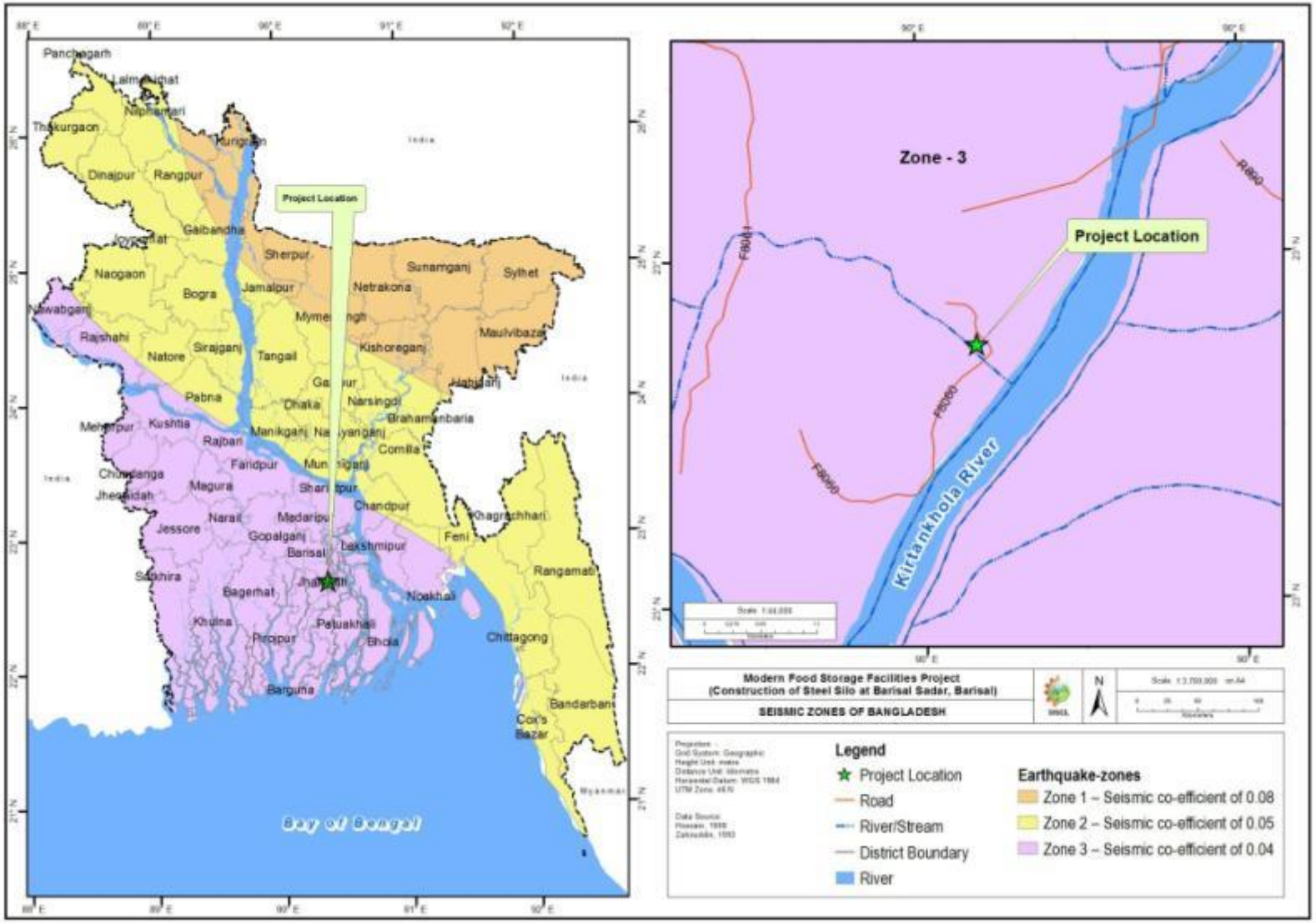


Figure 4.18: Seismic Zones of Bangladesh

4.2 Biological Environment

The countries of South/Southeast Asia are recognized by International Union for Conservation of Nature (IUCN) to be regions of high species diversity. A large number of native plants, including 3,000-4,000 species of woody flora, have been recorded from Bangladesh. The country is at the meeting point (ecotonal region) of several floristic provinces, including Manipur-Khasia, Bengal and North Burman provinces within Indo-Malayan realm (IUCN 2002).

Bangladesh was once with well forest, but most of the native forests have been destroyed in recent decades due to mounting pressure from populations. Only scattered patches of native trees, wetlands and associated fauna habitat remain in isolated locations within the terrestrial environment (IUCN, 2002). In many parts of the country, the abundance of plantations and groves of trees around villages creates an aspect of discontinuous forest (Wahab, 2008).

The floodplains of Bangladesh have long been subject to cultivation, the most dominant land use within the project area, with only scattered patches of native trees, wetlands and associated fauna habitat remaining in isolated locations within the terrestrial environment (IUCN, 2002).

4.2.1 Bio-Ecological Zones

Within a relatively small geographic boundary, Bangladesh enjoys a diverse array of ecosystems. Being a low-lying deltaic country, seasonal variation in water availability is the major factor, which generates different ecological scenarios of Bangladesh. Temperature, rainfall, physiographic variations in soil and different hydrological conditions play vital roles in the country's diverse ecosystems. The ecosystems of Bangladesh could be categorized into two major groups, i.e. (i) land based and (ii) aquatic. The land-based ecosystems include forest and hill ecosystems, agro-ecosystems and homestead ecosystems; while seasonal and perennial wetlands, rivers, lakes, coastal mangroves, coastal mudflats and chars, and marine ecosystems fall into the aquatic category.

Each of the ecosystems has many sub-units with distinct characteristics as well. IUCN Bangladesh in 2002 classified the country into twenty-five bio-ecological zones (Figure 4.19). The project area falls the bio-ecological zones described below.

Ganges Floodplain: The Ganges floodplain is basically consisted of the active floodplain of the Ganges River and the adjoining meandering floodplains, and is mostly situated in the Greater Jessore, Kushtia, Faridpur and Barishal districts. This floodplain comprises ridges, basins and old channels. The Gangetic alluvium is readily distinguished from the old Brahmaputra, Jamuna and Meghna sediments by its high lime contents. Ganges channel is constantly shifting within its active floodplain, eroding and depositing large areas of new char lands in each flooding season, but it is less braided than that of the Brahmaputra- Jamuna. Both plants and animals are adapted with the pattern of flooding. The floodplains are characterized by mixed vegetation. Huge number of stagnant water bodies and channels, rivers and tributaries support habitat of rich biodiversity. Free-floating aquatic vegetation is commonly shown in most of the wetlands. Both cultivated and wild plants species are found in homesteads forest. Major groups of the oriental birds are represented in this zone by many species. A large number of migratory birds are observed in winter. Different species of tortoises and turtles are found in perennial water bodies.

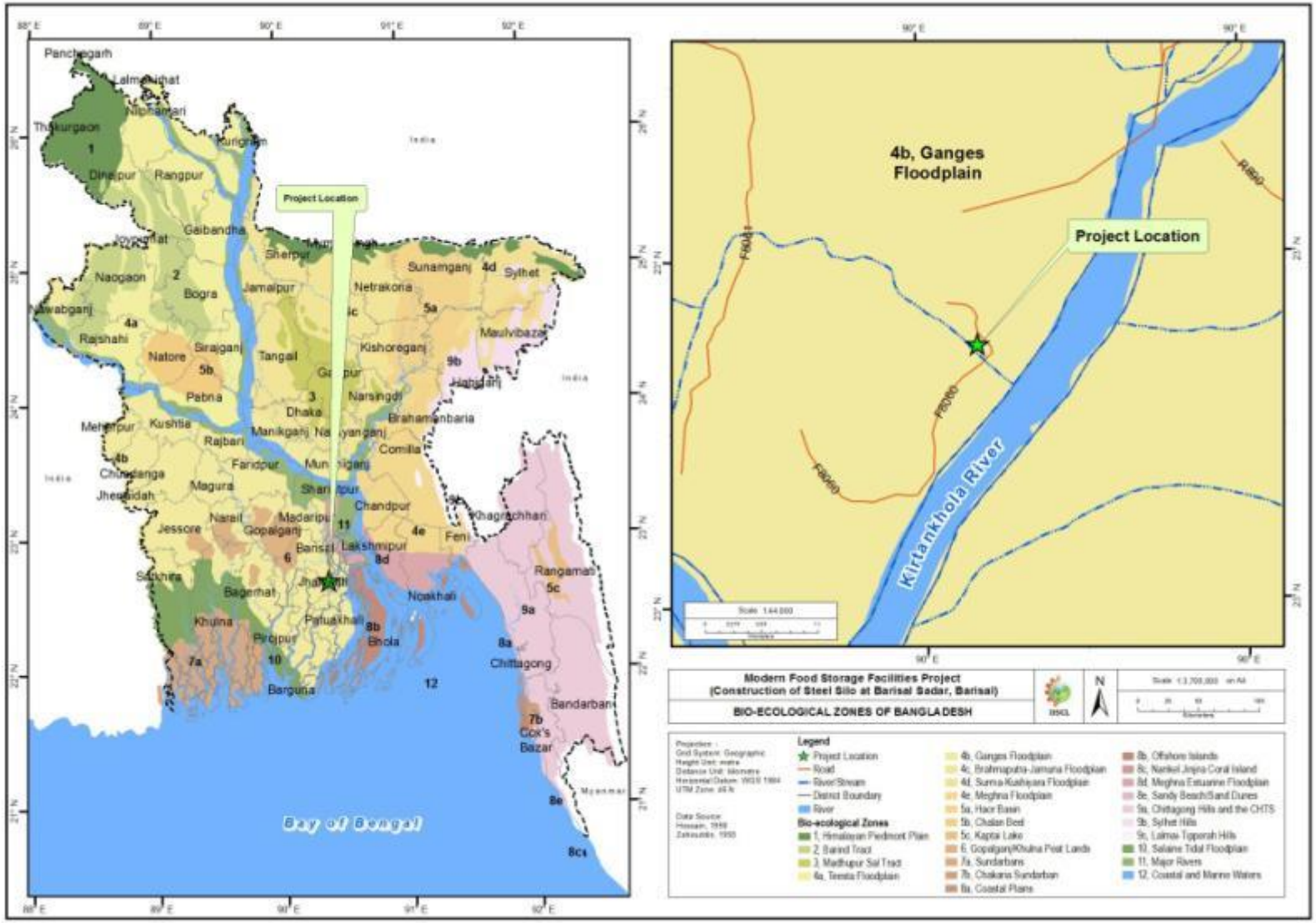


Figure 4.19: Bio-ecological Zones of Bangladesh

4.2.2 Terrestrial Ecosystem

The status of terrestrial floras and faunas at the project site were assessed from visual observations, review of literature, and information documented by other agencies. The project area consists of several ecological subsystems e.g. open agricultural land, homesteads, and roadside vegetation. The open agriculture land ecosystem dominates the area providing widespread habitat types for various species of flora and fauna under flooded and non-flooded conditions. The vegetation covers of agricultural lands are different crop species, weeds and other herbaceous plants species. The faunal species in the agriculture land and roadside bush ecosystems include birds, amphibians, fishes, snakes, rodents and few mammals. The homestead ecosystem provides the main tree covered areas within rural Bangladesh including the project site. The homesteads are covered by fruit, timber, fuel wood, medicinal plants and various multipurpose tree species. The wildlife species in homestead ecosystem include the birds, amphibians, reptiles, rodents and mammals like mongoose, jackal, cats, monkey, etc. Many of the species including mammals are vulnerable or/and endangered in Bangladesh due to habitat loss, over exploitation, natural calamities and lacking management. The project command area is not the specific habitat for any particular species of flora and fauna hence none such species will be specifically affected due to project implementation.

4.2.2.1 Flora

The project influence area (PIA) has mixed vegetation. Crops, vegetables are cultivated at the surrounding mainly include rice, wheat, rabi crops and variety of homestead vegetables. A sizeable number of fruit trees with economic value have been observed in the PIA. The fruit trees include jackfruit, mango, litchi, banana, coconut etc. Considerable number of trees and bushes in the PIA site provide habitat for birds and other animals. The composition of plant community includes low growing grasses, trees, herbs and shrubs. The data, collected from the field survey, suggests that the predominant species are those of cultivated vegetables and trees. A list of terrestrial floral species found in the project area is shown in Appendix G.

Some aquatic plant species exist in the banks of the rivers and khals and in water of ponds khals and rivers. The species commonly found are Shapla (water Lily), Kalmilata,, Kochuripana, DholKalmi, Helencha, Khudipana, Malanchi ,Shingara, Keshar dam etc.

4.2.2.2 Fauna

The diversified habitat and ecosystem in the project area support various types of animals as given in Appendix H. Primary and secondary mode was adopted for identification of fauna. Most of the birds are identified through direct observation rather than from people. Most of the Amphibians, Reptiles and Mammals were identified by using books and description of the local people during the field survey. Most of the Amphibians, Reptiles and Mammals were identified by using books and description of the local people during the field survey. The most common amphibians found in the project influence area are Kuno Bang. Cow, Buffalo, Goat, Rat etc. are the common mammals available in the project areas. Fairly available mammals are kathbirali, monkey etc. the most common aves available in the project area are Charui, hen, babui, duck, pecha etc.

As many as 53 species of fish are found in the area. Some indigenous fish species previously common can hardly be found in the town. The species that are found in the project area include Puti, Tengra, Shoal, Taki, Bele, Drakina, Koi, Singh, Magur, Kakla etc. The species of cultured fish include Ruhit, Katla, Silver carp,Pungas,Mrigel, Grass carp, Telapia, Mirror carp, Big Head etc. Batashi, Pabda, Swar punti, etc. found available in the area.

There are pond and river outside the CSD area. It is observed from the consultations that no endangered/ rare fish species were identified. In the river, near silo area no fishing activities were observed. Silo area is located on the bank of the river Kirtonkhola. Availability of fish spices in this river diminishing naturally due to frequent movement of motorized vessel and effluent disposal from the surrounding nos. of factories. No anticipated impact on aquatic species as well as fish species would be observed due to the implementation of the project activities.

4.2.3 Protected Areas & Red Book Species

Many wildlife species are in stress in Bangladesh, many more are endangered/threatened and a large number already faced extinction. The status of faunal species in Bangladesh has been published by IUCN (2000). According to the IUCN findings this country has lost 10% of its mammalian fauna, 3% avifauna and 4% reptiles over the last 100 years. More than 50 species are presently critically endangered in Bangladesh of which 23 species are already declared as endangered in the Red Data Book of IUCN. In addition, 83 species are commercially threatened and are included in the appendices of Convention on International Trade in Endangered Species (CITES). Among the most endangered species are: elephant, tiger, wild Cat, Leopard or wild goat, serao, dolphin; birds: white-winged duck, comb duck, stork, carne, pheasant, partridge, and crocodile, python, monitor, lizard, tiger terrapin, roofed turtle, soft turtle, and marine turtles.

In and around the project area some wildlife species were identified as locally vulnerable. Some species were also identified as locally endangered. Any construction must consider impacts on the rate of deforestation, loss of habitat, habitat fragmentation, and interruption of wildlife migration patterns. Figure 4.20 shows that no environmental sensitive area is present around the project region.

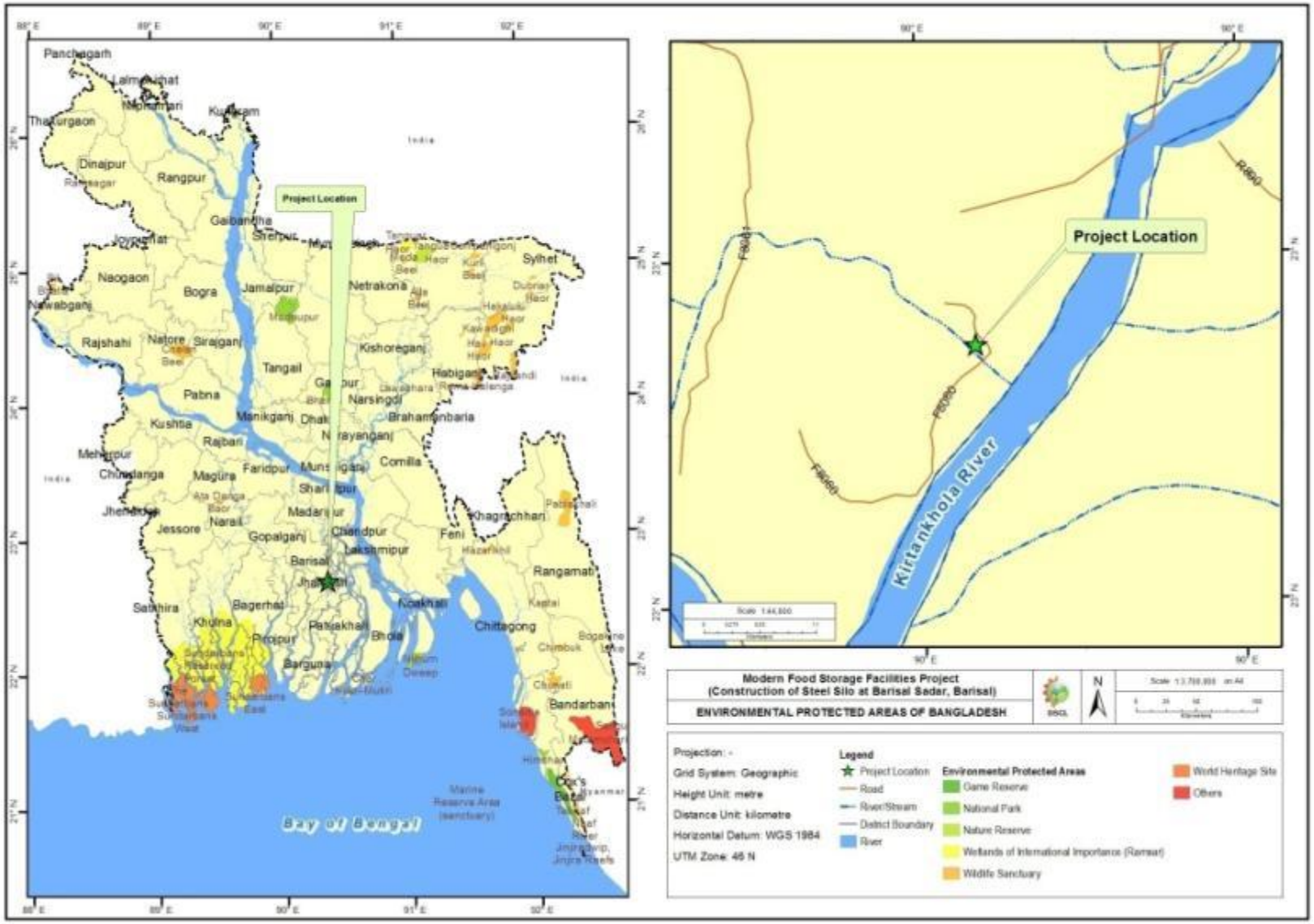


Figure 4.20: Environmental Protected Areas of Bangladesh

4.3 Social Environment

This Section presents an analysis of the socioeconomic baseline of Project area developed based on data from secondary sources, questionnaire survey and from community consultations at the local level. The analysis presents the socioeconomic profile of the Project area, population, and communities.

4.3.1 Demographic Profile

4.3.1.1 Background

Barishal is a district in south-central Bangladesh, formerly called Bakerganj district, which was established as a district in 1797. It was a municipality from 1876 to 2002 and upgraded to Barishal City Corporation in 2002. Barishal was declared a division on 1 January 1993. Its headquarters are in the city of Barishal, which is also the headquarters of Barishal Division.

4.3.1.2 Area and Location

Barishal District (Barishal Division) area 2790.51 sq km, located in between 22°27' and 22°52' north latitudes and in between 90°01' and 90°43' east longitudes. It is bounded by Madaripur, Shariatpur and Chandpur districts on the north, Patuakhali, Barguna and Jhalokati districts on the south, Bhola and Lakshmipur districts on the east, Jhalokati, Pirojpur and Gopalganj districts on the west.

4.3.1.3 Administrative/Geographic Unit

Barishal district consists of one city corporation, five municipalities, 66 wards, 111 mahallas, 10 Upazilas, 86 union Parishads, 1147 mouzas and 1175 villages.

4.3.1.4 Population Characteristics

According to Population and Housing Census 2011, the total population of Barishal is 2.324 million. The sex ratio of the district is 0.958.

4.3.1.4.1 Religion Composition

According to Bangladesh Population Census, 2011 the religion composition of the district is showed in the below Table 4.6.

Table 4.6: Religion Composition of Barishal

Muslim (%)	Hindu (%)	Christian (%)	Buddhist (%)	Others (%)
95.06	4.89	0.033	0.013	0.007

4.3.1.4.2 Tribal Communities

The ethnic minorities living in Barishal are Chakma, Garo, Tripura and others. The number of total tribal population in Barishal is 76. And the percentage of the ethnic people living in Barishal is 50. No tribal communities would be anticipated by the project activities.

4.3.1.5 Household Size and Density

According to the BBS Population and Housing Census 2011, household size of the city is 4.5 persons per household. And the population density is 835 persons per square kilometer.

4.3.1.6 Literacy and Education

Information on literacy and education is furnished below:

Literacy: In Barishal, it is found that 61.20% population is literate. Among them 61.90% are male and 60.00% are female.

Educational Institutions: Noted educational institutions of Barishal are Barishal Law college, Sher-E-Bangla Medical College and Hospital, Govt. B M College (1889), Syed Hatem Ali College, Barishal Govt. women's College, Chakhar College, Bakerganj College, Kalaskati College, Muladi College, Hizla College, Banaripara College, Gaurnadi College, Agailjhara College, Babuganj College, Badalpara Secondary School and College, Kashipur High School and College, Bagdha Secondary School and College, Barishal Zila School, 'Brozo Mohan School, Barishal Zila Girls' School, Barishal Missionary School, Paterhat Muslim High School, Paterhat Jubili High School, Shahid Altaf Mahmud High School, Hizla PL Secondary School, Baisari High School, Banaripara High School, Gaurnadi High School, Agailjhara High School, Gaila High School, Babuganj High School, Barishal Govt. Girls' High School, Baptist Mission Boys High School, Gava High School, Bakerganj JSU High School, Oxford Mission High School, Khalishkota Secondary School, Rahmatpur Secondary School, Halima Khatun Girls' Secondary School, DGL Secondary School, Char Amaddi WK Secondary School, Kamarkhali KSU Secondary School, Pinglakathi Govt. Model Primary School, Bheduriarchar Govt. Primary School, DarusSunnatJamia-E-Islamia Madrasa, DudhalIslamiaFazil Madrasa, Kakdhara AKM Institution, Banaripara Model Union Institution, Kalaskati BM Academy.

Table 4.7: Educational Institutions in Barishal

Educational Institutions	No.(s)
University College	1
Medical College	1
Law College	1
Teacher's Training College	2
Physical Education College	1
Cadet College	1
Polytechnic College	1
College	70
Secondary School	390
Primary School	1710
Madrasa	710

4.3.1.7 Arts and Culture

The notable folk cultures are Bhatiali, Rakhali, Marfati, Jarigan, Sarigan, Murshidi, dazzle, proverb, fiction or feigned story, palagan, Kavigan, etc are conventional. Jatrapala and theatre practice are also displayed in this district.

4.3.1.8 Ownership of Farm Land

Ownership of Farm land is showed in the below Table.

Table 4.8: Ownership of Firm Land in Barishal

Household	No.
Total Household	482,075
Farm Households	322,054
Small (0.05-	290,408
Medium (2.50-	29,899
Large (7.50+	1,747

4.3.1.9 Economy and Occupation

The main sources of income of the people of Barishal are listed below:

Table 4.9: Income Sources of Barishal

Income Source	Percentage (%)
Agriculture	48.25
Non-agricultural Laborer	4.00
Industry	1.27
Commerce	17.52
Transport and Communication	2.83
Service	13.08
Construction	2.45
Religious Service	029
Rent and Remittance	2.31
Others	8.00

Tourist spots of Barishal are Durgasagar, Collector Bhaban (building), Chakhar Archaeological Museum.

4.3.1.10 Land Area and Land Use

Total area of land in Barishal is 658,859 acres. The land use distribution of the project area is showed below.

Table 4.10: Land Use Distribution of Barishal

Land Type	Percentage (%)
Fallow	5.64
Cultivated	58.15
Forest	11.99
Irrigated	18.47
Under	5.75

4.3.1.11 Housing Status

The table below shows the housing pattern of Barishal.

Table 4.11: Housing Pattern of Barishal

Household Type	Percentage (%)
Pucca	7.3
Semi-Pucca	10.9

Kutcha	80.0
Jhupri	1.8

4.3.1.12 Transportation

Interior roads: There are interior roads in the CSD campus and also a link road (6m width) from the Kirtonkhola River up to the entry of the CSD campus and also to the BCC (Barishal City Corporation) road (Figure-3.4). At the river bank, there is a small Jetty (Pontoon) owned by the BIWTA (Figure3.4).

Road: The lane width (one way-two lanes) of the road outside of the CSD that connects the highway is 4.9 m. The vehicles that ply over this road are trucks, human hauler, rickshaw, motorbike and bicycle. An initial traffic survey was carried out at this road in the daytime of the weekday. The identified peak rate of traffic flow was 196 vehicles/hour, where 14% of them are trucks (Source ESAMF of MFSP). Increase of traffic during construction of silo will be low and will be in allowable limit.

4.3.1.13 Utility (Power, Water & Gas) Supply at the Site

The sources of power supply are western zone electric power supply. 11KV transformer was seen at gate of Barishal CSD which is 500'-0" away from the proposed site. Frequent power cuts have been a continuous problem for the CSD. City corporation water supply is available for the existing CSD & staff Quarter & no gas supply at CSD.

4.3.2 Survey Finding of Social Impact Assessment

During socioeconomic survey of SIA study, the consultants observed that the proposed silo facilities will be constructed in a DG food occupied government land. Since it is a DG food own land no new acquisition of land is required. The sites are also well connected by road and river. This proposed project will be anticipated with no dislocation in terms of physical and economic to the local people, no dislocation of any homestead, no affected on any women or vulnerable groups, no affected on physical cultural resources and no affected of any unseen items which can be related with social issues.

It will bring more employment in terms of using more labors, more rice mills will be established, transport business will boost, poultry farming will enrich further and so on. The local people requested that local labor should be used during construction and operation.

It would be highly appreciated if the project authority engages local people to the construction and operation of the silos. This would be given social benefit to the local people from this project as ancillary facilities. Hence, this proposed silo project facility has no other significant adverse impact its adjoining area but has positive impact all over Bangladesh.

4.3.3 Environmental & Social Hotspot

The socio-cultural aspects include the educational institutions, hospitals/health centres, religious structures, cultural structures, burial grounds, market places, water bodies, etc., few of which would be affected directly and indirectly through implementation of the project. Such sites could be termed as Environmental Hotspots in relation to project activities and, hence,

need to be dealt carefully during the construction phase. Locations of major environmental hotspots in the project area are shown in the Figure 4.21. A detail list of the cultural and sensitive areas located within 1 km radius of the project area is presented in Appendix I. Neither of the environmental &social hotspot would be affected by the project activities.

4.3.4 Cultural, Religious and Archaeological Sites

There is no remarkable cultural centre or religious or historical monument in project area. There are also 2 Mosques, 1 Graveyard, 1 school, 1 Medical College, one historical martyr monument and 1 Armed Forces Police battalion Office near the project site. Since, historical martyr monument is very close to the project area extra care should be taken for any anticipated impact during construction and operation of the project. Neither of the cultural, religious and archaeological sites would be affected by the project activities.

Figure 4.21: Sensitive Locations in Barishal

5. SOCIAL MANAGEMENT AND RESETTLEMENT POLICY FRAMEWORK

5.1 Objectives of SMRPF

The Social Management and Resettlement Policy Framework (SMRPF) is intended to provide general policies, guidelines, and procedures to DG-Food for social inclusion and integration of required mitigation measures of possible safeguard impacts into the selection, design and construction of silo facilities. The objective of the SMRPF is to help DG-Food to achieve the following:

- ✓ Enhance the social development outcomes of development of modern silos facilities at strategic locations and provide home silos to targeted families in disaster prone areas;
- ✓ Identify and mitigate adverse impacts that the selected sites might cause on people (men & women), including protection against loss of livelihood activities, with culturally, socially and economically appropriate measures;
- ✓ Develop necessary safeguard mitigation measures to adequately disclose and consult with affected people on draft action plans, to replace their lost assets and to improve (or at least restore) their incomes and livelihoods, and
- ✓ Ensure compliance with the relevant GOB policies and those of the World Bank on social safeguards and other social issues, including those with gender implications.

5.2 Basic Planning Principles

In consideration of the potential adverse impacts associated with land acquisition and displacement of authorized and unauthorized private activities from its own (and other public) lands, the strategic planning approach was followed by the DG-Food to select, design and implement all activities in accordance with the following principles:

- ✓ Prior to selection of specific site, undertaking community and stakeholder consultations about their objectives, scopes, and social safeguard implications, especially with respect to land acquisition and displacement of businesses, trading and other activities from its own lands (and other public lands, if they are also likely to be used by the project). Consultations will inter alia include,
- ✓ All formal/informal local entities, such as Municipal Committees, Union Parishads, local women's groups and others with direct and indirect stakes in the project who are deemed as key actors to influence project design and implementation.
- ✓ The persons to be discussed with, like the landowners, business owners, traders, embankment settlers etc. who would be directly affected by the project.
- ✓ The persons who would be affected in terms of loss of livelihood and/or loss of access to common property resources.
- ✓ Avoiding private land acquisition and limit its activities, to the extent feasible, within the existing land of DG-Food to minimize displacement of economic and other activities from private and public lands.

- ✓ Avoiding the activities that might be threaten the cultural way of life of tribal peoples; severely restrict their access to common property resources and livelihood activities; and affect places/objects of cultural and religious significance (places of worship, ancestral burial grounds, etc.)
- ✓ Undertaking social screening of all sites to identify potential social safeguard issues, and adopt and implement impact mitigation measures consistent with the Bank's OP 4.12.
- ✓ Special attention to female affected persons in the resettlement process and to the vulnerability of women and children in the project areas to social exclusion, trafficking, risks of HIV/AIDS infection following the policy guidelines of the World Bank on gender.
- ✓ Special attention to the vulnerable communities and destitute groups including poor, women, ethnic minorities, small and marginal farmers, and tenant contract farmers, in selection of beneficiaries and making available family silos based on needs.

5.3 Social Screening & Impact Assessment

DG-Food screened the sites to identify potential safeguard compliance issues and social impacts associated with the construction of silo facilities, in order to determine applicability of the OP 4.12 and the required Social Management Plan. Where adverse impacts cannot be avoided entirely, DG-Food selected, design and implement the project in accordance with the following guidelines:

5.3.1 Exclusion Criteria

To ensure that the project meets its overall objectives, and that the national legal as well as Bank's safeguard requirements are met, the following criterion for the exclusion of silo sites from project finance:

- ✓ Require land acquisition that affects private homesteads those cannot be relocated in available lands;
- ✓ Affect mosques, temples, graveyards, cremation grounds, and other places/objects that are of religious and cultural significance;
- ✓ May significantly restrict access to common property resources and livelihood activities of groups and communities;
- ✓ Threatens cultural/traditional way of life of tribal peoples, restrict their access to common property resources (forests, water bodies, etc) and livelihood activities, and affect their places/objects of cultural and religious significance (places of worship, ancestral burial grounds, etc.).

5.3.2 Social Impact Assessment Methodology

Social impacts and risks including land acquisition, resettlement and other social impacts were primarily identified during the initial social screening of silo sites. Once social impacts were noted, census of affected persons and assets would be conducted following the site boundary and where applicable land acquisition plan in compliance with the SMRPF guidelines. The surrounding communities were consulted during the census survey to understand the risks and

options and devising mitigation of social impacts. In the case of land acquisition, if there was any case of affected person, the process would be initiated well ahead of time so that assessment of social impacts and risks could be done for preparation and approval of RAPs before award of civil works contract and implementation of the same before displacement of people. Land acquisition proposal for respective sites would provide information on land and the census (by DG-Food) and joint verification (jointly by DC and DG-Food) would provide data on inventory of losses and risks recognized in the SMRPF.

With this SMRPF in place, when sites for construction of silo facilities are determined, detailed social impact assessment (SIA) following the initial social screening, was undertaken to identify all project beneficiaries, impacted people and other relevant stakeholders. The SIA utilized a well-planned and all-inclusive communication and consultation strategy and survey methodology to lay out a detailed socioeconomic survey covering the prevailing status of income, employment, education, age, skills and other socioeconomic aspects along with cultural and community aspects in the areas. The following methodology has been adopted.

- ✓ The SIA has been carried out in accordance with the civil works time table.
- ✓ Community/stakeholder consultations at locations with habitations and documentation of such consultation.
- ✓ Focus group discussions with beneficiaries, key affected persons and their community.
- ✓ Census and socioeconomic survey among the project affected households (if any).
- ✓ Assimilation and analysis of data and information to address key issues following SMRPF.
- ✓ The information was recorded on strip maps and computerized, and photography/ video-graph were used to document existing structures and land holding and other impacts in the corridor of impact.
- ✓ Updated the final alignment on the Mouza maps and finalized (no land acquisition required).
- ✓ All data was disintegrated by gender, age and ethnicity where necessary. A gender analysis would also be undertaken (in case).

In case of land acquisition; the Deputy Commissioner at respective districts, where a site involve land acquisition, would process land acquisition on behalf of DG-Food under the provision of the ARIPO 1982 and make payment of compensation under law to legalize land acquisition. However, DG-Food would make additional payment where needed to ensure replacement cost of land and other property acquired for any silo site following the provision of RAP prepared in compliance with this SMRPF.

5.4 Social Management and Resettlement Policy

The ARIPO 1982 is not adequate to deal with the adverse impacts associated with land acquisition and involuntary displacement in compliance with the Bank's OP 4.12 on Involuntary Resettlement. The Ordinance has no provisions for resettlement of the affected households/businesses or any assistance for restoration of livelihoods of the affected persons.

Land acquisition, therefore potentially diminishes productive base of affected farm families and infringe impoverishment risks to those physically or economically displaced due to undertaking of infrastructure projects. No involuntary resettlement issues were observed. As the legal framework falls short of the provisions of the World Bank OP 4.12 on Involuntary Resettlement, the project would apply the following added mechanisms to meet the Bank's requirements:

- ✓ **Avoid or minimize resettlement:** The law only implicitly discourages unnecessary acquisition, as lands acquired for one purpose cannot be used for a different purpose. However, there are no mechanisms to monitor if this condition is actually adhered to.
- ✓ **Eligibility for compensation:** The law stipulates compensation only for the persons who appear in the land administration records as the owners. It does not recognize the rights of those, such as squatters, who do not possess legal title to the lands they live in or make a living from.
- ✓ **Compensation:** The law provides compensation for lands and other objects built and grown on them (structures, trees and orchards, crops and any other developments like ponds, built amenities, etc.). No provisions are there to assess and restore lost income stream or income sources that acquisition causes to the affected persons, be they legal titleholders or others like squatters, tenants and employees of affected businesses.
- ✓ **Compensation standards:** Although the law stipulates 'market prices' of the acquired lands as the just compensation, the legal assessment method almost always results in prices that are far below the actual market prices9. Certain pricing standards, which are regarded as unrealistic, are used to assess other losses like structures and various built amenities, trees, crops and the like.
- ✓ **Relocation of households and other establishments:** No legal obligation is there to relocate, or assist with relocation of, those whose homesteads have been acquired or whose place of residence or livelihoods has been affected. Such persons/households, be they titleholders or squatters, are left on their own.
- ✓ **Ensuring payment of compensation:** Lands are legally acquired and handed over to the project execution agency as soon as the acquisition authority identifies the owners (or 'awardees'), by examining the records, and sends a legal notice advising them to claim the compensation (or 'awards'). It is the obligation of the affected landowners to prove, by producing an array of documents that the acquired lands legally belong to them. As gathering these documents is a long, expensive and cumbersome process, many landowners may remain unable to claim their awards10.
- ✓ **Socioeconomic rehabilitation:** The law shows no concern whatsoever about the long-term socioeconomic changes the affected persons and households might undergo in the post-acquisition period. There is no provision in the law except compensation for ensure economic rehabilitation and social reintegration of the displaced persons.

6. IMPACTS ASSESSMENT AND MITIGATION

6.1 Assessment of Environmental Impacts and Mitigation

The campus is protected from all sides. The area is free from environmental hotspot, and away from any environmentally sensitive area. The sub-project will not be harmful to the settlement, vulnerable group or women, rather; it will generate a huge employment for the local people. The economy will be developed through increasing business, trades and poultry development.

Some anticipated impacts will have to be considered, especially, during construction and operation periods and those are to be well managed, to minimize environmental and social impacts and hazards, as the means of mitigation measures to the probable impacts. For the sustainable development as well as to maintain environmentally friendly infrastructure, measures start from design phase. Barishal silo site is now well protected by boundary wall. Before starting the construction works, good planning is required to place the laborers' shed, drinking water facility, sanitary latrines, equipment and materials yards, lubricant and fuel keeping facility, temporary drainage facilities, solid waste management facilities etc. The traffic and machineries' movement routes etc. are to be established in the construction site. Essential facilities like; labor-shed with proper living, lighting and cooking arrangement, waste water drainage arrangement from the kitchen area, waste bins and solid waste management facilities, and adequate drinking water supply, sanitary latrine facilities, personal protection equipment and first aid box etc. are to be provided before starting the construction works. The construction materials' yard and place for keeping the prefabricated steel sheets will be fixed in ahead of starting the silo bins' super-structure setting. There is no stone/ brick crushing will be allowed within the silo site. Only pre-fabricated steel sheet will be carried to the construction site and separate areas/ yards will have to be maintained for that. For carrying the construction materials, care should be taken on traffic management. Safety measures will be taken for the local pedestrians, school children, local traffic along with the other traffic movement for existing CSD godowns. In addition to road, the waterway may also be used to carry construction materials.

6.1.1 Potential Impacts during Pre-construction Phase

Loss of tree and ecological impact: Due to site clearing works for silo construction, some coconut trees need to be felled down and bush; shrubs and herbs need to be cleared. To minimize the anticipated impacts for the loss of such trees and bush, shrubs & herbs, the project authority as well as the design consultants has already designed the landscape in the silo campus and huge amount of tree, flowers and grass will be planted for greenery and landscaping purposes.

Damage due to Flooding: As the project area is very near to the Kirtonkhola River, there should be a risk of flooding. The historical data shows Barishal was inundated in last 30 years. So, proper flood management strategy, prior to starting the construction works is essential.

Mitigation:

The following measures will address for the flooding management:

- ✓ The design will ensure that facilities remain safe from flooding and inundation.
- ✓ The site selected for the facilities will be sufficiently higher than the maximum water level during high tides and storm surges.
- ✓ Appropriate raising of the foundations will be carried out.
- ✓ Appropriate drainage system will be included in the design.

Damage due to Waste Disposal: The improper solid waste management activities during construction period would damage the local environment. So, proper arrangement of solid waste management, prior starting the construction works, is essential. The contractor is solely responsible for total solid waste management activities.

Solid Waste Quantity: During the construction works, 150 workers may work at a time (during pile driving for silo bins' foundation works and for other construction works. If per capita waste generation is 300 gm per day, the quantity of solid waste will be 45 Kg in a day.

Type of works	number of workers	per capita waste	Quantity
Pile driving for silo bins	100	300 gm	30 Kg
Other ancillary work	50	300 gm	15 Kg

Mitigation:

- Within the silo campus, some waste bins are to be provided by the contractor,
- A primary transfer station for solid waste will be constructed by the contractor within the project boundary near the gate of east side. The Conservancy unit of Barishal City Corporation will collect this waste daily basis. A transfer station (2 m long x 1 m width x 1.5 m height) masonry walled box with provision of door and tin shed is to be constructed on the immediate north-west side of the entrance gate (the gate at present). The engaged laborer will collect solid wastes from different waste bins, inside, and deposit that in the transfer station. The City Corporation conservancy unit will collect that waste and dispose at the landfill site daily. In absence of services of City Corporation conservancy unit, the contractor will make suitable arrangement for safe disposal of solid waste.
- The contractor will arrange with the Conservancy unit of City Corporation for the solid waste management and disposal activities. The Contractors' laborer will collect the solid wastes from different places within the silo areas (waste bins should be placed by the contractor) and will dump those in a suitable place from where the City Corporation conservancy unit will collect the wastes and dispose to their landfill site.
- If the contractor plans for solid waste management by themselves, they will make some suitable arrangement of safe dumping of solid waste.

Damage due to Septage Disposal: There is no sewerage system in the silo site. On-site sanitation is necessary for the septage as well as latrine waste management. The sanitary

latrines, to be provided for the laborers and that should be with proper on-site sanitation system. Prior to start the construction works, sanitary latrines should be provided by the contractors.

Mitigation:

- ✓ The contractor will install sanitary latrines (may be low-cost latrines) with two-pit septic tank facilities,
- ✓ The latrines should be at a distant and safe location, preferably near the north-west boundary wall side.
- ✓ The latrines should be with proper washing facilities (water and soap).

Damage due to inadequate water supply: Prior starting the construction works, it is very essential to establish water supply in the construction site. There is no supply water in the construction site. If the supply water is inadequate both in terms of quality and quantity that will damage the entire construction works. So, water supply should be proper, quality and adequate.

Mitigation:

- ✓ The contractor will install tube well as considered in the BOQ (environmental and social safeguard component) prior starting the construction works,
- ✓ The water quality will have to be tested for its quality judgment.

Pollution from fuel and lubricants: Improper placing of fuel and lubricants is essential, to prevent damage of surrounding environment and measures are to be taken prior starting the works.

Mitigation:

- Raised platform (brick soling with neat cement finishing) shall be constructed prior to start working.
- The place should be well protected and to be prepared prior to start working. The place should be in a safe corner of the silo campus.

Transportation planning before starting works: The contractor will set up the stock yards as shown in the attached Figure7.1, the larger stockyard is to be set up near the silo office building and other two separate smaller size stockyards in between silo bins and store building.

Mitigation:

- ✓ Coarse sand and fine sand will be transported from Sunamganj or Sylhet areas through the bi-pass road or water way by using Kirtonkhola River; those will be dumped in the stock pile in the silo campus.
- ✓ The reinforcement steel and cement will have to be carried by road or using water ways and to be stored in the bulk pile stock and only fabricated steel to be carried to the stock pile at silo site.

- ✓ Steel sheets (fabricated/ non-fabricated) will have to be carried from Chittagong port to the large stock pile (in the silo campus) and those will be carried through Chittagong-Dhaka-Barishal route or using water ways.
- ✓ In all the cases, the possible water ways will be used and the materials will be stored in the bulk storage facilities of the silo campus.
- ✓ For mass concrete works (especially for the concreting of in-situ pile casting, separate batch plant is preferable.

Contingency planning for any uneven situation: There are so many unwanted happenings may be there during construction periods. Proper contingency planning is required for overcoming any uneven situation, otherwise, that will hamper the progress of works. As preparedness works, proper contingency planning is essential for smooth progress.

- ✓ All the emergency telephone numbers of all the departments like Police station, fire service & civil defense, truck & bus stands, hospitals, clinics, etc.
- ✓ Standby transport facilities to deal any accidental case,
- ✓ Emergency on-call physician
- ✓ Emergency arrangement of medicine
- ✓ Arrangement of Safe havens (within the Barishal area), that may be used as emergency shelter during any disaster like Cyclone, etc.
- ✓ Proper liaison, with the local people and community leaders, is to be maintained so that the local people may always be with the silo construction engineers and workers, during any uneven situation.

6.1.2 Potential Impacts during Construction Phase

Arrangement of stockpile: Proper stock piling is essential during construction period. Improper stockpiling may hamper the construction works, especially for the silo campus of Barishal silo.

- ✓ Large stock piles should be outside the silo campus. Large volume of construction materials should be at large stock pile. Prefabrication of steel sheet and reinforcement bars should be there.
- ✓ Separate batch plant should be maintained for concrete mixing.
- ✓ The stockpile in the silo campus will be used for essential items and for the fabricated steel sheets.
- ✓ Separate fencing is to be maintained for the stock pile within the silo campus.

Transportation Planning: the local road by which the construction materials transported is two lane road. The road is capable of carrying about 200 vehicles per hour, from the following trip model calculation:

The capacity of a four-lane urban road can be calculated using formula:

$$C_A = 1900\ N f_w f_{HV} P_{HF}\ g/C$$

C_A= intersection approach capacity

N = number of lanes on the road segment

f_W= adjustment factor for lane width = 1 + (W-12)/30 (w is lane width, here 16 ft)

f_{HV} adjustment factor for heavy vehicles = 100/ {100 + HV (Er-1)}

Where: *HV* = percent of heavy vehicles and E_T= 2.0 passenger car equivalents,

Here for outside street of the sub project sites located outside of city traffic, it is assumed that *HV*=50% to simulate the congestion effect of heavy vehicles/trucks and low vehicles

HF P = Peak Hour Factor = 0.88 is considered for sub project area

g/C= effective green time-to-cycle length ratio = 0.55 is considered for sub urban arterials.

It has been observed, during ESIA study, that the total vehicle running on the road is less than 160 out of which less than 40 trucks move at market days. During the silo and ancillary works' construction, on an average 15-20 more trucks will move per day, on the road. Maximum construction materials will be carried by water transport. If there are any materials to be carried by the road transport, those will be carried during evening time (7:00-11:00 PM).

- ✓ To avoid local traffic congestion, any materials required for construction should be transported at night time (within 7.00 – 11.00 pm),
- ✓ Vehicle schedule should be maintained with proper consultation of the local people,
- ✓ Emergency parking arrangement should be kept in between the internal road and boundary wall,
- ✓ Unloading of materials should be done inside project areas,
- ✓ Traffic control manpower will be deputed during construction and operation period,
- ✓ Control sign will be provided to regulate traffic movement,
- ✓ Safety arrangement has been inserted in the safeguard cost in BOQ.

Pile Casting: In Barishal silo site, 600 mm dia and 42m long (cast in situ) piles will be casted. The pile boring and casting will be done by diesel driving machineries. Prefabricated pile reinforcement will have to be set up within the pile hole and a huge quantity of concreting works will be done. Safety measures are very much important during the whole pile works and sound pollution will likely to be occurred also. A huge quantity of bore hole waste (mixture of sand, clay and water) will come out and its proper management is very much essential.

Mitigation:

- The pile diving machineries if applicable should be with proper silencer and muffler to minimize the sound pollution,
- The pile waste (mixture of sand, clay and water) should be managed properly. Earlier site fixing should be ensured before starting piles diving.
- Fabrication of pile case should be done carefully, in a safe corner, by the side of north and south boundary wall.

- Concrete mixing should be done in a separate batch plant.
- Ensure use of proper PPE (helmet, gloves, safety shoes, nose masks, ear plug etc) of all workers during pile boring and casting work.

RCC and Brick Work: This item of works consists of carrying of construction materials (cement, brick/stone chips, construction sand), reinforcement from source to the construction site, unloading from truck, steel fabrication, shuttering works, mixing of concrete using mixture machine, pouring of concrete and compacting of concrete by using vibrator machine, carrying of bricks, building of walls using scaffoldings. All these works will be done by manual laborer, so personal accident may occur during operating the work.

Mitigation:

- Steel fabrication should be done in a separate corner within the silo campus,
- Concrete mixing should be done in a separate batch plant,
- For the small concrete works, mixture machine will be used and in that case, sound control will be there through setting muffler and silencer properly to control uneven sound,
- Ensure use of proper PPE (helmet, gloves, safety shoes, nose masks, ear plug etc) of all workers during work.

Pollution from construction materials: Dumping of construction spoils, including accidental leakage of lubricant, fuel etc. from carrying vehicles in equipment yards, is an important hazard. Both surface and ground water might be polluted from these contaminants. Safe transport, storage and disposal provisions for construction materials, equipment. Especially lubricant, fuels etc. have to be carried out in order to avoid accidental spillage and leakage

Mitigation:

- These hazardous materials will be stored over raised platform (brick soling with neat cement finishing)
- Carrying vehicle should be checked by an experienced mechanic by every week, filled up a checklist and keep in the site office
- Carrying vehicle should be with proper license and route permit from Bangladesh Road Transport Authority (BRTA),
- Construction material should be transported by covered van/ truck,
- The playground of the educational institutions shall not be allowed to use as a stack yard.
- Location for stockyards for construction materials will be at least 30 m away from the labourers' camp and sseparate enclosures shall be put around the stock yard,

- If any private land is used as stock yard then agreement with the land owner should be submitted to the Supervision consultant.
- Storage of the material should not create obstacle for movement of vehicles and pedestrians.

Dust: Different activities like; pile diving & casting, machinery movement, handling of construction materials (stone/brick chips, sand, cement), rod fabrication, movement of trucks with construction materials etc. may generate dust and damage the air quality.

Mitigation:

- Water will be sprayed to control the dust, which is the main way to suppress dust in the working site.
- Construction material should be transported through truck covered by tarpaulin.

Noise and vibration: Movement of vehicles, concrete mixer machine, and vibrator machine generates noise. Pile diving, concrete casting, cutting of steel for reinforcement and steel sheet for silo bins etc. may cause noise hazards.

Mitigation:

- Transportation of the construction materials have to be carried with scheduled time, mainly night time
- All powered mechanical equipment and machinery shall be fitted with noise abating gear such as mufflers for effective sound reducing device.
- Crushing of bricks/ stones shall not be allowed at the project site, so broken brick or stone chips should be collected from source to the project for construction purpose.
- For concreting works, separate batch plant should be used.

Water Quality: The quality of surrounding surface water may deteriorate if construction debris, construction waste, pile waste, effluent from work camps, food wastes etc. are allowed to dump in the nearby road side borrow pits or haphazardly.

Mitigation:

- Waste material in any form should not be thrown in water body or unspecified places,
- Proper construction management including waste management, training of operators and workers will be provided to avoid pollution of water bodies or nearby habitants.
- Waste bins are to be provided at different location of working and living places.

Safety Hazards and Public Health: During construction works, specially, during installation of steel frame and sheets at large height of silo bins and other mechanical

arrangement of silo bins. Occurrences may be with fall from height, burns, cuts and other body injuries.

Mitigation:

- Specific condition of contract, for maintaining health, safety and environmental conditions, should strictly be followed during construction and installation,
- Proper scaffolding should be made available during installation and setting of steel frame and sheets,
- Material safety data sheet (MSDS) will be followed during handling and installation of steel silo bins,
- PPE wearing should be ensured during framing, installation, setting and fitting of steel frame and sheets of silo bins,
- HSE trainings will be provided to the workers and supervisors of silo site.
- First aid boxes will be made available at each construction site.
- Emergency phone numbers (hospitals, Fire Service, Police station etc.) will be displayed at key locations of silo area.
- Firefighting equipment will be made available at the facilities.
- Liaison with the community will be maintained.
- Traffic movement along local road should be synchronized with that for using silo construction works, and contractor shall maintain the traffic movement those will be used in carrying materials.

Temporary Drainage System during Construction works: During rainfall and during construction works, temporary flooding may be occurred in the construction site. Temporary drainage arrangement has been considered and the item has been inserted in the BOQ of environmental safeguard issues.

- ✓ Earthen drains will be constructed immediately after any occurrence of water shading
- ✓ The drains should be closed after the end of the water shading occurrences,
- ✓ The outlet of the temporary drains should be in line with the outlet of the drainage system already designed for the silo campus.

Occupational Safety and Sanitation: It involves the safety problems of the construction workers and the provision for sanitation and drinking water facilities at work sites. Occupational safety is essential during handling construction materials, fabrication of reinforcement steel, handling of steel sheets for silo bins, fitting of steel sheets with bolts & nuts, mixing of concrete, welding works, placing & compacting concrete etc. may cause serious health hazards and accident. On the other hand, improper sanitary facilities may also cause health hazards and that may reduce the work efficiency.

Mitigation:

- Provision of deep tube well for water supply (both for drinking and construction works) and toilets along west-boundary wall, for male/female workers, to be ensured.
- First Aid Box with sufficient gauze, bandage, antiseptics etc. to be made available.
- Ensure availability and using proper PPE (helmet, gloves, safety glass, safety shoes, mask, ear plug etc.) of all workers during work.

Social Conflict: The presence of a large workforce, establishment of construction camps, Project-related traffic and construction activities may potentially cause conflicts with the nearby communities, privacy issues for the women and other similar problems.

Mitigation:

- Orientation and training will be provided to the contractors, supervisors and workers, on health, safety and environment including sexual diseases control (as of BOQ),
- Liaison with the communities will be maintained throughout the construction phase.
- Grievance redress mechanism has been established at the sub-project site.

Safeguard of Hot-spots: To protect the physical and natural resources around, the following measures shall be taken into consideration, during construction period:

- ✓ The machineries to be used shall be checked with proper silencer and muffler,
- ✓ The materials carrying trucks shall be planned to move during night time,
- ✓ All the materials carrying trucks/lorry shall be covered properly,
- ✓ The construction watchers shall keep eyes to the school going children and will not allow them to enter into the silo campus during construction period,
- ✓ Solid waste disposal shall be well planned to avoid any uneven dumping around,
- ✓ The construction dust shall be controlled every day

Location and Facilities of Labour Camps:

- The labor-camp will be at the middle portion along west boundary wall,
- The labor shed shall be with the facilities like; mosquito nets, cooking arrangement, water supply, waste bins, lighting etc.
- Temporary drains for the kitchen waste water and rain water are to be provided and maintained around camp site,
- The camp should be with standard living condition and arrangement.

6.1.3 Potential Impacts during Operational Phase

Safety Hazards and Public Health: The silo bins and ancillary facilities under Modern Food Storage Facilities Project (MFSP) has been designed in an automated system, from

loading the food grains within the silo bins till bagging the same for distribution, where there is no chance of generating any waste and dust. The use of chiller for temperature control and use of inert gas Nitrogen (auto generated system) for disinfection and that will not impose any harm to human health.

Proper capacity building issues will be addressed carefully to handle the system efficiently and effectively. The O&M staff will be trained up to ensure maximum use of technology and to minimize any operational hazard.

Mitigation:

The following precautionary measures will be taken, in addition:

- Each facility will prepare a site specific Health, Safety and Environment (HSE) Plan.
- Awareness raising programs for health, safety and on communicable diseases,
- HSE Plan will be made an integral part of the Operational Manual of each facility.
- Material safety data sheet (MSDS) will be followed in overall O&M process,
- PPE will be provided to the O&M staff and use of musk shall be mandatory during handling food grains,
- HSE trainings will be provided to the O&M staff on a regular basis.
- Availability of safe drinking water will be ensured at each facility.
- First aid boxes will be made available at each construction site. Emergency phone numbers (including hospitals, Fire Department, and Police) will be displayed at key locations within the facility.
- Firefighting equipment will be made available at the facilities.
- All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.
- Waste management plan to be prepared and implemented in accordance with international best practice.
- Liaison with the community will be maintained.

Health and safety Issues in using Ancillary Facilities: The silo bins is associated with several ancillary facilities like grain chiller; Nitrogen gas disinfection system; mechanical handling system etc.

Grain Chiller itself will not pollute air (it is just like an air-cooling system). Inert gas, Nitrogen will be extracted from natural air by Nitrogen gas generator as and when required and to be used in an automatic monitoring and controlled way in the silo bins. So, no special mitigation is required for these chiller and nitrogen gas use, as it will not create any hazard.

The mechanical handling systems are in-built with filtration and aspiration system and it will not create any dust pollution. So, there is no need of mitigation measures in case of ancillary system lying with silo bins.

Air Quality: Though there is no chance of occurring air pollution from the modern silo and ancillary system, food grains carrying transport may generate some air pollution around and the following precautionary measures will be considered:

- ✓ The food grain carrying vehicle should comply with the national standards.
- ✓ The steel silos to be constructed under has the duct at the dust collection point, which will be attached to a reverse jet bag filter and then to the fan which will vacuum the duct and extract the dust. These suction ducts will be suitably installed at the dump pit of the grain collection point, to the bucket elevator and chain conveyors also to collect dust during operation of silos.
- ✓ The O&M staff will be provided HSE trainings on regular basis; these trainings will address the air quality standard including hygiene practices.

Soil & Water Contamination: Inappropriate waste disposal from the O&M activities as well as from offices and residential facilities may potentially contaminate soil and water thus negatively affecting nearby communities and biological resources of the area.

Mitigation:

The following measures will be to minimize adverse impacts of the Project associated with soil and water contamination:

- Each facility will have waste management plan as part of its Operations Manual. No untreated waste effluents will be released to the environment.
- For the domestic sewage from the offices and residential areas, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity.
- Waste oils will be collected in drums and sold to the recycling contractors.
- The inert recyclable waste from the site (such as hard board, drums, and broken/used parts) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste.
- Domestic solid waste from the offices and residential areas will be disposed in a manner that does not cause soil contamination.

Noise &Vibration: The O&M activities (running of motors, conveyor belts, bag filters, chilling plant, dryers, and others) at the silos and vehicular traffic will generate noise and vibration which are likely to affect the O&M staff and nearby communities.

Mitigation:

The following measures will address the adverse impacts of the Project associated with noise and vibration:

- It will ensure that the noise from the facility complies with the national and WB standards.
- PPE (ear muffs or air plugs) will be provided to the O&M staff
- Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the silo authority.
- Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.
- Vehicles will have exhaust silencers to minimize noise generation.
- Nighttime traffic will be avoided near the communities.
- Movement of all project vehicles and personnel will be restricted to within work areas,
- Liaison with the community will be maintained. Grievance redressal mechanism is in place to address the community complaints.

Vehicular Traffic: Transportation of food grain to and from silos will cause additional traffic on the access routes. This increased traffic can potentially cause traffic congestions on local roads and also pose safety hazards for the nearby population and community.

Mitigation:

- To avoid local traffic congestion, transportation of food grains should be transported at night time (within 10.00 pm – 6.00 am),
- Proper vehicle schedule should be maintained with proper consultation of the local people,
- Emergency parking arrangement should be kept in between highway road and project boundary wall,
- Unloading and loading of food grains should be done inside project areas,
- The PMU, MFSP will prepare a traffic management plan for the silo facility. This plan will be a part of the Operational Manual of each facility.
- Liaison will be maintained with the relevant authorities (such as traffic police) regarding the wheat transportation particularly during emergencies.

Electricity Consumption: For continuous power supply on priority basis through the 33 KV power line will have to be ensured at the Silo for uninterrupted operation of a silo. If chilling system is interrupted the soil will not meet the required temperature and infestation of soil will be expedited.

Mitigation:

- Ensure electricity connection from multiple grids.
- Keep the provision for backup generator.

Aesthetic View: Presence of silos may potentially affect the aesthetic value of the area.

Mitigation:

- Landscaping and tree plantation will be carried out at each facility.
- Proper housekeeping will be regularly maintained at the facilities.

Safeguard of Physical and Natural Resources: To protect the physical and natural resources around, the following measures shall be taken into consideration, during operation and maintenance:

- ✓ The silo uploading machineries shall be with proper silencer and muffler,
- ✓ The bagging and truck loading machines shall also be with proper silencer,
- ✓ Food grain carrying trucks should be with controlled speed,
- ✓ The silo guards shall check and limit public/ children entrance properly,
- ✓ Solid waste management shall be proper to avoid nuisance around

6.2 Assessment of Social Impacts & Mitigation

6.2.1 Social Screening

To assess the potential impacts of the proposed project on environment and people around the silo facilities, social screening of the site for construction of modern public silo infrastructures was carried out during initial visit to the sites. A rapid social checklist was used for the screening shown in table 6.1 below.

Table6.1: Social Screening

Site Name	Availability of Land	Land Acquisition process	Impact on Tribal Population
Barishal silo at CSD site	DG-Food owned land	The area is within the confined area of CSD under DG-Food, so no question of acquisition process.	None

6.2.2 Impacts on Indigenous People

The silo sites did not affect any people from the tribal communities. The World Bank's OP 4.10 on Indigenous Peoples therefore, does not apply to the project as a whole. None of the indigenous community would be affected by the project activities.

6.2.3 Social Exclusion

The objectives of the project are to improve food stock and supply of food grains during emergencies and at the events of disaster. The project is expected to benefit the communities in the target areas. Although the project intends to benefit communities from all strata, there is no risk of inequity with the issues like; gender, ethnicity and other social stratification of beneficiaries from the silo facility. The disadvantaged groups like the small ethnic and other minorities, women, disabled and very poor populations will be equally treated during any event

of disaster. Social safeguard issues have been incorporated along with the environmental safeguard issues.

6.2.4 Impacts Due to Non-Local Work Force

Increased number of non-local peoples on site during construction may pose a risk to public health and to some extent spread of STDs including HIV/AIDS. Social and environmental management plans has been incorporated to address such impacts.

6.2.5 Impacts on Local Infrastructure

The local infrastructures in the project adjacent area are far away from the silo campus. The construction of the silo and ancillary works will not directly affect the community. None of the local infrastructure/ institution would be affected by the project activity.

6.2.6 Impacts on Conflict of Labor Influx

Conflicts may occur between local residents who may feel that they have received unfair wages. During construction and operation phases external worker from outside the project area will be deployed. Then conflict may also occur between local residents and external workers because of any changes to local customs if external workers cannot understand local customs.

A number of consultations have been conducted with local residents about local conflict of interest. Local people should be employed for the construction works to the maximum extent possible, and any workers from other countries should be taught to respect local customs in order to facilitate good relationships with local people. The lodgings of the project workers should be equipped with sufficient living facilities to keep workers at the project site as much as possible.

To minimize the adverse impacts of temporary project induced labor influx, measures will be taken during implementation of the project: engaging local people as much as possible; monitoring of the workers movement for avoiding any unexpected social activities (robbery, crime, political attachment and conflicts, drugs abuse; minimization of gender-based prejudice and discrimination from the working place by monitoring; conducting awareness raising program to minimize sexually transmitted diseases (STDs) and gender based violence and sexual exploitation and abuse (GVB/SEA); confidential record and solution of the gender based violence and sexual exploitation and abuse (GVB/SEA) and preventing exposure to health risks linked to sexually transmitted diseases (STDs).

6.2.7 Project Benefits

Barishal is located strategically in terms of storage of rice; it is connected by road as well as water way and placed in the central part of Bangladesh. Rice will be collected, from other districts, by road as well as water way and will be delivered to the surrounding LSDs, and will meet up emergency during and after any disaster, in the similar transport pattern. So, Barishal is well located in terms of food storage and distribution that the surplus food storage during harvesting period as well to meet up the emergency during any disaster like early flood. The silo facilities are more efficient than flat warehouses. The silo can be constructed within smaller

horizontal areas than normal traditional flat system godowns. The rice may be stored more efficiently, where loss (in terms of quantity and quality) is minimum and the quality of rice will be sustained for longer periods. The silo facility has wonderful opportunity of blending vitamin and mineral enriched rice kernels to the stored rice to improve the health of the people, especially for child and lactating mother.

Modernizing the current food storage system in the country will result in improved storage capacity at national level to make available food stock the emergency and disaster periods. The project will help ensure food and nutritional security to the communities, particularly in the disaster periods. By enhancing the post-disaster food distribution system, the project will serve to safeguard livelihood, human capital and welfare of the poor and vulnerable populations.

6.2.8 Social Welfare Works by the Project Authority

During the environmental and social data and information collection process, type of effects, their advantage and disadvantages etc. were analyzed mainly on the issues like; Agriculture, Fisheries, Livestock, Bird, Animal, Forestry, Income, Employment, Movement of local people, Tourism, Business, Industry, Archeological and Historical Site, Health, Literacy Rate etc. Different effects found are mentioned in the following table.

The Table 6.2 shows the social impact assessment of the project.

Table 6.2: Social Impact Assessment (SIA)

Sl	Issues	Advantages/ Disadvantages/ No effect
1.	Agriculture	**No Effect:** As there is no issue of land development.
2.	Fish	**Disadvantage:** Hence, Kirtonkhola River and some ditches is very adjacent to the silo site, effect will be significant if any waste disposal happens.
3.	Livestock	**No effect**: as, the construction will be within confined area.
4.	Bird	**No effect**: as, the construction will be within confined area.
5.	Animal	**No effect**: as, the construction will be within confined area.
6.	Forestry	**Disadvantage**: as, there are some young and immature trees may be cut down, but huge new plantation has been considered
7.	Income	**Advantage**: Construction works will create business opportunity
8.	Employment	**Advantage**: Construction works will create employment opportunity
9.	Movement of people	**Disadvantage**: Due to increased movement of goods, vehicles, people.
10.	Tourism	**Advantage**: Tourism will be developed through movement & migration.
11.	Business	**Advantage**: The food processing, rice husking etc. will be developed.
12.	Industry	**Advantage**: Industries will be developed during the silo operation.
13.	Archeological Site	**No effect**: No effect will be there on archeological infrastructure
	Historical Place	**No effect**: No effect will be there on historical infrastructure
14.	Health	**Disadvantage**: Adverse effect may be due to external workers
15.	Literacy Rate	**Advantage**: Literacy rate may be increased due to the presence of more educated people and workers during and after construction operation.
16.	Communication	**Advantage**: People may be connected with more local road networks due to project implementation **Disadvantage**: In the road network, there will be few traffic increased during construction, but the effect will be localized.

7 ARRANGEMENT OF SILO BINS AND ANCILLARY FACILITIES

7.1 General

16 nos. steel silo bins and a number of ancillary facilities are to be accommodated in the proposed silo site. The ancillary facilities are: Guard room by the new silo gate site, Truck scale, Sampling house, Laboratory house with weight control room, Truck parking area, Bulk truck receiving area (8x28m), Control room (9.5x11.2m), Bulk elevator tower (6x8.4 m size), Bagging house (24x48m size), Empty gunny bag godown (15x18m size), Workshop cum store (14x30m), Sub-station (10x20m), Inspection bungalow, Silo office, Car parking, Public toilet (5x8m area), Canteen, Four storied dormitory for support staff, three storied Officers dormitory, Fortified rice bags receiving area (4x4m size) etc. The Designers arranged all the silo bins and the ancillary facilities very effectively (refer to the Figure 3.3, the layout plan for the silo and ancillary works).

7.2 Safeguard Facilities during Construction works

For the environmental and social safeguard compliances, the construction and installation of water supply and sanitation facilities, along with the labor-camp placement, will have to be done very carefully. The areas (Figure 7.1) near the office building along the boundary wall side will be suitable for setting the workers' facilities like labor-shed, toilet and solid waste management. Cleaning of labor-camp site, etc. will have to be accommodated very cautiously, because of the existing CSD facilities, no disturbance will be allowed to the existing CSD godowns and related facilities. Also, the toilet facilities may be accommodated along the boundary wall side. Precaution is to be made on cleaning the living and toiletry facilities, because, the whole works will be commenced within the existing CSD areas. The Supervision Consultant's Engineer and the Contractor will take a careful decision for setting the workers' facilities, material stocking yard etc. within the limited area. The Contractor will have to separate areas for large scale stock piling, fabrication of steel sheets for the silo bins etc.

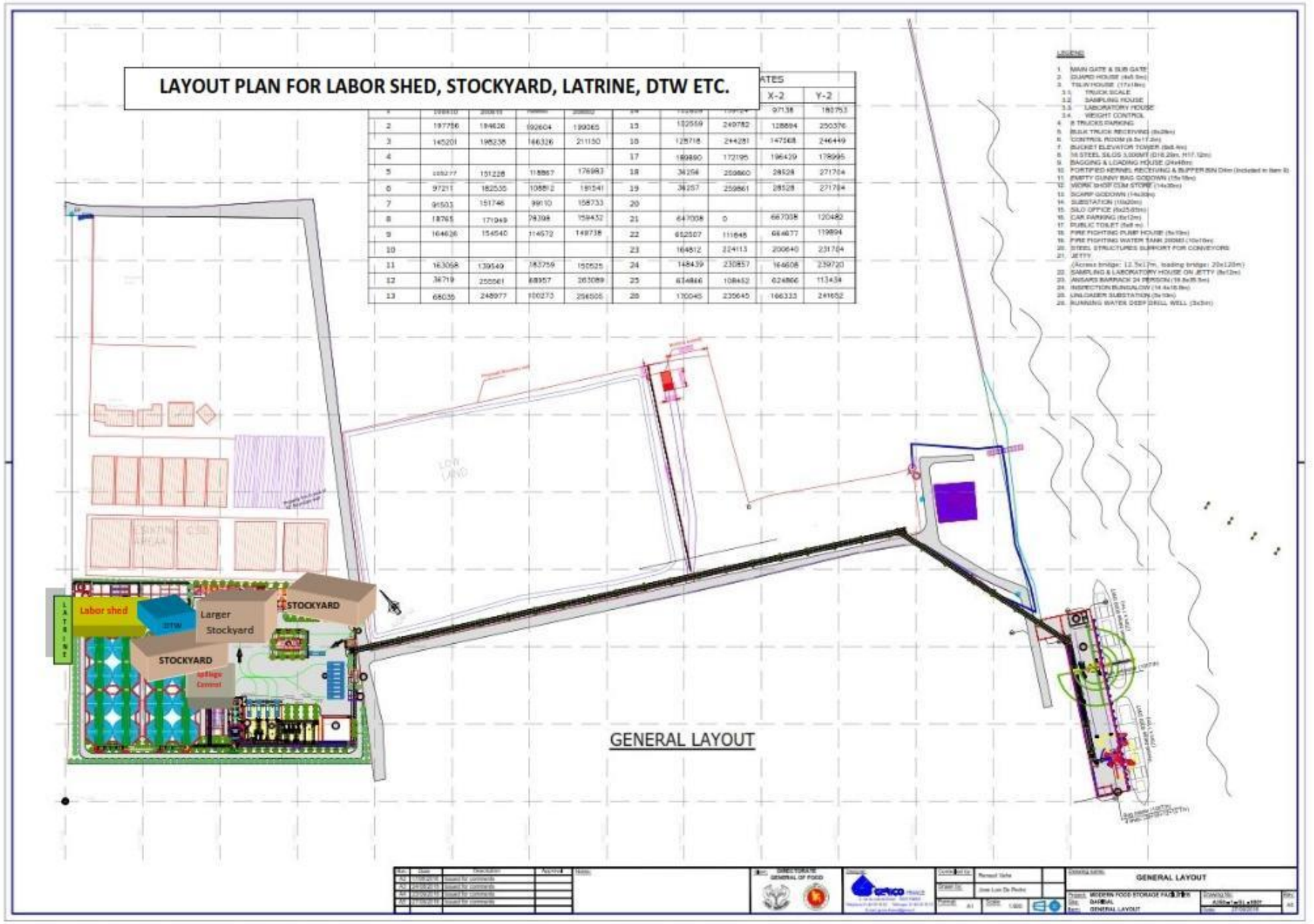


Figure 7.1: Arrangement of labor camp, stockpiles, water source, latrines etc.

7.3 Traffic Management

The Silo Campus is adjacent to the local road. There is another alternative route of waterway that may be suitable to carry coarse and fine aggregates. The waterway may also be used to carry the construction materials as maximum as possible. The materials carrying vehicles may use Chittagong-Dhaka-Barishal route for transporting different materials. The vehicles for construction and installation will be only through this road. The use of transport routes may follow the following sequences:

- ✓ The construction materials like stone/ brick chips, sand (both local and Sylhet sand) may be brought from Sylhet/Sunamganj area,
- ✓ Steel Rod for reinforcement works may be from Chittagong,
- ✓ Cement may be purchased and brought from local area or Khulna,
- ✓ The Steel Sheet (pre-fabricated) for the silo bins may be brought from Chittagong Port or Dhaka to the project site.

Proper traffic management is necessary during carrying construction materials. The environmental and social safeguard issues have been accommodated with the engagement of people for traffic management during construction and operation periods (also traffic arrangements are shown in Figure 7.2).

7.4 Residential Arrangement for the Silo Experts

The Contractor may have to arrange some residential arrangements for the International and National Experts during construction period. In that case, the Contractor will be able to rent houses in Barishal Town and or hotels. The contractor can also built a site office with residential facilities at one corner of the silo campus depending on the design of the silo.

7.5 Solid waste Management support from City Corporation

The Contractor may have an arrangement with City Corporation for the solid waste management activities and that must be synchronized with the existing CSD infrastructures and facilities. In that case, a temporary transfer station is to be constructed by the roadside and that transfer station should be confined by proper shade and boundary wall. The City Corporation garbage carrying truck will carry the waste to the landfill station. The Contractor will have to make an arrangement with the City Corporation Conservancy unit for the solid waste management system.

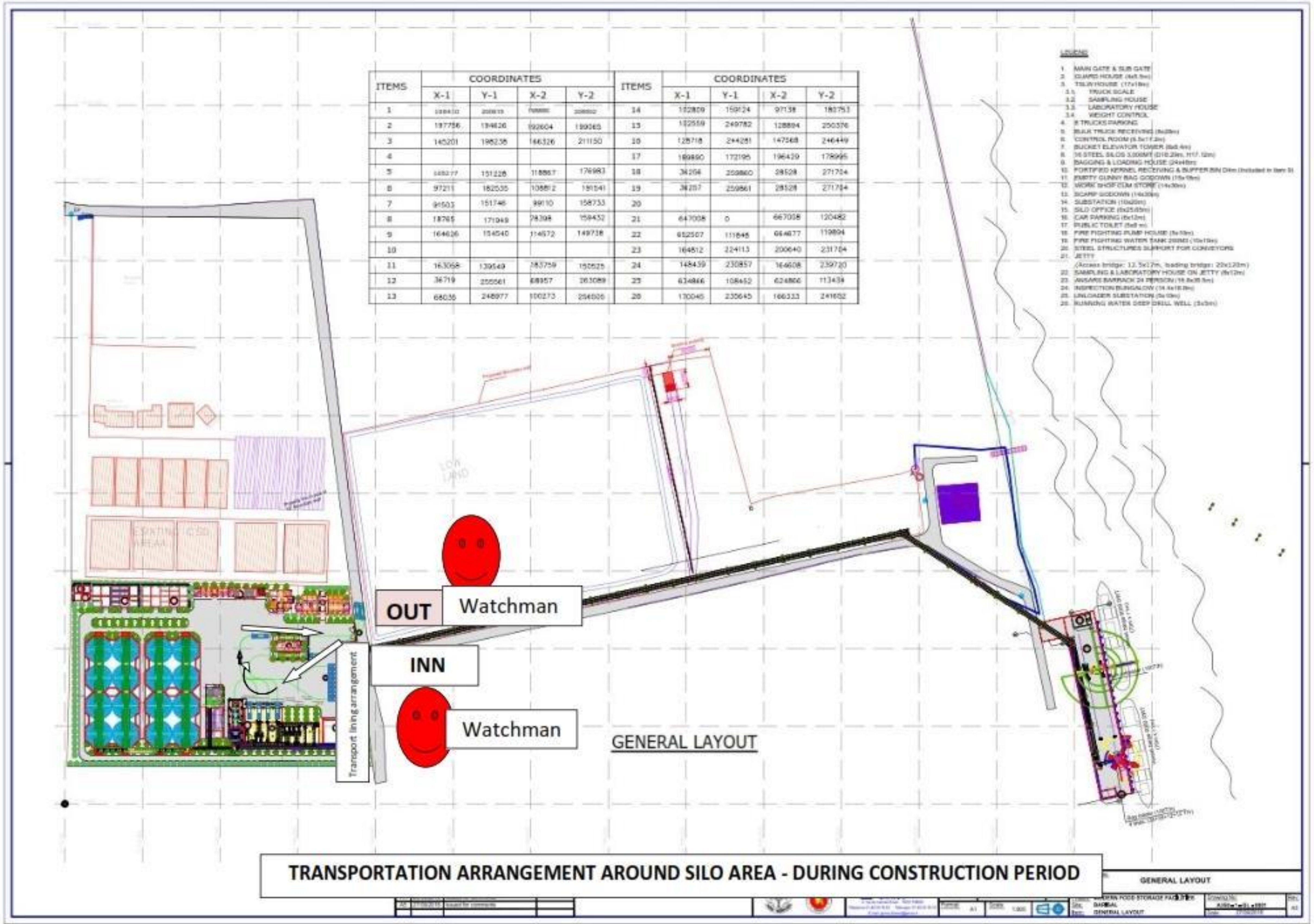


Figure 7.2: Transportation arrangement around silo area during construction period

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) aims to ensure the compliance of all activities undertaken during implementation and operation of the sub-project with the environmental and social safeguard requirements of both the World Bank and Government of Bangladesh. Furthermore, it aims to integrate the environmental and social mitigation measures needed for the sub-project. The plan consists of mitigation, monitoring and institutional arrangements to be undertaken during implementation and operation to eliminate adverse impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures.

8.1 Objectives of the ESMP

The basic objective of the ESMP is to manage, prevent, and mitigate the adverse impacts due to the sub-project interventions in a way that minimizes the adverse impact on the environment and the people around Barishal Silo/CSD areas and specifically to:

- ✓ Facilitate the implementation of the environmental and social mitigation measures identified during the present ESIA.
- ✓ Assign responsibilities of the PMU, MFSP and Contractors for the environmental and social management of the Project;
- ✓ Define a monitoring mechanism and identify monitoring parameters to ensure effective implementation of the ESMP.
- ✓ Assess environmental training required for different stakeholders at various levels.
- ✓ Describe communication and documentation requirements.

8.2 Environmental and Social Management and Mitigation Plan

Environmental and Social Management and Mitigation Plan summarizes the potential impacts, corresponding to, (i) preventive measures during pre-construction/design period, (ii) both preventive and mitigation measures during construction phase and (iii) preventive and mitigation measures during operation period. The plan is also for setting the responsibilities of different level of stakeholders with specific task and function. There will be an indication of timeframe for effective implementation of ESMP.

Potential impacts have been assessed according to magnitude (minor, moderate, major), sensitivity and impact duration (Temporary or Permanent) and are presented in a manner that shows magnitude, sensitivity and duration of a particular impact. Level of duration and magnitude assumed without mitigation measures.

Table 8.1: Environmental and Social Management /Mitigation Plan

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Pre-Construction stage					
Site Preparation (already done)	Measures for environmental safeguard during preparatory works	Environmental safeguard issues were added in the BOQ of site preparatory works	Included with the BOQ of preparatory works	Contractor	PMU, MFSP
Traffic movement plan	Traffic load will be increased on local road, during construction. Also traffic congestion may arise along with the trucks' movement for old CSD food grains	• Extra man-power will have to be provided to control the traffic movement. • Most of the construction materials will be carried from local areas. • Water way will also be used to carry construction materials	Cost for traffic control has been included in the BOQ	Contractor	PMU, MFSP
Design Considerations	Foundation works for the silo bins, consideration of pile design	• Pile design for silo bins has been completed as per soil test report. • Foundation for the ancillary facilities has been designed according to sub-soil test. • Design of construction of silos and his associated facilities has been ensured safe from potential risk of flooding and inundation as well as storm surges from Brahmaputra River.	Cost has been included in the BOQ	Design Consultants	PMU, MFSP

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
	Anticipated contamination of soil and water around, during construction works	• Appropriate waste collection and disposal systems has been adapted with the environmental and social safeguard compliance issues • Temporary drainage facilities have been incorporated with environmental management plan. • Proper drainage system and on-site sanitation system has been considered during design works	Cost for waste collection system and temporary drainage system has been included in the BOQ.	Contractor	PMU, MFSP
Construction of labor camp	If not controlled and maintained properly, impacts will be there on surrounding environment.	• The labor camp has been considered along the boundary wall site (west side of CSD area). • Proper sanitation and waste collection system are to be provided along with the labor-camp.	Cost has been estimated and items have been incorporated in the BOQ	Contractor	PMU, MFSP and CSC
Construction stage					
Earthwork	Slope, erosion and dust blowing, during earth work for any foundation work	• Care to be taken during any excavation work, • Dust blowing is to be controlled by providing water spray every day	Included in the BOQ.	Contractor	PMU, MFSP and CSC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Noise	Increase of noise level of the construction site. Increasing noise level during construction works may disturb to the nearby physical and social infrastructures like school, mosque, etc	• Noise level to be measured periodically, near the middle of developed area, • Proper scheduling of transportation of material and noise generating equipment/ works, • All vehicles and equipment used in construction shall be fitted by exhaust silencers, maintain regularly to minimize noise level.	According to overall Environmental Management plan in addition to Compliance included in BOQ	Contractor	PMU, MFSP and CSC
Dust	Dust is generated during vehicle movement, material carrying and construction works	• Construction materials should be carried by the covered vehicle • Spraying should be done every day, during construction period	BOQ is with the issues (environmental safeguard)	Contractor	PMU, MFSP and CSC
Surface water	Chance of contamination of surface water around, during construction period	• Ensuring wastes/effluent disposal properly, • Ensuring solid waste management properly.	BOQ is with the environmental safeguard issues	Contractor	PMU, MFSP and CSC
Water Logging	During construction work and in rainy season, water logging may occur	• Temporary earthen drain will be constructed to drain out rain water. • Temporary earthen drain is to be provided with the labor camp	As per BOQ of bidding document	Contractor	PMU, MFSP and CSC
Vehicular Traffic	Materials carrying vehicles may damage	• Speed limits will be enforced for the Project vehicles.	Environmental Management plan,	Contractor	PMU, MFSP and CSC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
	environment and may be a disturbance to nearby physical and social institutions.	• Reduced speed in the CSD area. • Safety signage should be placed at the work sites (both road side and in the CSD/ silo areas	environmental safeguard compliance cost in BOQ		
Public Health and Safety	Due to migrated workforce, infectious diseases may be there in and around Barishal CSD/ silo site	• The contractor will engage local people as maximum as possible, • Health checking should be done, especially for migrated people, • Workshop and training will be with the workers & supervisors.	Environmental Management plan, environmental safeguard compliance cost in BOQ	Contractors	PMU, MFSP and CSC
Social and Gender Issues	Some issues related to society and gender may be raised during construction works	• Workshops with the surrounding community people, leaders will be arranged. • Grievance redress mechanism has been established at silo site	Expense is included in the environmental and social safeguard compliance BOQ	Contractors	PMU, MFSP and CSC
Children's right	Child labor may be engaged during construction	• Contractor shall avoid the engagement of child labor force, • Patrolling periodically to check for any child labor	Clear indication is there in the tender documents.	Contractors	PMU, MFSP and CSC
At the end of construction works i.e. during	Any unwanted substances may be left behind, at the end of construction, may lead environmental pollution and damage to the	• At the completion of work, the contractor shall remove all unwanted material from the site, • The cleaning of construction site should be done properly.	Expense is included in contract cost.	Contractor	PMU, MFSP and CSC

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
completion stage	aesthetic views and may cause disturbance to nearby physical and cultural resources	• Damaged equipment, debris, waste and unusable materials should be cleaned from the campus and those are to be disposed properly.			
Operation and Maintenance stage					
Chiller System and use of Nitrogen	Chiller system has been adapted in the modern food storage facilities project, instead of using Fumigation (AP) system. In addition, Nitrogen gas will be used for insect and fungal control.	In the silo bins, an improved control, of insect and fungi, has been adapted and designed. Design & Supervision Consultant has designed the system. The use of Nitrogen gas will be automatically controlled and there is no chance of any hazard due to use of nitrogen gas for disinfection.	Cost has been included in the bidding document	Silo Super	DG Food
Public Health and Safety	The total system (from food grain loading to bagging) is automated and mechanized. Some problem may be raised during maintenance of steel of bins at outside.	• Proper care will be undertaken during maintenance of bin sheets at the operation phase, • Capacity building, including on-the-job training shall be continued during O&M phase.	Environmental Management plan, environmental safeguard compliance cost in BOQ	Silo Super	DG Food
Traffic for grain transportation	Noise levels may increase due to movement of more vehicles during operation and may be a disturbance	Awareness building and administrative measures should be taken to regulate	BOQ (O&M phase)	Silo Super	DG Food

Sub-project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
	to the nearby physical and social institutions				
Children's Right	Child labor engagement	• Prohibit child-labor engagement, • Patrolling periodically to check child labor engagement	BOQ (O&M phase)	Silo Super	DG Food
Operation of Machinery and equipment	May cause air quality deterioration and noise level may also be increased and may be a disturbance to the nearby physical and social institutions	• Controlled vehicular movement, • Regular monitoring air quality, • Arrangement of HSE training to workers and supervisors, • Regular monitoring noise quality, • Ensure PPE to the O&M staff • Waste management plan as part of its operation & maintenance, • On-site sanitation system should be with proper septic tank, • Health, Safety and Environment (HSE) Plan is to be developed, • Health and awareness building orientation workshop to be arranged time to time.	BOQ (O&M phase)	Silo Super	DG Food

8.3 Environmental and Social Monitoring Plan

8.3.1 General

Environmental and Social Monitoring Plan has been prepared to provide guidelines for environmental and social management plan during the construction and operation phases. The environmental and social components will be monitored during construction period and the monitoring will be continued up to certain period of silo operation. Environmental and social management and monitoring plan is an essential tool to keep the base environment undisturbed as well as to upgrade the environmental standard of the sub-project area. The major environmental impact, monitoring method, responsibility, expenses, time period etc. are illustrated in table 8.2.

8.3.2 Objectives of the ESMoP

The objective of environmental and social monitoring plan during the construction and operation phases is to compare the monitored data against the baseline condition collected during the study period to assess the effectiveness of the mitigation measures and the protection of the ambient environment based on national standards. The main objectives of the pre-construction, construction and operation phase monitoring plans will be to:

- ✓ Monitor the actual impact of the works on physical, biological and socioeconomic receptors in and around the sub-project area.
- ✓ Recommend mitigation measures for preventing adverse impacts and to control impacts at its acceptable limit.
- ✓ Ensure compliance with legal and community obligations including safety on construction sites;
- ✓ Ensure the safe disposal of excess construction materials.
- ✓ Ensure measures to protect and improve physical, biological and socio-economic environmental standards for long time.

Table 8.2: Environmental and Social Monitoring Plan

Environmental Indicator	Management	Means of Monitoring	Parameters	Frequency	Responsibility	
					Implementation	Supervision
Air Quality	Measurement of air quality	Portable air quality measuring machine	CO, SOx, NOx, SPM	Once in every three months	Contractor	PMU, MFSP and CSC
Dust Control	Spraying of water	Visual	-	During creation of dust	Contractor	PMU, MFSP and CSC
Noise Control	Measurement of noise level	Portable noise measuring machine	Noise level (dB)	Once in every three months	Contractor	PMU, MFSP and CSC
Waste management	Collection, transportation and disposal of solid waste.	Inspection	Different types of waste	Daily	Contractor	PMU, MFSP and CSC
Health and safety	Monitoring health and safety of workers	Inspection	PPEs	Daily	Contractor	PMU, MFSP and CSC
Water quality	Surface and ground water	Inspection and Water analysis through a government approved laboratory like DPHE, BUET etc.	Organic & inorganic	Once in every three months	Contractor through an agency	PMU, MFSP and CSC
Infectious Disease HIV/AIDS	Monitoring affected people if any	Engaging Physician	No. of affected person	Twice in a year	Contractor	PMU, MFSP and CSC
Traffic movement	Nos. of vehicle movement	Inspection & record keeping	No. of vehicle	daily	Contractor	PMU, MFSP and CSC

8.4 ESMP in Bidding Document

The following items have been incorporated as ESMP in the bidding document:

Table 8.3: Environmental and Social Management in the BOQ of the Bid Document

No	Description of Work	Unit	Quantity	Unit Rate	Amount	Remarks
I	**Overall Environmental and Social Management**					
1	Temporary Camp for the laborers with the facilities of lighting, cooking, utensils, washing, disposal of waste water facilities including providing kitchen waste bins etc. as per direction of Engineer in Charge (EC)	No.	1	150,000	150,000	
2	Prevention of spillage, leakages of polluting materials, i.e. arrangement of keeping fuel, lubricant, kerosene, mobil, etc. for which a pucca platform (at least 100 sq. ft with brick soling and plastering) as per instruction of EC	LS	1	30,000	30,000	
3	Adequate supply of potable water, through installation of Deep Tube Well (250-300m depth and 150 mm dia pipe boring), with at least 6m Strainer, Submergible pump at 25m depth, with 3 HP delivery pump for all purposes, by pipe setting (as and where required). Arrangement of water reservoirs; 1.5 cum plastic overhead tank for laborer shed, surface water reservoirs for construction (at least 3m x 5m size masonry tank on ground with 1.0 m depth). The water quality should be tested in the standard testing laboratory in Bangladesh, specifically but not limited with the parameters like; pH (6.5-8.5), Iron (0.3-1 mg/L), Arsenic (0.05 mg/L), Aluminum (0.2 mg/L), Ammonia (0.5 mg/L), Chromium total (0.05 mg/L), Manganese (0.1 mg/L), Salinity (0%) and the whole works to be done to the entire satisfaction of EC	No.	1	350,000	350,000	
4	Installation of Toilets at two separate corners of the boundary wall or at suitable locations, with water ans sap in the toilets as per satisfaction of EC	No.	4	25,000	100,000	
5	Providing First Aid Box with sufficient gauge, bandage, antiseptic cream, antiseptic lotion and with essential medicines with the satisfaction of EC	No.	1	20,000	20,000	
6	Arrangement stockpile sites through fencing around for keeping construction materials (sand, brick, stone, rod, etc), brick crushing sites, borrow areas, workforce camp in a suitable place (to be decided by the engineer in charge) and time to time rehabilitation of the stock pile site.	LS	1	100,000	100,000	
7	Construction of temporary earthen drain and its maintenance during rains to drain out the surface water during rains, to avoid water stagnant in the whole construction site as per satisfaction of EC	LS	1	50,000	50,000	

8	Providing personal protection equipment (PPE); with 20 pairs-hand gloves, 20 pairs-gumboot, 20-approne, 20 pairs-eye protecting glass, 20-Helmets, all the materials should be as per satisfaction of Engineer-in-charge	LS	1	150,000	150,000	
	Sub - Total I				**950,000**	
II	**Environmental Monitoring (Analytical and Visual) during Construction period**					
1	Water Quality Testing; water sample will be tested in the standard environmental laboratory, every after 3months or as directed by the Engineer in Charge (EC)	No.	3	10,000	30,000	
2	Air Quality Testing; The air quality (NOx, SOx, Suspended Solid, etc) will be tested, using standard air quality measuring machine (through contracting with any standard laboratory), every after 3months or as directed by the Engineer in Charge (EC)	No.	3	10,000	30,000	
3	Noise and Vibration Testing; Noise and Vibration will be tested by the recognized agency/ laboratory, every after 3months or as directed by the Engineer in Charge (EC)	No.	3	10,000	30,000	
4	Waste Management; Solid waste management activities, through providing at least 5 plastic bins (0.5 cum size each) in the construction site and through providing a full-time manpower with trolley and shables to dispose solid waste to a safe dumping place.	LS	1	50,000	50,000	
5	Work environment and Safety; Maintaining Safety at Construction site, through hanging red tape (at very protective sites) and yellow tape (at moderately protected places) around the construction work sites and cost should be including erection of tapes, at least 300m yellow and 300m red nylon tape with at least 25 mm width, to be preserved in a suitable place, as per direction of EC.	LS	1	50,000	50,000	
6	Accident Control; Control of accident trough providing at least 2 Watcher (well dressed) in the site, including traffic control, for the whole construction period (2 persons x 9 months x 2 shifts)	person -month	36	20,000	720,000	
	Sub - Total II				**910,000**	
III	**Environmental and Social Enhancement Measures (Capacity building Activities)**					
1	Awareness raising training particularly for communicable disease such as Hepatitis A&B and HIV/AIDS (100 participants in a day)	person -day	100	300	30,000	
2	Awareness raising Refresher training particularly for communicable disease such as Hepatitis A&B and HIV/AIDS (100 participants in a day)	person -day	100	300	30,000	
3	Capacity Building, of key local stakeholders like Millers and Suppliers, on Rice Fortification (100 participants in a day)	person -day	100	300	30,000	
	Sub - Total III				**90,000**	
	TOTAL (in taka)				**1,950,000**	

IV	**Environmental Monitoring (Analytical and Visual) during Commissioning and first phase operation period**					
1	Water Quality Testing; water sample will be tested in the standard environmental laboratory, every after 3months or as directed by the Engineer in Charge (EC)	No.	3	10,000	30,000	
2	Air Quality Testing; The air quality (NOx, SOx, Suspended Solid, etc) will be tested, using standard air quality measuring machine (through contracting with any standard laboratory), every after 3 months or as directed by the Engineer in Charge (EC)	No.	3	100,000	30,000	
3	Noise and Vibration Testing; Noise and Vibration will be tested by the recognized agency/ laboratory, every after 3months or as directed by the Engineer in Charge (EC))	No.	3	10,000	30,000	
4	Waste Management; Solid waste management activities, through providing a full-time manpower with solid waste collection trolley to dispose solid waste to a safe place for safe dumping.	man-month	9	20,000	180,000	
5	Accident Control; Control of accident trough providing at least 2 Watchers (well dressed) in the site, including traffic control, for the initial operation period (1 x 9 months x 2 shifts)	man-month	18	20,000	360,000	
6	Monitoring budget for operation period of first 9 months			L.S	630,000	
	TOTAL (in taka)				**1,260,000**	

Construction of the public toilets has been included in the civil works. Based on the site condition and space availability, landscaping and tree plantation has been designed which is also included in the civil works items. In addition, measures for emergency response, fire safety etc. is included in the civil works.

8.5 Grievance Redress Mechanism

Environmental Safeguards. A grievance can be defined as an actual or perceived problem that might give grounds for complaint. As a general policy, DG-Food along with the MFSP will work proactively towards arising and minimizing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. The Grievance redress mechanism (GRM) sets out the information and communications strategy to ensure that PAPs and communities are fully informed about their rights to offer suggestions and make complaints, and the different mechanisms through which they can do so, including grievances through creating more sounds during construction, pollution through improper solid waste management, traffic disturbance during the movement of more vehicles during construction and operation phases etc. This will be the responsibility of the PMU, CSC, and contractors and persons designated to be responsible for stakeholder liaison. The objectives of GRM are (potential impacts and effects that are most likely to give rise to grievances for this Project is related to):

- ✓ Mitigation to any disturbance during construction and operation phases,
- ✓ Distribution of employment opportunities;
- ✓ Construction noise, vibration, surface water pollution, waste management & control,
- ✓ Presence of a construction labor force and its effects on neighboring villages, local services and infrastructure.

Any stakeholder (individual or organization) will be able to submit a grievance to the Project if they believe a practice is running with adverse impact on community, the environment, or on their quality of life. They may also submit comments and suggestions. Grievances could include:

- ✓ Adverse impacts on a person or a community (financial/physical lose, nuisance);
- ✓ Dangers to health and safety or the environment;
- ✓ Failure of PMU, MFSP, its contractors and their workers or drivers to comply with standards or legal obligations;
- ✓ Harassment of any nature;
- ✓ Criminal activity;
- ✓ Improper conduct or unethical behavior;
- ✓ Financial malpractice or impropriety or fraud; and
- ✓ Attempts to conceal any of the above.

Social Safeguards. DG-Food will establish a Grievance Redress Mechanism (GRM) to answer to queries and address complaints and grievances about any irregularities in using the guidelines adopted in the SMRPF. The GRM will address all grievances/complaints through

Grievance Committees (GRCs) that will be formed at silo/local and PMU levels. All unresolved cases at the silo levels will be forwarded to the PMU for final decision. Based on consensus, the GRM will help to resolve issues/conflicts amicably and quickly, saving the aggrieved persons from resorting to expensive, time-consuming legal actions. The GRM will however not preempt an aggrieved person's right to go to the courts of law.

The GRC at the silo level will have the following memberships:

1.	Project Coordinator-, Silo Site, MFSP, DG-Food	Convener
2.	Technical Site Specialist, Silo Site, MFSP, DG-Food	Member Secretary
3.	Councilor/Member of the respective City Corporation / Pourashava/Union Parishad	Member
4.	Women Councilor/Member of the respective City Corporation / Pourashava/Union Parishad	Member
5.	Representative from the Project Affected Person/Beneficiaries/ Stakeholder of the respective Silo site	Member

The GRC at the PMU level will have the following memberships:

1.	Project Director, MFSP	Convener
2.	Deputy Project Director, MFSP	Member Secretary
3.	Director- Monitoring, Development and Technical Services, Ministry of Food	Member
4.	Representative, Ministry of Agriculture	Member
5.	Representative, Ministry of Land	Member
6.	Representative, Ministry of Environment and Forest	Member
7.	Senior Social Specialist/Senior Environmental Specialist, MFSP	Member

DG-Food will also establish two more GRMs: one exclusively for workers who would be engaged by contractors during construction of the silos, and the other for HHS distribution program. With these activities, the local communities have been made aware of the functions of GRMs and GRCs. The basic objective is to resolve complaints / conflicts amicably, without having to wait for other means of resolution. The GRCs dealing with labor grievances/complaints have members who are directly and indirectly associated with the construction and other works at the individual silo sites. Each GRC will have five members:

1. DG-Food official who is in charge of all construction and other activities at individual silo sites will act as convener
2. Resident engineer of the DSM consultant
3. A male worker representing the workers
4. A female worker representing the workers
5. A DG-Food official, designated by the Project Director, who is not associated with the construction activities in the field, but a member of PMU

The convener will designate an official to receive the complaints and carry out the tasks as described above for the GRCs dealing with complaints of project affected persons and others. Where the complaint is lodged against a person (e.g., labor sardars, supervisors and those who

directly work with laborers) who is present in the site, the GRC will hear it in no more than one week. The convener will ensure that,

- The complainant does not lose his/her job and is not intimidated to withdraw the complaint *before* the formal hearing.
- Most importantly, where the complaint is not related to a worker's performance, but for reasons, such as gender-based violence or sexual exploitation and assault, the convener will ensure that the complainant remains on the job – irrespective of favorable /unfavorable decision -- for a certain time period, unless he/she quits voluntarily.
- The convener will refer all unresolved complaints to the Project Director, who will make the final decision.

To ensure impartiality and transparency, hearings on complaints will be held in a non-threatening environment and will remain open to all other workers in the site. The GRCs will record the (i) details of the complaints -- separately for men and women; (ii) reasons that led to acceptance or rejection of the individual cases, as well as the number of accepted and rejected cases; and (iii) decisions agreed with the complainants. DG-Food will keep records of all resolved and unresolved complaints and grievances and make them available for review as and when asked for by the World Bank and other interested entities/persons.

8.6 Institutional Arrangement for Project Implementation

The institutional arrangements required for implementation of the EMP are discussed below. A flow chart for implementation arrangement is added in Figure 8.1.

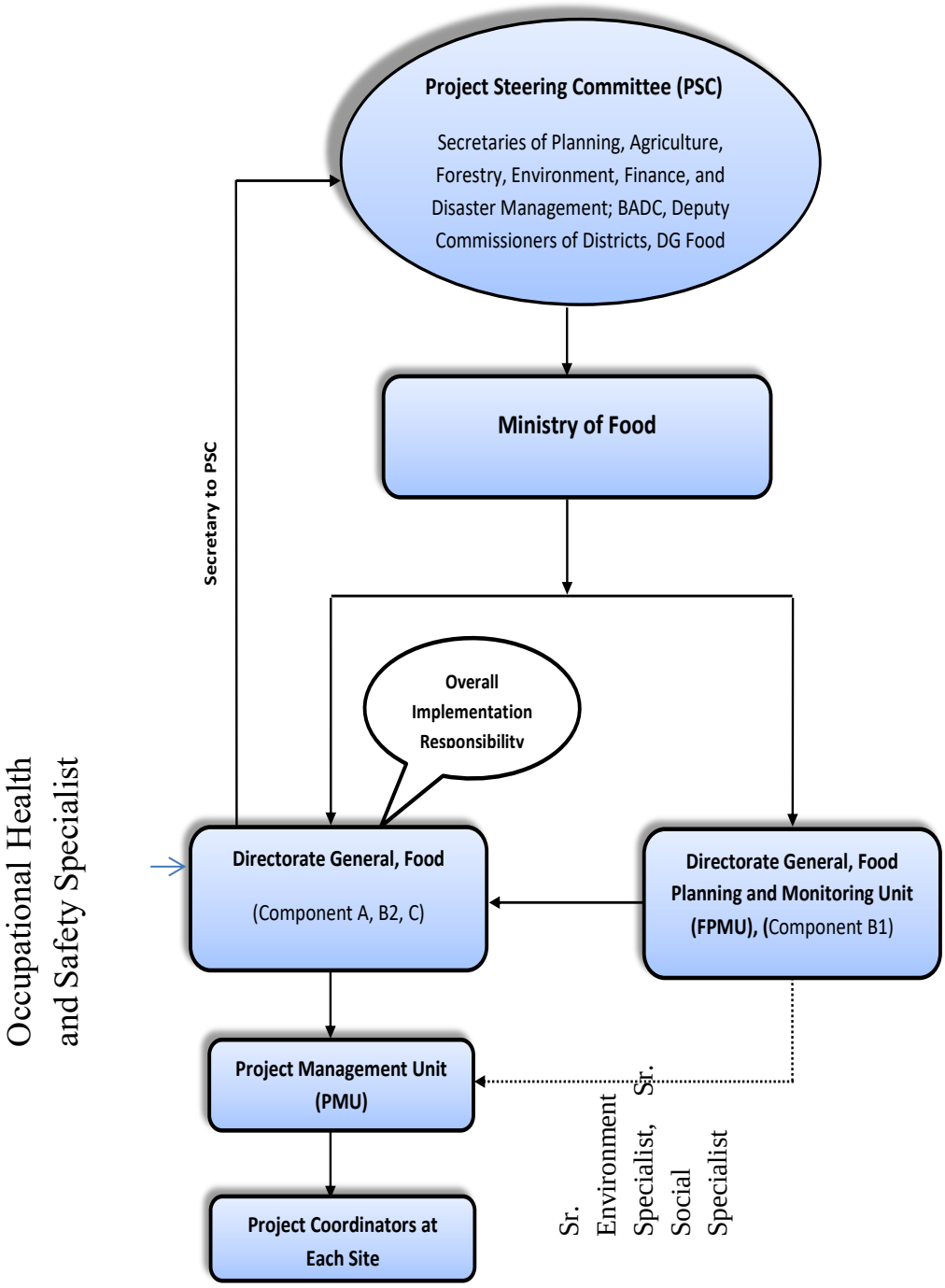


Figure 8.2: Implementation Step Up of the Project

8.6.1 Implementation Responsibility

The Project proponent (DG Food) will be overall responsible for the implementation of EMP through consultants and contractors. The staff of the proponent, consultants and contractors who are responsible for ensuring the implementation of the EMP needs to have the capability to handle the complexities and spirit of management strategies. Training and workshops will need to be arranged involving proponent, consultants and contractors to share the issues of environmental and social protection.

A **Project Management Unit (PMU)** has been established under the DG Food's office for day–to-day implementation and monitoring the project activities. The PMU is headed by a Project Director who is assisted by; (i) Deputy-Project Director and Assistant Deputy Project Director, and a number of consultants like; (i) technical specialists (Civil, Mechanical and Electrical); (ii) Senior Procurement Specialist, and Procurement Analyst; (iii) Senior Financial Management Specialist, and Accountant, (iv) Senior Environmental Specialist, (v) Senior Social Specialist, and (vi) Senior Communication Specialist. Each Silo site is headed by the Project Coordinator for coordination with the contractors, consultants and local administration, along with a Technical Supervision Specialist. The Senior Environment Specialist is responsible for ensuring the adequacy of environmental safeguard issues in the Bidding Document (BOQ) and ensures the quality of Environmental Action Plan (EAP) that will be developed and submitted by the contractor before starting the work (Sample EAP is attached in the annex-M). The field level environmental specialist (D & S Consultant) will be on board before commencement of the construction work

8.6.2 Construction Phase

Environment Specialist in PMU. The Senior Environmental Specialist (SES) of PMU will have to ensure implementation of EMP and other environmental safeguard issues. The SES is responsible for maintaining liaison with WB safeguards team, regulatory agencies and other stakeholders during the Project implementation. The SES will also coordinate with the environmental specialist of the Construction Supervision Consultants and Environmental Supervisor/ Safety Officer of the construction contractor.

Supervision Consultant's Environmental Specialist and Environmental Monitors. The Supervision Consultants will have dedicated, properly qualified and experienced, site-based Environment Monitor (EM) at each construction site during construction period headed by an Environmental Specialist. The EMs will monitor and supervise the EMP implementation at the field level. The EMs will maintain coordination with the Environmental Specialist of Supervision Consultant and SES at the PMU level and supervise and monitor the construction contractor. The Environmental Specialist of Supervision Consultant will maintain coordination with the SES at the PMU level and supervise and monitor the construction contractor. The EMs should be a graduate preferably in environmental science/engineering with at least 5 years' experience in the related field.

Contractor's Environment Supervisor/Safety Officer. The construction contractors will have dedicated properly qualified and experienced, site-based Environment Supervisors (ESs) at each construction site. The ESs will be responsible to implement various aspects of the EMP particularly the mitigation measures to ensure that the environmental impacts of the

construction works remain within acceptable limits. The ESs will maintain coordination with the EMs at the site level.

8.6.3 Operation Phase

The (Health, Safety and Environment) HSE function will be a key element of the operation and maintenance arrangements at each of the silo facility. Dedicated HSE personnel will be part of the O&M staff and will be responsible to prepare and then implement the relevant parts of the Operations Manual for ensuring health and safety during project operation.

8.7 Training Plan

A series of training programs has been proposed under the MFSP Silo project to enhance the skills of the MFSP as well as contractor staff in environmental aspects especially Environmental Management Plan (EMP) and Environmental Safeguard arrangements. The Environmental and Social consultants (PMU and D&S consultants) will be responsible for imparting training to the engineers and supervisors engaged in construction and operation works. The, following training programs are to be included for effective implementation of environmental safeguard issues during construction period and operation stages:

- ✓ Implementation of Environmental Management Plan (EMP)
- ✓ Overall safeguard requirements of the Project
- ✓ Internal and external communications
- ✓ Internal audit

A training plan is provided the following Table 8.4.

Table 8.4: Environmental and Social Training Plan

Contents	Participants	Responsibility	Schedule
✓ Environmental issues related to Silo Construction and associated facilities under MFSP ✓ Environment policy & legislation of Bangladesh, guidelines on Environment, Health and Safety (EHS) safeguards of co-financiers	DG-Food/ MFSP staff and Contractor staff	MFSP (PMU and D&S Consultant)	Prior to start the Project activities. (To be repeated as needed.)
✓ Environmental and social safeguard issues required during construction works and remedial measures for adverse impacts during construction works. ✓ Environmental and social safeguard issues during	DG-Food/ MFSP staff and Contractors' Crew	MFSP (PMU and D&S Consultant)	During and after construction works

operation and maintenance of Silo Bins.			
✓ Environmental parameters' quality measurement activities required during construction works, ✓ Mitigation measures with the environmental parameters during operation phases	DG-Food/ MFSP staff and Contractor's staff	MFSP (PMU and D&S Consultant)	During and after construction works
✓ Monitoring and checking the ecological parameters around, during construction works. ✓ Reporting of environmental monitoring	DG-Food/ MFSP staff	MFSP (PMU and D&S Consultant)	During and after construction works
✓ Waste disposal; ✓ HSE	Construction crew	MFSP (PMU and D&S Consultant)	Prior to start the Project activities. (To be repeated as needed.
✓ HSE during Operation Phase	DG-Food/ MFSP staff	MFSP (PMU and D&S Consultant)	Prior to start the Project activities. (To be repeated as needed.

9 PUBLIC CONSULTATIONS

9.1 General

Public Consultation was made with different level of people in and around Barishal CSD areas. The people are not fully aware of the activities of modern steel silo projects. During the consultation meetings and interactions, the sub-project, its benefit etc. were elaborated by the consultation team (environmental and social). The consultations were made with different level of people like, local elected persons, community leaders, mosque Imam, businessmen, and rice husking factories in and around Barishal CSD areas. The direct and indirect beneficiaries, like workers, businessmen, people of all level etc. of the existing CSD at Barishal were also consulted. The target of such consultation was to finalize the environmental and social safeguard compliance issues to be considered during pre-construction phase, construction phase and operation phase, including the options for rice storage, fortification, bagging and distribution of rice during disaster period. The probability of impacts on local peoples' business and employment was also judged through such consultation. Such stakeholders' engagement is an integral part of ESIA preparation and is a statutory requirement of the ESIA legal framework in Bangladesh on Environmental and Social Safeguards. The consultation program for the Project is based on informed consultation and participation in line with ESIA requirements with the people, and such consultations were made during January 2017.

9.2 Objectives

The objective of stakeholder consultation is to finalize the environmental and social safeguard compliance issues to be incorporated in the ESMP. The consultation was done for the following specific objectives:

- ✓ to find the legal obligations are involved with the silo construction works at Barishal CSD area,
- ✓ to find out the probable ways to avoid traffic congestion during carrying construction materials,
- ✓ to find out the best possible ways to adapt solid waste management options to be applied for Barishal CSD/ silo campus,
- ✓ to find out the water supply, sanitation etc. facilities to be involved during construction and operation,
- ✓ to find safety options for construction of silo and ancillary facilities in Barishal.
- ✓ to identify the stakeholders affected and/or with an interest in the sub-project area,
- ✓ describe how the views and issues raised have informed and influenced the development of the sub-project; and
- ✓ outline the future plans and approach to stakeholder engagement.

9.3 Consultation with various Stakeholders

A stakeholder is defined as any individual or group who is potentially affected by the proposed Project or can they affect the proposed Project directly or indirectly. Stakeholder consultation is an inclusive process for sharing information that enables stakeholders to understand the risks, impacts, and opportunities of a development or project, allowing them to express their views and articulate their perceptions towards it.

Through the project preparation stage extensive consultations/FGDs have been arranged during the conduct of the ESIA surveys. The details of FGDs are given in the following Table 9.1. The findings of the FGDs are summarized in Table 9.2 and the details of these FGDs are given in Appendix K.

Table 9.1: Details of FGDs

FGD No.	Type of Participants	No. of Participants
1	Local People	15
2	Local People	15
3	Local People	15
4	Local People	13
Total		**58**

Figure 9.1: Photos of Focus Group Discussions

Table 9.2: Summary of the FGD

Questions for discussion	Answer, Opinion, Comments and Suggestions
Are you aware of the activities of the sub-project? If yes, what are they?	Yes. The details of the project were shared with us, earlier. Silo-bins will be constructed to store surplus food during harvesting period and distribution of food during/after a disaster.
Any air pollution in the area due to the project activities? If yes, how to mitigate?	The area is away from the community, by the side of local Road, within the CSD confined area and the project authority will take necessary measures to control air pollution,
Noise- impact in the locality during construction and operation? How to mitigate?	There will be a little noise impact, due to pile driving, vehicular movement etc. but the project authority will have to minimize the noise.
Any impact on local soil due to the project activities? If yes, how to mitigate?	The construction will be within the confined area, within boundary wall, and no impact will be occurred on the soil.

Any impact on ground water/ drinking water quality due to the project? If yes, how to mitigate?	There is no problem with the groundwater quality because of the construction. However, the project proponent should confirm that no accidental spillage or washout of hazardous/waste material to surrounding water bodies during construction; particularly in the monsoon.
Any impact on the surface water body (river, pond, khal, beel, canal etc.)? If yes, how to mitigate?	There project authority will control waste water during construction and operation. They will also control the accidental spillage or washout of hazardous/waste material to surrounding water bodies during construction; particularly in the monsoon.
Any impact on drainage system? If yes, how to mitigate?	No; the project authority will design the drainage system to drain out storm water and onsite sanitation system for septage management, keeping synchronization with CSD campus.
Any impact due to on site or offsite disposal of construction waste or household waste? If yes, how to mitigate?	Waste will be generated, no doubt, during construction and operation, both from silo areas and the residential areas, but the project authority will have to manage all type of wastes in synchronization with those issues of CSD campus.
Is the proposed area inundated during flood? If yes, how much?	No, the area is not inundated during rainy season.
Environmental Protected Area (EPA) around?	No, there is no such EPA around/ in the vicinity
Environmental Sensitive Area (ESA) around?	No, there is no such ESA around/ in the vicinity
Will the project lead to any agricultural land loss/crop loss?	No. The vacant land within the CSD campus will be used for Silo sub-project.
Will the project increase the disaster preparedness of the country?	Yes. The food storage will help supplying food in emergency situation right after a disaster. And thus it will increase the disaster preparedness of the local community and country.
Will the project help in meeting food security needs caused by disaster induced food shortage?	Yes. After a disaster, the storage will meet up the emergency food supply and thus it will help in meeting food security needs caused by disaster food shortage.
Will the project stabilize the food price?	Yes. If there is enough food stored, then the price of the food will be stabilized too.
Will the project reduce storage losses?	Yes. This modern food storage facility is an improved technology, which will reduce storage losses compared to conventional food storage systems.
Will the project be helpful for the poor and vulnerable?	Yes. the scarcity of food will be reduced, and price of the food will be stabilized even after a disaster which will ultimately be helpful to the poor and vulnerable group.
Does the project involve any land acquisition or involuntary resettlement?	The land is owned by DG-Food, and there are a number of food storage godowns, and within the CSD, some vacant land about 13 acres of land will be used for Silo construction.
Does the project need demolishing of any structure?	No. But, in future, some old and unused godowns will be dismantled and will be kept for further development.

Will the project lead to destruction of trees and vegetations?	No destruction of trees will take place; however, the project authority is very careful in landscape development and tree plantation.
Does the project require land filling? If yes, what is the source of land filling material/soil?	The land filling has already been done during the preparatory works. The sandy soil was carried from far places by the engaged Contractor.
Will there be any traffic disturbance due to construction material and wastes transportation?	During carrying construction materials, traffic load will be increased than at present. The materials will either be carried from Chittagong, Sunamganj, Sylhet areas. Emphasis will be given to carry materials from locally areas.
Will there be any negative impact in neighborhood or community?	No, the community is far from the construction site, it is 1 to 2 km away from Barishal town.
Will there be any impediments to movement of people and livestock?	The construction works will be commenced within the confined area, within the boundary wall, so, there will be no problem for the peoples' movement through RHD road.
Will there be any hazard to the schools during construction	No. But excess movement of materials carrying vehicles may create problem and that is to be controlled.
Will the project impact on your social and economic sector? If yes, how?	Yes. It will generate some employment, hence the project will be beneficial to the community people, on the point of more employment for the local people.
What types of benefits are you expecting from the project?	We are expecting increase in working facilities, food supply and improvement of trade and commerce. We also expect the improvement of local community.
Do you have any recommendation before the implementation of this project?	The local people of the project area are expecting more employment generation for them and they urged to engage more local people for construction and operation phases.
Are you in favor of this project? Why?	Yes. the people appreciated the initiatives, it will generate business, employment etc. for the local people.

9.4 Findings of the consultation meetings

Four consultation meetings were held during January 2017 at the project areas. The consultation meetings were conducted with different level of local people. Total 58 (fifty-eight) participants, different level of people like; local representatives, businessmen, day laborers, farmers, shop keepers, etc, were in the meetings. In consultation meetings; environmental and social issues were examined. The main focus was to dig out the mental supports from different level of stakeholders regarding the new concept of food storage facilities, i.e. the silo construction works in lieu of the traditional food storage facilities. The issue on potential impact of construction works has also been raised.

Most of participants appreciated because of the benefit from the proposed project. They also discussed about noise, water and soil pollution issue that are evolving because of existing project and the future possibilities. They expect improved technology to minimize the problem.

The outcomes of the consultation meetings were as follows.

- ✓ There should be effective mitigation measures in order to reduce noise pollution during construction period. Improved technology and proper management plan would help to mitigate the noise pollution.
- ✓ Surface water and soil pollution should be controlled by monitoring the runoff of waste materials to the surroundings.
- ✓ Air pollution from the construction materials and emission from machineries might create problem. Contractor should spray water during material transportation and use cover for air pollution sources if possible.
- ✓ It will generate more employment in terms of using more laborers, more rice mills will be established, transport business will boost, poultry farming will enrich further and so on. The local people requested that local labor should be used during construction and operation.

10 CONCLUSION & RECOMMENDATIONS

10.1 Conclusion

On the basis of the analysis, it may be concluded that the project stands environmentally sound and sustainable when the recommended mitigation measure and environmental management processes are adopted properly.

The benefits of the project will be realized primarily at the level of the national economy. Benefits in the project area will be insignificant except for some short-term employment and business opportunities during the construction phase. However, the needs of the food storage facility are obvious and for that the livelihood of the area will be developed. Developed livelihood will directly influence the growth of economy of the area.

The adverse environmental impacts from the project will mostly take place during the construction stage. There are no significant cumulative adverse impacts during operation that are identifiable at this stage. The construction impacts should be very predictable and manageable, and with appropriate mitigation measures. Some funds are required for the environmental clearance certification and certificate renewal fees.

The project is expected to have a small "environmental footprint". No endangered or protected species of flora or fauna are reported at the project site. The proposed project activities have no significant adverse environmental impact so far as a time bound execution program with application of advanced construction technology is ensured. The mitigation measures are well within such codes and practices of construction and operation of the proposed project.

Seasonal weather conditions would have an impact on the construction activities. The construction activities may even have to be stopped during these periods. So it is recommended that commencing construction in early winter season may help to reap the benefit of full dry spell of the season. It is also recommended that more people should be engaged in different works simultaneously if applicable especially in the winter season for advancing of the physical progress.

10.2 Recommendation

- ✓ Adequate provisions have been made for the environmental mitigation and monitoring of predicted impacts, along with their associated costs.
- ✓ Flood proofing design should be applied during construction of the silos.
- ✓ Adverse impacts if noticed during implementation will be mitigated using appropriate design and management measures. The potential cumulative and residual impacts of the project classify as not a highly sensitive or complex.
- ✓ The EMP, its mitigation and monitoring programs, contained herewith shall be included within the Bidding documents for project works.

- ✓ The Bid documents state that the contractor shall be responsible for the implementation of the requirements of the EMP, as per environmental safeguard compliances costs, mentioned in the BOQ.
- ✓ The contractor will engage Environmental Monitor/Safety Officer to implement EMP properly.
- ✓ Contractor will ensure availability of the PPEs to the workers;
- ✓ Contractor will monitor behavioral matter of the workers to avoid any undue risks related to labor influx and preventing exposure to health risks linked to sexually transmitted diseases (STDs), gender-based violence and sexual exploitation and abuse (GBV/SEA).
- ✓ Tree plantation and landscape design should be properly followed by the contractor.
- ✓ Sustainable environmental management should be ensured by avoiding inappropriate use of natural resources, conserving nature sensitively as much as possible.
- ✓ A respectful and rational occupational health and safety of all people working on the subproject, general public at the vicinity and inhabitants of the subproject should be ensured.
- ✓ A strong recommendation is being made to implement the proposed sub-project in the CSD campus.

APPENDICES

APPENDIX A: Site Clearance Certificate with ToR for EIA

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

Memo No: DoE/Clearance/5654/2016/ 393 Date: 08/09/2016

Subject: Site Clearance for Construction of Steel Silo Including Ancillary Works under Modern Food Storage Facilities Project (MFSP) at Barisal City Corporation, Barisal.

Ref: Your Application dated 11/07/2016.

With reference to the above mentioned subject, the Department of Environment (DOE) hereby accords the Site Clearance to the construction of Construction of Steel Silo Including Ancillary Works under Modern Food Storage Facilities Project (MFSP) at Barisal City Corporation, Barisal subject to fulfilling the following terms and conditions.

1. This clearance shall only be applicable for the development of the infrastructure of the said project.
2. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) report considering the overall activity of the said Project in accordance with the TOR and time schedule submitted to the Department of Environment (DOE).
3. The EIA shall incorporate the following components/items :

(a) Executive summary
(b) Introduction (Background, brief description, scope of study, methodology, limitation, EIA team, references)
(c) Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared)
(d) Project activities: A list of the main project activities to be undertaken during site clearing, construction as well as operation
(e) Project schedule: The phase and timing for development of the project
(f) Resources and utilities demand: Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project
(g) Map and survey information
Location map, Cadastral map showing land plots (project and adjacent area) Topographical Map
(h) Baseline Environmental Condition should include, inter alia, following :
- Physical Environment : Geology, Topology, Geomorphology, Soils, Meteorology, and Hydrology
- Biological Environment : Habitats, Aquatic life and fisheries, Terrestrial Habitats and Flora and Fauna
- Environmental Quality : Air, Water, Soil and Sediment Quality

(i) Socio-economic environment should include, inter alia, following :
- Settlement and housing
- Traffic and transport
- Public utilities: water supply, sanitation, solid waste, drainage, dedicated industrial effluent drainage, sewerage system, green area, parking, fire hydrant, space for various utility services, etc.
- Economy and employment
- Fishing activities, fishing communities, fishing resources, commercial factors.

(j) Identification, Prediction and Evaluation of Potential Impacts (identification, prediction, magnitude, extent, quantifying, causes and effects, evaluation and assessment of positive and negative impacts likely to result from the proposed project)

(k) Management Plan/Procedures :
For each significant major impact, proposed mitigation measures both in-house and external will be set out for incorporation into project design or procedures, impacts, which are not capable of mitigation, will be identified as residual impacts. Both technical and financial plans shall be incorporated for proposed mitigation measures
An outline of the Environmental Management Plan shall be developed for the project.

1

In Environmental Monitoring Plan, a detail technical and financial proposal shall be included for developing an in-house environmental monitoring system to be operated by the proponent's own resources (equipments and expertise)

(l) Explore and design the project in an environmentally sound and sustainable concept by incorporating 3R policies, resources and energy efficient, optimum use of water resources energy, rain water harvesting, use of low or non waste technology, etc.

(m) Consultation with Stakeholders/Public Consultation (ensures that consultation with interested parties and the general public will take place and their views taken into account in the planning and execution of the project)
Beneficial Impacts (summarize the benefits of the project to the Bangladesh nation, people and local community and the enhancement potentials)

(n) Conclusion and Recommendations.

4. Without approval of EIA report by the Department of Environment, the project authority shall not be able to open L/C in favor of importable machineries.
5. Without obtaining Environmental Clearance, the project authority shall not start the operation of the project
6. Rehabilitation of human settlement or compensation for any sort of activity which will incur damage or loss or public or private property shall be addressed as per Government of Bangladesh rules and regulations, where necessary.
7. Appropriate permission would be required to obtain from the forest Department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.
8. No activity of cutting/razing/dressing of hill or hilly land is endorsed under this clearance without due permission/clearance of the concerned authority of the Government of Bangladesh.
9. The project authority shall submit the EIA along with other necessary documents to the Barisal Divisional Office of DOE with a copy to Head Office of DOE in Dhaka.
10. A soft copy of the image data as well as the maps to be generated from the image shall be submitted to DOE Head Office along with the EIA.
11. Violation of any of the above conditions shall render this clearance void.
12. This Clearance is valid for one year from the date of issuance and the project authority shall apply for renewal to the Barisal Divisional Office of DOE with a copy to Head Office at least 30 days ahead of expiry.
13. This Site Clearance Certificate has been issued with the approval of the appropriate authority.

08.09.2016

(Syed Nazmul Ahsan)
Director (Environmental Clearance, c.c)
Phone # 8181673

Project Director
Modern Food Storage Facilities Project (MFSP)
Probashi Kallan Bhaban (17th Floor)
71-72, Eskaton Garden, Ramna, Dhaka-1000.

Copy Forwarded to :

1) Private Secretary to the Hon'ble Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
3) Director, Department of Environment, Barisal Divisional Office, Barisal.
4) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

2

APPENDIX B: Noise Level Test Result

DSCL

Multidisciplinary Development Consultants

DSCL Environmental Laboratory

Name of the Project	Construction of Steel Silo including ancillary works at Barishal CSD site
Project Location	Dokkhin Alekanda, Barishal CSD, Barishal
Description of sample	Noise Level
Sample Collector	Collected by DSCL Team
Sampling Date	27th January, 2017

Noise Level Analysis

ID	Sampling Location	GPS Location	Zone*	Noise Level Day dB (A)	Bangladesh Standard at Day dB (A)**	Remarks
NM-01	Project Site	22.68061° N 90.36077°E	Commercial Area	46.91	70	Good
NM-02	Project Site	22.68115 N 90.36019°E	Commercial Area	43.39	70	Good
NM-03	Project Site	22.68113°N 90.36078° E	Commercial Area	44.72	70	Good
NM-04	Project Site	22.6818°N 90.36076° E	Commercial Area	43.90	70	Good
NM-05	Project Site	22.6812°N 90.3615°E	Commercial Area	45.85	70	Good

Note:
** According to Environmental Quality Standard 1997 and subsequent amendment in 2006.*
*** Bangladesh Standard for Noise Level at different types of areas (as per Noise Pollution (Control) Rule, 2006).*
The sound level standards for silent area are 45 dBA, for residential area 50 dBA and for commercial area 70 dBA at day time.
The sound level standards for silent area are 35 dBA, for residential area 40 dBA and for commercial area 60 dBA at night time.
Abbreviation:
NM- Noise Measurement, dB- decibel

Test Performed By:	Approved By:
Md. Atiqur Rahman Jr. Environmental Specialist	**Israt Jahan Sumi** Director

Development Solutions Consultant Ltd.
House-734 (5-B), Road-10, Avenue-04, DOHS Mirpur,
Dhaka -1216, Bangladesh. Tel:+8804478035444
Email: dscl@dsclbd.com Web: www.dsclbd.com

APPENDIX C: Test Result for Surface Water (On Site)

DSCL

Multidisciplinary Development Consultants

DSCL Environmental Laboratory

Name of the Project	Construction of Steel Silo including ancillary works at Barishal CSD site	
Project Location	Dokkhin Alekanda, Barishal CSD, Barishal	
GPS Coordination	Latitude- 22.6808°N	Longitude- 90.36161°E
Description of sample	On-Site Surface Water Test	
Sample Collector	Collected by DSCL Personnel	
Sampling Date	28th January, 2017	

Surface Water Test Analysis (On-Site)

Water Quality Parameters	Unit	SWB-01	Drinking Water Quality Standard, DOE*	Method of Analysis
pH	---	9.2	6.5-8.5	pH Meter
TDS	mg/L	29	1000	TDS Meter

Note
** Environmental Conservation Rule (ECR)'97*
TDS – Total Dissolved Solids

Source: Field survey, Cells in grey color shed indicate the exceedance the limit of DOE standard.
SWB-01–Near Barishal Silo Site.

Development Solutions Consultant Limited * DSCL *

Test Performed By:	Approved By:
Md. Atiqur Rahman Jr. Environmental Specialist	Israt Jahan Sumi Director

Development Solutions Consultant Ltd.
House-734 (S-B), Road-10, Avenue-04, DOHS Mirpur,
Dhaka -1216, Bangladesh. Tel: +8804478035444
Email: dscl@dsclbd.com Web: www.dsclbd.com

APPENDIX D: Test Result for Ground Water (On Site)

DSCL

Multidisciplinary Development Consultants

DSCL Environmental Laboratory

Name of the Project	Construction of Steel Silo including ancillary works at Barishal CSD site	
Project Location	Dokkhin Alekanda, Barishal CSD, Barishal	
GPS Coordination	Latitude- 22.68278°N	Longitude- 90.36123°E
Description of sample	On-Site Ground Water Test	
Sample Collector	Collected by DSCL Personnel	
Sampling Date	27th January, 2017	

Ground Water TestAnalysis (On-Site)

Water Quality Parameters	Unit	GWN-01	Drinking Water Quality Standard, DOE*	Method of Analysis
pH	---	8.5	6.5-8.5	pH Meter
TDS	mg/L	42	1000	TDS Meter

Note
** Environmental Conservation Rule (ECR)'97*
TDS – Total Dissolved Solids

Source:Field survey, Cells in grey color shed indicate the exceedance the limit of DOE standard.
GWB-01 – Near Barishal Silo Site.

Development Solutions Consultant Limited DSCL

Test Performed By:	Approved By:
Md. Atiqur Rahman Jr. Environmental Specialist	Israt Jahan Sumi Director

APPENDIX E: Test Result for Surface Water (DPHE Laboratory)

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 359/ CC, DPHE, CL, Dhaka. Date: 16/02/2017

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2017020079	Sample Receiving date: 01/02/2017
Ref. Memo No: Nil/2017 & Dated: 01/02/2017	Sample Source: Suface Water
Sent by:S.M. Sanaul Kafi ,Environmental Specialist , Dhaka.	Dist:Barisal, Upa:Barishal City Corporation
Care Taker: Modern Food Storage Facilities Project.	Union:, Vill.:ID # SWB -01
Sample Collection date: 31/01/2017	Date of Testing: 01/02/2017 - 15/02/2017

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Aluminium (Al)	0.2	0.221	mg/L	AAS	0.05
2	Biochemical Oxygen Demand (BOD)	0.2	12	mg/L	5 days Incubation	0.20
3	Colour	15	2.7	Hazen	UVS	-
4	Dissolved Oxygen (DO)	6.0	4.12	mg/L	Multimeter	-
5	Iron (Fe)	0.3-1	<LOQ	mg/L	AAS	0.05
6	Temperature	20-30	25.4	°C	Thermometer	-
7	Turbidity	10	21	NTU	Turbidity Meter	-
8	Zinc (Zn)	5.0	0.09	mg/L	AAS	0.08

Comments: Sample was collected & Supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	16-02-17	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	16/02/2017
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	16.02.17	2.) Name: Designation:	

Page 1 of 1

APPENDIX F: Test Result for Ground Water (DPHE Laboratory)

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 359/ CC, DPHE, CL, Dhaka. Date: 16/02/2017

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2017020080	Sample Receiving date: 01/02/2017
Ref. Memo No: Nil/2017 & Dated: 01/02/2017	Sample Source: Ground Water
Sent by:S.M. Sanaul Kafi ,Environmental Specialist , Dhaka.	Dist:Barisal, Upa:Barishal City Corporation
Care Taker: Modern Food Storage Facilities Project.	Union:, Vill.:ID # GWB -01
Sample Collection date: 31/01/2017	Date of Testing: 01/02/2017 - 15/02/2017

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Aluminium (Al)	0.2	0.062	mg/L	AAS	0.05
2	Biochemical Oxygen Demand (BOD)	0.2	1	mg/L	5 days Incubation	0.20
3	Colour	15	1.1	Hazen	UVS	-
4	Dissolved Oxygen (DO)	6.0	6.5	mg/L	Multimeter	-
5	Iron (Fe)	0.3-1	1.91	mg/L	AAS	0.05
6	Temperature	20-30	25.2	°C	Thermometer	-
7	Turbidity	10	1.3	NTU	Turbidity Meter	-
8	Zinc (Zn)	5.0	<LOQ	mg/L	AAS	0.08

Comments: Sample was collected & Supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS- UV-Visible Spectrophotometer, LOQ - Limit of Quantitation.

Test Performed by:	Signature	Countersigned/Approved by:	Signature
1.) Name: Mahabuba Sabina Motin Designation: Sample Analyzer	16-02-17	1.) Name: Md. Biplab Hossain Designation: Chief Chemist	16/02/2017
2.) Name: Md. Saiful Alam Khosru Designation: Sample Analyzer	16.02.17	2.) Name: Designation:	

APPENDIX G: List of Terrestrial and Aquatic Flora in the Project Area

List of Terrestrial Trees in the Project Area

Common Name	Scientific Name	English Name	Family
Aam	*Mangiferaindica*	Mango	Anacardiaceae
Boroi	*Ziziphusmauritiana*	Chinese date	Rhamnaceae
Bel	*Aegle marmelos*	Golden apple	Rutaceae
Debdaru	*Polyalthialongifolia*	False ashoka	Annonaceae
Deshi Neem	*Azadirachtaindica*	Nim tree	Meliaceae
Eucalyptus	*Eucalyptus globules*	Gum Tree	Myrtaceae
Jambura	*Citrus maxima*	Pomelo	Rutaceae
Kathal	*Artocarpusheterophyllus*	Jackfruit	Moraceae
Mahogony	*Swieteniamacrophylla*	Mahogony	Meliaceae
Narikel	*Cocos nucifera*	Coconut	Arecaceae
Peyara	*Psidiumguajava*	Guava	Myrtaceae
Rain tree	*Albiziasaman*	Rain tree	Fabaceae
Shishu	*Dalbergiasissoo*	Indian rosewood	Fabaceae

List of Terrestrial Shrubs in the Project Area

Common Name	Scientific Name	English Name	Family
Joba	*Hibiscus rosa-sinensis*	China Rose	Malvaceae
Lebu	*Citrus sp.*	Lemon	Rutaceae
Tulsi	*Ocimum sanctum*	Holy basil	Lamiaceae
Ulotkombol	*Abromaaugustum*	Devil's cotton	Sterculiaceae

List of Terrestrial Creepers in the Project Area

Common Name	Scientific Name	English Name	Family
Kochu	*Colocasiaesculenta*	Taro	Araceae
Mete alu	*Dioscoreaalata l.*	Yam	Dioscoreaceae

List of Terrestrial Herbs in the Project Area

Common Name	Scientific Name	English Name	Family
Amrul	*Oxalis corniculata*	Creeping wood sorrel	Oxalidaceae
Durbaghash	*Cynodondactylon*	Bermuda grass	Gramineae
Dheki Shak	*Diplaziumesculentum*	Fern	Athyriaceae
Kola	*Musa sapientum*	Banana	Musaceae
Kochu	*Colocasiaesculenta*	Taro	Araceae

List of Aquatic Flora in the Project Area

Common Name	Scientific Name	English Name	Family
Dholkalmi	*Ipomoea carnea*	Pink morning glory	Convolvualaceae
Helencha	*Enhydrafluctuans*	Water cress	Asteraceae
Kochuripana	*Eichorniacrassipes*	Water hyacinth	Pontederiaceae
Kalmilata	*Ipomoea aquatic*	Water spinach	Convolvulaceae
Malancha	*Alternantheraphiloxeroides*	Alligator weed	Amaranthaceae

APPENDIX H: List of Fauna and fish Identified in the Project Area

Scientific Name	English Name	Local Name
Class: Amphibia		
Bufo melanostictus	Common toad	Kuno bang
Uperodonglobulosus	Balloon frog	Potka bang
Euphlyctiscyanophlyctis	Indian skipper frog	Kotkoti bang
Hoplobatrachustigerinus	Indian bull frog	Sona bang
Rhacophorus bipunctata	Tree frog	Gecho bang
Class: Reptilia		
Gecko gecko	Wall lizard	Tokkhok
Xenochrophispiscator	Checkered keel back	Dhorashap
Psammophilus dorsalis	Pennisular rock agama	Roktochosha
Class: Aves		
Corvussplendens	House crow	PatiKak
Egrettagarzetta	Little egret	Bok
Passer domesticus	House sparrow	Charui
Halcynsmyrensis	White breast kingfisher	Machranga
Class: Mammalia		
Feliscatus	Cat	Biral
Canisfamilaris	Dog	Kukur
Rattusrattus	Rat	Indur

List of Fisheries in Kirtonkhola River

Local Name	Scientific Name
Katal	*Catlacatla*
Rui	*Labeorohita*
Jatputi	*Puntius sophore*
Boal	*Wallago attn*
Chital	*Macrognathusaculeatus*
Shol	*Chpisomagarna*
Ghawra	*Lepidocephalusguntca*
Bata	*Labeobata*
Raik	*Cirrhinnsreba*
Tit puti	*Puntius ticto*
Mola	*Amblypharngodonmola*
Kakila	*Xenentodoncancila*
Pabda	*Ompokpabda*
Tengra	*Mystustengra*
Ayre	*Mystusaor*
Baila	*Glosso GOB ins giuris*
Kajuli	*Ailacoila*
Kachki	*Coricasoborna*
Chanda	*Chanda ranga*
Foli	*Notopternschital*
Baim	*Mastacembeluspanchus*
Taki	*Channastriatus*

APPENDIX I: Sensitive Locations in the PIA

Name	Location		Description	Photo
	N	E		
Mosque	22.68222	90.36179	Two storied mosque. Around 70m away from the site area.	
CSD Pond	22.68081	90.36162	Big pond which is outside the boundary wall of new silo site	

Memorial Graveyard	22.68081	90.36162	Graveyard in memory of the martyrs of liberation war. It is situated at a dstance of 70m from the sub-project area.	
Armed Forces Police Battalion Office	22.6829	90.36323	Government organization consisting a huge area. It is around 110m away from the project site.	

Vatarkhal Govt. Primary School	22.68303	90.36301	Three storied building situated at a distance of 120m from the project site and that is out side the CSD boundary wall.	
Anwar Uddin Hawladar Jame Mosque	22.68313	90.36174	Two storied mosque. It is situated around 125m away from the project site.	

APPENDIX J: Socio-Economic Survey Template

Questionnaires for Socio-Economic Survey

Location & Identification of Household:

01	District	:	
02	Upazila	:	
03	Pourashava	:	
04	Union	:	
05	Mouza	:	
06	Village	:	
07	Others	:	

General Information about Household Head:

Name of the Household Head:	
Father's/Husband's Name:	
Name of Respondent:	
Relation of Respondent with Household Head:	
Religion:	
Ethnicity:	

Household Composition:

Total Household Members:_____ Male:_____ Female:_____

Sl. No.	Relationship with Household Head	Sex	Age	Marital Status	Education	Occupation		Place of Work	
						Primary	Secondary	Primary	Secondary

Membership Involvement with any Organization:

Are you or any member of your family involved with any NGOs/Associations?	
If yes, the name of organization& how long you are involved?	
Your involvement in what capacity?	
Did you receive any loan& what is the amount?	
Repayment procedure/method	

Fixed Household Assets, Land & Facilities:

Do you have any house of your own?	
If yes, what is the total cost of your family house?	
If no, what is the arrangement?	
Total land ownership (Land in Acre)	
Do you have any pond or orchard?	
What is the cost of your owned pond land or orchard?	
Your yearly income from the pond or orchard?	
Farmer type (Farming own land/Farming own and other's land/Sharecropper)	
Cropping intensity and patterns in practice	
Crop production per acre in Kgs	
Do you have electricity?	
What type of fuel do you use?	
Who usually gives decision in the family?	

Health & Nutrition:

Common diseases in your family		
Whom do you contact first for treatment?		
Average food intake per day?	Breakfast	
	Lunch	
	Dinner	
Source of common food you intake?		

Water & Sanitation:

Sources of drinking water	
If tube well or pond, ownership of source	
Is there any arsenic problem in the area?	
Is there any salinity problem in the area?	
Sanitation type	
Source	

Livestock:

Does the household own the following livestock?

Livestock	Nos
Cattle	
Goats	
Sheep	
Buffalo	
Pigs	
Ducks	
Chicken	
Pigeon	

Trees

What types of trees does the household own?

Timber Trees	Nos	Fruit Trees	Nos	Medicinal Plants	Nos
Eucalyptus		Banana			
Mahogany		Mango			
Akashmoni		Coconut			
Neem		Jackfruit			
Shishu		Litchi			
Rain tree / Koroi		Guava			
Palash		Olive			

Babla		Lemon			
Teak		Jambura			
Bakul		Blackberry			
Palm / Tal		Mulberry			
Silk cotton / Simul		Ambra			
Sal		Papaya			
Chatim		Tamarind			
Sajna		Marmelos / Wood-apple / Bel			
Pakur		Custard apple			
Kadam		Pomegranate			
Koroi		Plum / Barai / Kol			
Tal		Carambola			
Chambol		Kotbel			
Chalta		Supari			
Manjori		Other			
Other		Other			
Other		Other			
Other		Other			

Livelihood:

What is your main income source?	
How many months of the year do you earn from this?	
What is your monthly earning?	
Where do you work?	
Do you generally receive loan from local traders?	
If yes, amount of money received last year and this year?	
Repayment method?	

All Sources of Household Income During the Last 12 Months:

No.	Income source	Income obtained from mentioned source in the last 12 months
1	Service holder	
2	Agricultural wage labour	
3	Non-agricultural Wage labour	
4	Wage labour – foreign countries	
5	Sale of household agricultural products (rice, vegetables, etc.)	
6	Boat operator	
7	Fishing	
8	Fish trading	
7	Income from local fish-culture	
8	Sale of household livestock products (milk, meat, etc.)	
9	Sale of tree and orchard products (timber, bamboo, fruit, etc.)	

What is the household's average monthly income?	
What is the household's approximate average monthly expenditure?	
Explain if expenditure higher than income?	
If the household has any loan?	
Number of new births in the household during the current year?	
Number of deaths in the household during the current year?	

APPENDIX K: Focus Group Discussion (FGD) Participants List

Modern Food Storage Facilities Project

Focus Group Discussions (FGDs)
List of Participants

Focus Group No.: 01 Date: 27-1-17 Time: 9:10 Am

Location: Dokkhin Alekanda, 30 Sudaran Road, Barishal

GPS Location: N 22.67958° E 90.36322°

SL No.	Participant's Name	Age	Occupation	Telephone No.	Signature
1	Mojibur Rahman	58	Business Councillor-11	01715951621	
2	Sheraj ul Islam	58	Service	01737699616	
3	Md. Siddikur Rah.	30	Labour	01741790721	
4	Hazi Abdur Razzak	80	Retired	—	
5	Md. Amin	23	Student	01789826935	
6	Naim	22	Student	01939783570	
7	Shamim Biswas	23	Student	01966626688	
8	Md. Alam Hawlader	26	Labour	01776684679	
9	Md. Firuj	40	Business	01725097503	
10	Md. Mofazzal Haw.	70	Boat man	01925936640	
11	Kabir	20	Labour	—	
12	Md. Habibur Rahman	40	Business	01735266640	
13	Md. Mokbul Fakir	80	Service	—	—
14	Md. Babul	50	Driver	01710128715	
15	Md. Yusuf	53	Helper	01729995035	

FGDs Completed By: Atiqur Rahman

Signature:

Modern Food Storage Facilities Project

Focus Group Discussions (FGDs)
List of Participants

Focus Group No. 02 Date 27.01.17 Time 10:30 AM

Location: Beside Pond, Dokkhin Alekanda, Barishal

GPS Location: N 22.68054°, E 90.36152°

SL. No.	Participant's Name	Age	Occupation	Telephone No.	Signature
1	Md. Alamgir Hossain	40	Labour	01792216333	
2	Md. Sumon	33	Labour	01821459522	
3	Md. Shoriff	26	Labour	—	
4	Md. Abbas	37	Labour	01919321896	
5	Sajal Howlader	40	Labour	—	
6	Md. Salim	40	Labour	01875498129	
7	Md. Milon	28	Labour	01917457782	
8	Sachindra	36	Labour	01730602958	
9	Mutaleb Sikder	45	Service	01734677583	
10	Sahabuddin	25	I	01740580264	
11	Babul Khan	52	Service	01729838633	
12	Babul Adhikari	55	Service	01914019490	
13	Md. Aslam	32	Painter	01962 307116	
14	Md. Mintu Howla	30	Labour	01931389259	—
15	Md. Rasel Mia	23	Service	01794352586	

FGDs Completed By Atiqur Rahman

Signature

Modern Food Storage Facilities Project

Focus Group Discussions (FGDs)
List of Participants

Focus Group No. 03 Date 27.01.17 Time 11:20AM

Location: Dokkhin Alekanda, Chowmer Bari, Barishal

GPS Location: N 22.68223 E 90.36263

SL No.	Participant's Name	Age	Occupation	Telephone No.	Signature
1	Md. Belal Hossain	30	Service	—	Belal
2	Md. Harris How.	42	Business	01712377355	Harish
3	SM Khairul Islam	19	Student	01682585071	Khairul
4	Md. Rashed Khan	22	Student	01912061629	RASHED
5	Md. Samrat	18	Student	—	Samrat
6	Liton Matobbor	34	Service	01724297670	Liton
7	Md. Sarowar Hossain Khan	30	Labour	01980678693	SSRO
8	Md. Oli	23	Service	01990797710	Oli
9	Aliaz Km Shahidulla	49	Councillor	01711709606	
10	Md. Masum	29	Business	01917223611	
11	Md. Jakir Hossain	30	Rickshaw Puller	01745755013	
12	Abdul Latif Howlader	50	Business	01734249444	
13	Md. Abdur Rahim	60	Service	01748645481	
14	Md. Rezzak	58	Business	01776724500	
15	Md. Abdul Latif	46	Service	01732469615	

FGDs Completed By Atiqur Rahman

Signature

Modern Food Storage Facilities Project

Focus Group Discussions (FGDs)
List of Participants

Focus Group No.---04--- Date-27.01.17 Time---1:30 PM

Location:---Infont of Armed Police---

GPS Location:---N 22.68292° E 90.36322---

SL No.	Participant's Name	Age	Occupation	Telephone No.	Signature
1	Md. Masud Sarkar	48	Service	01728710232	29/1/17
2	Md. Jasim Uddin	31	Service	01740360000	
3	MD: Babul Islam	24	Business	01711936886	Babul
4	Abir Sarkar	20	Service	01798326659	
5	Md. Golam Kaddus	70	Retired	01729185951	
6	Aminul	28	Business	01724891937	
7	Md. Nurul Islam Faker	52	Driver	01716846175	
8	Abdus Salam	46	Shop keepe	01746766800	
9	Md. Alamin Hos	22	Student	01934428927	Alamin
10	Md. Polash Howlader	22	Student	01930947321	
11	Md. Roni	35	Labour	01766726863	
12	Md. Sabuj	18	Service	01972396877	
13	Md. Rakib	18	Labour	01760679518	
14					
15					

FGDs Completed By---Atiqur Rahman---

Signature---

APPENDIX L: Reference Used for ESIA Study

Government Departments : Rules Act Policy and related data	
1.	Bangladesh Water Development Board
2.	Department of Environment
3.	Bangladesh Meteorological Department
4.	Bangladesh Forest Department
5.	Bangladesh Bureau of Statistics
6.	Soil Resources Development Institute (SRDI)
7.	Department of Food, Government of Bangladesh
Journals, Books & Existing Studies	
8.	Environmental & Social Assessment & Management Framework (ESAMF) Bangladesh Modern Food Storage Facilities Project, Phase I (BMFSFP-I), March 2013
9.	Aktar, M.N. (2013). Impact of climate change on riverbank erosion, International Journal of Sciences: Basic and Applied Research, 7(1): 36-42.
10.	Garde, R.J. (2011). River morphology, Second Edition, New Age International Publishers, India.
11.	*ECR (1997), "Environmental Conservation Rules "Ministry of Environment and Forest, Government of Bangladesh.*
12.	*Munn, R. E. (1979) Environmental Impact Assessment, Principal and procedures. John Wiley & Sons.*
13.	*DOE (1997) EIA (Environmental Impact Assessment) Guidelines for Industries.*
Website	
14.	Wikipedia
15.	Google maps
16.	Google earth images
Others	
17.	Site visits
18.	Environmental and Social Screening report of the project
19.	Different project related EIA-Report
20.	BBS Community Series -2011, Barishal district

APPENDIX M: Sample Environmental Action Plan for MFSP Sub-projects

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
	Pre-Construction Stage				
1	Construction of Labor camp and necessary facilities	✓ Obtaining approval of layout plan for the labor camp and related facilities, ✓ Providing accommodation facilities for the workers, ✓ Setting the cooking arrangement, ✓ Setting the washing and cleaning arrangements, ✓ Providing waste bins in and around the labor camp, ✓ Supply of safe drinking water and sanitation facilities for the laborers, ✓ Fencing and demarcation around the labor camp to prevent unwanted entrance.	Before starting the Works	Approval requires before construction of labor camp and continuous monitoring will be there to ensure quality labor camp and related facilities	
2	Development of fuel storage areas	✓ Construction of at least 100 sqft pucca (masonry) platform for storing all type of fuel and lubricants, ✓ Demarcation around the area, ✓ Placing of firefighting equipment.	Before starting the Works	Construction of pucca platform to be done once and with regular maintenance	
3	Water Supply	✓ Supplying potable water for the laborers through installation of tube well (as per specification & BOQ), ✓ Ensuring the location plan of tube well, that should be sufficiently away from on-site sanitation facilities, ✓ Ensure tube well location that is at safe distance from surface water source. ✓ Development of drainage line from the water source to drain out waste water.	Before starting the Works	Monitoring the quality of water at the time of commissioning	

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
4	Sanitation facilities	✓ Providing suitable sanitation facilities for the work force (as per BOQ). ✓ Ensuring Solid Waste Bins within the Silo Campus, ✓ Installation of sanitary latrines and urinals at safe distance, as per BOQ, ✓ Provide separate latrines for the women, ✓ Installing onsite sanitation facilities (septic tank, soak pits etc.) with toilets.	Before starting the Works	Before starting the work and replacement after damage with Continuous monitoring/ cleaning	
5	Transfer point for solid waste	✓ Installation of solid waste transfer station near the main gate of silo campus (BOQ), ✓ Providing fencing around the masonry transfer station.	Before starting the Works	Installation once with regular maintenance	
6	Providing First Aid Box	✓ Providing First Aid Box with sufficient gauge, bandage, and antiseptic cream and with sufficient medicine.	Before starting the Works	Continuous monitoring& input	
7	Stock pile for construction materials	✓ Development of stock pile area with clear demarcation and fencing, ✓ Rehabilitation of stockpile area.	Before starting the Works	Continuous monitoring& repair	
8	Temporary drainage arrangements (preparation)	✓ Construction of temporary earthen drain to drain out the excess water due to rains and due to construction activities, ✓ Closing the temporary drains after escaping from temporary floods.	Arrangement before starting the Works	Continuous monitoring with corrective measures	
9	Personal Protection Equipment (PPE)	✓ Providing personal protection equipment (PPE) with at least 20 pairs-hand gloves, 20 pairs-gumboot, 20-approne, 20-eye protecting glass, 20-Helmets etc. (BOQ).	Arrangement before starting the Works	Purchasing once and replacement after damage	
10	Public Health and Safety	✓ Notification of the public adjacent to the construction areas, ✓ Protection of school going children during their movement.	During starting the Works	Continuously	

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
	Construction Phase				
11	Monitoring Water Quality (potable water)	✓ Monitoring the drinking water quality with the parameters like; arsenic, iron, manganese, chloride and other organic/ inorganic pollutants.	During construction	Quarterly	
12	Maintaining air quality	✓ Regular maintenance of vehicles ✓ Covering or wetting of dusty materials ✓ Dust suppression by spraying water	During wworks with regular monitoring	Continuously	
13	Maintaining and monitoring Noise quality	✓ Ensure construction activities with acceptable limit of noise level, ✓ Notify nearby population prior to occurrence of any uneven sound, ✓ Working hours should be kept within the daylight hours, ✓ Locate the noisy equipment and facilities away from sensitive receptors ✓ Monitoring of noise level (dB) at selected sensitive sites during working hours.	During the wworks	Continuously maintaining the noise quality and checking the magnitude (dB) on quarterly basis	
14	Solid Waste Management	✓ Ensuring collection & safe disposal of solid waste from construction area, ✓ Safe storage of inorganic wastes and regular disposal of organic wastes, ✓ Ensure safe waste collection, transportation and disposal systems at approved disposal sites.	During the Works	Continuously	

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
15	Ecosystem (Flora and Fauna) monitoring	✓ Monitoring flora and fauna species around the construction camp, ✓ Discussion with local people regarding any effect of construction work on terrestrial floral species, ✓ Discussion with local people on the effect on local fisheries system/ species due to construction works.	During construction	Bi-annual	
15	Waste water disposal system	✓ Installation of proper filtering elements for disposing the waste water (soak pit arrangement etc.). ✓ Ensure safe disposal of liquid wastes generated in the camp.	During the Works	Continuously	
16	Occupational health and safety and minimise chance of accidents	✓ Train up the workers on health and safety issues, ✓ Educating the workers on HIV and sexually transmitted infections (STI), ✓ Ensuring use of proper PPE materials during working hours, ✓ Ensure wearing helmet by the visitors/ inspectors during working hours, ✓ Educating the people in using the first aid items during any accidents, ✓ Provide sanitation facilities where needed, ✓ Provision of safe drinking water to work force (tube- well water, bottled water etc.) during works, ✓ Proper signaling of working areas.	During Works	During starting the works and reviewing quarterly	

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
17	Public Health and Safety	✓ Proper signaling of working areas, ✓ Limitation of construction vehicles at public roads during peak hours, ✓ Construction activities are to be ensured during daylight (07:00 – 17:00 hours) on weekdays.	During the Works	Continuously	
18	Tree Plantation	✓ preparatory works for tree plantation, ✓ Plantation points development.	Before ending construction	Once with monitoring	
19	Monitoring of Surface Water Quality	✓ Preventing entrance of waste, soil, etc. in the water system through waste management and dust suppression process.	During the Works	Continuously	
20	Complaints and Environmental Incidents	✓ Grievance Redress Mechanism will be established at silo site, ✓ Complaints received from the public or other stakeholders will be registered and recorded and be brought to the attention of the Site Engineer, ✓ All environmental incidents occurring on the site will be recorded and be brought to the attention of the Site Engineer.	During the Works	Continuously	
	Operation and Maintenance Phase				
21	Monitoring of Air Quality	✓ Monitoring of air quality (SO_X, NO_X, particulate matter etc) at selected sensitive sites during operation phase (contract period).	During operation phase	Quarterly	
22	Monitoring of water Quality	✓ Monitoring of water quality (both metallic and non-metallic parameters of potable water) at the water source being used during operation (contract period).	During operation phase	Quarterly	

Sl. No.	Activities/ Item of works	Management Actions to betaken	Implementation	Frequency	Compliance (date)
23	Monitoring of Noise Quality	✓ Monitoring of noise level (dB) at selected sensitive sites during working hours.	During operation phase	Quarterly	
24	Use of works safety materials	✓ Monitoring the use of safety materials like; wearing safety shoes, eye glass, helmet etc (PPE) as appropriate	During operation phase	Continuous	
25	Control of accidents	✓ Monitoring the accident control activities like; deployment of watchers to control unauthorized entrance, ✓ Traffic movement control, ✓ Precaution during working in altitude.	During operation phase	Continuous	
26	Tree Plantation	✓ Landscaping and tree plantation works' preparation (cleaning the lands), ✓ Making the holes suitable for plantation, ✓ Arrangement of fencing around the tree, ✓ Arrangement of spraying water, ✓ Arrangement of cleaning the unwanted vegetation around the tree.	During operation phase (till the trees reach to specified height)	Continuous and replacement after damage	
27	Monitoring of Surface Water Quality	✓ Performance of analyses on surface water (river, khal, beel and pond) for: pH, TDS, DO, BOD, EC/Salinity and Turbidity.	During operation and maintenance	Quarterly	
28	Complaints and Environmental Incidents	✓ Grievance Redress Mechanism will be established at Silo Site, ✓ Complaints received from the public or other stakeholders will be registered and recorded and be brought to the attention of the Site Engineer. ✓ All environmental incidents occurring on the site will be recorded and be brought to the attention of the Site Engineer.	During the Works	Continuously	