

# **Environmental & Social Assessment and Management Framework (ESAMF)**

**Bangladesh Modern Food Storage Facilities Project, Phase I (BMFSFP-I)**



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## LIST OF ACRONYMS

AC	After Construction
ADB	Asian Development Bank
AD	Alluvion-Diluvion
AIDS	Acute Immune Deficiency Syndrome
AP	Affected Person
ARIPO	Acquisition and Requisition of Immovable Property Ordinance
BADC	Bangladesh Agriculture Development Corporation
BBS	Bangladesh Bureau of Statistics
BC	Before Construction
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDT	Bangladesh Taka
BECA	Bangladesh Environment Conservation Act
BFIDC	Bangladesh Forest Industries Corporation
EHS	Environmental, Health and Safety
BIWTA	Bangladesh Inland Water Transport Authority
BMFS	Bangladesh Modern Food Storage Facilities
BMFSP	Bangladesh Modern Food Storage Facilities Project
BNBC	Bangladesh National Building Code
BP	Bank Procedures
ESA	Environmental and Social Assessment
ESAMF	Environmental and Social Assessment Management Framework
BUET	Bangladesh University of Engineering Technology
CBN	Cost of Basic Needs
CoP	Conference of the Parties
CHT	Chittagong Hill-Tracts
CI	Corrugated Iron
CIP	Country Investment Plan
CLAC	Central Land Allocation Committee
CO	Carbon Monoxide
CSC	Construction Supervision Consultant
CSD	Central Supply Deport
CUL	Compensation under Law
DC	During Construction
DC	Deputy Commissioner
GDP	Gross Domestic Product
DFID	Department for International Development
DG	Director General,
DG-Food	Directorate General of Food
DOF	Department of Forest
DoE	Department of Environment
DPHE	Department Of Public Health Engineering

EA	Environmental Assessment
EA	Executing Agency
ES	Environmental Supervisor
EAP	Environmental Action Plan
ECRRP	Emergency Cyclone Recovery and Restoration Project
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rule
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMO	Environmental Management Overview
EMP	Environmental Management Plan
ESA	Environment and Social Assessment
HSE	Health, Safety and Environment
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESAMF	Environmental and Social Assessment & Management Framework
FD	Food Department
FFW	Food for Works
FPMU	Food Planning And Monitoring Unit
GAAP	Governance and Accountability Action Plan
GOB	Government of Bangladesh
GRC	Grievances Redress Committee
GRM	Grievance Redress Mechanism
GW	Ground Water
HDCs	Hill District Councils
HIES	Household Income and expenditure Survey
HIV	Human Immunodeficiency Virus
HQ	Head Quarter
IDA	International Agency,
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPM	Integrated Pest Management
JICA	Japan International Cooperation Agency
JVS	Joint Verification Survey,
KV	Kilo Volt
KVA	Kilo Volt Ampere
LAP	Land Acquisition Plan
LSD	Local Supply Depots
LGED	Local Government Engineering Department
MC	Moisture Content
MoEF	Ministry of Environment and Forest
MoF	Ministry Of Food
MOL	Ministry of Land

MSDS	Material Safety Data Sheet
MT	Metric Ton
NAPA	National Adaptation Program of Action
NCR	Non-Compliance Report
NEMAP	National Environmental Management Action Plan
NFP	National Food Policy
NGO	Non-Government Organization
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Unit
O&M	Operation & Maintenance
OECD	Organisation for Economic Co-operation and Development
OMS	Open Market Sale
OP	Operational Policy
PAD	Project Appraisal Document
PAP	Project Affected Persons
PAVC	Property Assessment and Valuation Committee
PD	Project Director,
PFDS	Public Food Distribution System
PIP	Project Implementation Plan
PM	Particulate Matter
PMU	Project Management Unit
PoA	Plan of Action
PPE	Personal Protective Equipment
PRSP	Poverty Reduction Strategy Papers
PSC	Project Steering Committee
PVS	Property Valuation Survey
PWD	Public Works Department
RAP	Resettlement Action Plan
RAB	Rapid Action Battalion
RH	Relative Humidity
RV	Replacement Value
SA	Social Assessment
SMP	Social Management Plan
SMF	Social Management Framework,
SMRPF	Social Management & Resettlement Policy Framework
SPM	Suspended Particulate Matter
SIA	Social Impact Assessment
SOD	Standing Orders on Disaster
TA	Transfer Allowance,
TCU	Total Colour Unit
TG	Transfer Grant
TRG	Transfer and Reconstruction Grant
TSP	Triple Super Phosphate
UP	Union Parishad

US	United States
USEPA	United States Environmental Protection Agency
UNFCCC	United Nations Framework Convention on Climate Change
VDP	Village Defense Party
VGf	Vulnerable Group Feeding
VGd	Vulnerable Group Development
WARPRO	Water Resources Planning Organization
WB	World Bank
WBG	World Bank Group
WFP	World Food Program
WHO	World Health Organization

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## EXECUTIVE SUMMARY

### Introduction

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. This pressure on nutrition and health will be particularly acute for women and children, who face difficulties in the aftermath of a natural disaster event. 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. The recurrence period for a major cyclone and widespread flooding in Bangladesh is around three years, necessitating an improved food storage system that can adequately distribute food aid during emergencies and disasters. This improved system would make use of modernized technologies that could store food grain (rice) for between two and three years, and would limit food storage losses significantly. In consideration to the above facts the Government of Bangladesh (GOB) approached the World Bank to assist in development of modern silo facilities for storage of about one million tons of food grains. The precise amount to be stored will be largely dependent on the projected increasing frequency and intensity of extreme weather events as well as growing variability currently predicted under climate change projections. Thus, a phased approach that addresses improving the storage systems and distribution networks could act as a first step in the projected growing demand for grain stocks. GOB, with this intension, has been preparing the Bangladesh Modern Food Storage Phase – I Project (BMFSP-I).

### Project Description

The objective of the project is to establish facilities for the efficient storage of food grains at the public and household levels to meet post-disaster needs. The objective is also to improve efficacy of the grain storage system, and monitoring and management of the food stock in the country. The project will benefit the whole nation with focus to the disaster prone areas. It targets additional 0.6 million tons of food grains in the proposed 8 sites which will strengthen the food security of the country. This buffer stock may be used during the natural disasters like flood, cyclone and drought, and may be used in open market sale to check price hike. The population in the coastal region, the Barind tracts and the flood plains will be benefited at the event of natural disasters. The low income group and vulnerable populations will be specifically benefitted from the buffer stock of food grains.

The project components includes (i) construction of modern public food grain storage silos (ii) procurement and distribution of household silos, (iii) implementation of social and environmental management plans, (iv) support for food planning and monitoring program and (v) program management, construction supervision, technical assistance, training and strategic studies. The physical components of the project in Phase I those involve social and environmental impacts includes (1) Public Storage Facilities in the form of modern grain storage silos; and (2) Household level storage facility or family silos particularly in the disaster prone areas of the coastal zone. Of the three main components, all three sub-component of Component A, Component A1: Construction of Modern Public Food Grain Storage Silos and Component A2: Household Silos and Component A3: Implementation of Social and

Environmental Management Plans are expected to trigger environmental and social impact. Construction of Modern Food Grain Silo will facilitate the steel bolted silos that are used in all climate zones would be used. These types of silos allow for speedy construction, and would have temperature control and fumigation systems, automated mechanical handling, and a central computerized control system. The household silo will involve containers which are made of food grade plastic cans with a storage capacity of 70 liters (40 kg). Activities under household silo which may have environmental and social foot print include: (i) choice of drum material which needs to food grade plastic bin or can (ii) gasket material to make the lid air tight (iii) user friendly design to facilitate holding/pulling/carrying in a safe way (iv) social benefit to withstand natural calamity. Under Component A3, the activities will be need based community infrastructure whose environmental and social impact can be addressed only during the small scale need based activities identification.

Initially eight sites (Dhaka, Chittagong, Mymensingh, Narayanganj, Ashuganj, Barisal, Madhupur and Maheswarpasha) have been chosen for the construction of Silos. Based on the need the project aims to consider more sites in future.

### Relevant Government and World Bank Policies

The document is prepared as per requirement of the government of Bangladesh and World Bank of Project/Program Financing. 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 use of fumigants during operation period. 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**". 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.

According to World Bank OP/BP 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 and use of low dose of fumigants 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. DG Food is already using fumigants in the existing godowns. Fumigants may be needed to be used during the operation phase of the Silo. A fumigant application mechanism should follow the USEPA and WHO guideline.

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.

## Alternative Analysis

The alternative analysis for BMFSFP project has been conducted into the following points (a) "no action" alternative of the project. (b) Alternative Analysis for Selection of Sites and (c) Alternative Analysis for Technology Options. It has been found the current storage capacity of the country is 16 lac tons. But will be reduced to 13 lac Tons by 2013 due to further deterioration of the old godowns. It is estimated the requirement of storage capacity for the food grain is 30.5 lakh tons by the end of 2020. If the storage facility is not increased immediately with the increasing frequency of natural disaster, decreasing storage facility due to deteriorated existing godown, the country will face shortage of food during emergency need of food.

Initially fourteen sites were taken into account. Considering the above conditions, 8 sites have been selected for the first phase. The site selection criteria are as follows:

- a. Strategic value of the storage location for distribution of food grain stocks in emergency relief situations or for the pre-positioning of such stocks
- b. Rationality of increased storage capacity at the site based on existing and anticipated food grain movements by the client for all uses in order to ensure proper rotation of stocks
- c. Avoidance of land acquisition issues that could delay the start of construction and therefore a focus on existing Food Department storage sites

Based on the above listed criteria and environmental and social aspect **Barisal CSD, Narayanganj CSD, Dhaka CSD, Mymensingh CSD, Maheswarpasha CSD, Ashuganj silo, Chittagong Silo and Madhupur** site have been selected for modern food grain silo construction. Technological benefits for Steel Silo, concrete silo and conventional godowns were also assessed in this report. It has been found Steel Silo provides the best scenario in terms of temperature and moisture control, space requirement, dust control and rodent control. However, steel silo requires high skill set for construction and operation.

## Environmental and Social Management Framework

Environmental Management Framework has been prepared to provide guideline to DG-Food, the implementing agency about codes of practice and procedures to be taken into consideration for integration of environmental and social aspects into the project design for conducting Environmental Impact Assessment (EIA) at the second phase of BMFSFP. The objectives of the Environmental Management Framework (EMF) are to ensure that Bangladesh Modern Food Storage Facilities project activities will ensure the following aspects:

- Ensure that environmental and related social issues are thoroughly evaluated and necessary interventions are incorporated in the planning, designing, implementation and operation phase of project activities through environmental and social impact assessment.;
- Ensure compliance and due diligence with World Bank environmental and social safeguard policies as well as with related Government Polices, regulations, guidelines and procedures as applicable to the cold storage and associated infrastructure development of the project;
- Preventing and/or mitigating any negative environmental impact that may emerge from any project component;
- Enhancement of positive environmental impact;
- Protecting human health

The EMF also provides the guideline for effective Environmental Management Plan applicable for project design, construction and operation phase.

The Social Management and Resettlement Policy Framework (SMRPF) has been prepared in compliance with the OP 4.12. The SMRPF will guide DG-Food to address social safeguard compliance issues arising at project implementation stage and to ensure social inclusion in the process. DG Food will assess social impacts of project interventions and prepare Social Management Plans (SMP) including Resettlement Action Plans (RAP) following the SMRPF.

### **Environmental and Social Assessment (ESA)**

The baseline environment for the subprojects of phase-I of project components of BMFSFP has been assessed regarding the project activities that relates to the area-specific conditions pertaining to Topography, Physiography and Geology, Seismicity, Hydrology and Drainage, Air Quality, Noise Quality etc. under physical environment and Terrestrial Ecology, Aquatic Ecology, Biodiversity, National Conservation Site of Importance under Biological Environment, Land Use/ownership Pattern, Water Supply and Sanitation, Fisheries, Industries and Commerce, Cultural and Archeological Resources under Socio-economic Environment. The water, air and noise quality were measured at each of the site for creating a strong baseline which will play a strong role for decision making during project monitoring. None of the site shows indication of air, water and noise pollution. Other than Madhupur, all other seven selected sites for the proposed silos are near rivers. Other than Madhupur all other areas have natural drainage system. A number of social establishments have been found within 500 m of Ashuganj, Barisal, Dhaka Madhupur Maheswarpasha and Narayanganj.

Social assessment comprised of (i) Beneficiary assessment, (ii) Stakeholder analysis, and (iii) Impacts assessments. Beneficiary assessment enabled building baseline socio-economic profiles at the project area; the current status of grain storage facilities at the public and at the household levels and the need for improved storage facilities and distribution mechanisms. The districts where the modern silos facilities are proposed to be constructed have been considered as the project area. While the disaster prone areas are considered for target areas for distribution of family silos. The social assessment identified key stakeholders at different levels in the project area and helped understanding their expectations, issues and concerns. The social assessment also included impact assessments and risk analysis. The results have been used in designing the social management and resettlement policy framework addressing social safeguards, thus ensuring positive and sustainable project benefits.

### **Impact Assessment and Mitigation**

#### **Environmental Impact**

The major environmental impacts to be affected are classified in the pre-construction, construction and operational stage. The possible impacts need to be considered during design phase are as follows (1) Risk of flooding and inundation and (2) Loss of agricultural and grazing land. The historical data shows Dhaka, Narayanganj, Ashuganj, Mymensingh and Maheswarpasha were inundated in last 30 years and Madhupur does not have any natural drainage system. In addition the existing godowns are already higher than the existing ground level. From consultation, it was found, water entered to the Narayanganj Godown during 1988 flood. The significance of this unmitigated impact is assessed as

high and long term. Huge losses are likely to take place in case of flooding. Establishment of construction camp, pile driving and other civil works for construction of silo, stock piling of construction material, increasing traffic during construction and operation will impact the existing social infrastructure in the vicinity, if those are not addressed properly during the design phase. The establishment of construction camp will put load on the existing natural drainage and sewerage system. The design consultant will ensure the issues and associate mitigation measures will be addressed during design phase.

During construction phase, around 450 trees will be cut from the 8 sites. To address this issue the contractor should prepare a tree plantation plan. The project will create noise and vibration in the surrounding due to a wide number of pile driving, at Dhaka and Mymensingh, demolition of structure will cause severe dust pollution. In addition Construction machinery and project vehicles will release exhaust emissions, containing carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and particulate matter (PM). Due to construction work, blocked access routes, stock piling of construction material, soil and water contamination, vehicular traffic increase is other environmental issues.

Occupational health and Safety is the major concern for construction and operation of steel silo. The construction activities will involve operation of heavy construction machinery, vehicular traffic, excavation, filling operations and demolition of structures. These activities may pose some safety hazards to the local population. The fuel storage at the camp sites may also pose safety hazards for the construction staff as well as for surrounding population. Stockpiling of construction material in all sites and debris from the demolished structure may cause serious accident to the construction worker and people in the vicinity. Construction of steel silos may pose significant hazards related to the potential fall of materials or tools. The silo will use fumigation. Although DG-food is using fumigants regularly and steel silo is expected to minimize the use of fumigants, use of fumigant should be according to the USEPA and WHO guideline. Environmental Health and Safety measures should strictly be followed for O&M of Silos.

### **Social issues**

Key social issues relating to project implementation are: (i) avoiding adverse social impacts in site selection, design and implementation; (ii) participation by project functionaries, business groups, NGOs, civil society and local communities; (iii) inclusion, particularly of the poor and vulnerable sections including ethnic minorities; (iii) identification of unavoidable adverse social impacts and mitigation; (iv) social conflicts and grievances during construction; (v) capacity building of key local stakeholders; (vi) addressing gender issues and community needs; and (vii) communication to address these issues.

None of the first year sites for civil works will be carried out in private land but within existing land reserve of the DG-Food except in Tangail, where a new site has been selected for construction of the public silo in Madhupur. Given that this land in Madhupur is a khas land (government owned land) no private people will be impacted. However, the project in the subsequent phases and at critical situations in the first phase construction, may not avoid acquisition of private lands or public lands from private uses.

## Environmental Management Plan

A comprehensive Environmental Management Plan (EMP) which focuses on managing construction and operation phase-related impacts should suffice in managing the potential construction and operation phase impacts. The EMP will be attached with the Bidding Document. The environmental management parameter will be included in the BoQ. Since many contractors do not have clear understanding the need of environmental management, some quoted very low price for implementation of EMP and eventually cannot implement EMP as per design. To avoid this problem, Fixed Budget will be assigned for EMP implementation. The contractors may need orientation on the requirement of the EMP in the pre-bidding meeting. The contractor needs to submit an Environmental Action Plan (EAP) based on the EIA and EMF in line with the construction schedule and guideline. The EAP needs to be reviewed by the supervision consultant and cleared by DG-Food and World Bank.

Extensive monitoring of the environmental concerns of the BMFSFP project will be required as per World Bank guideline. The monitoring program will help to evaluate: (i) the extent and severity of the environmental impacts against the predicted impacts and baseline; (ii) trends in impacts; and (iii) overall effectiveness of the project environmental protection measures (iv) effectiveness and promptness of environmental, health and safety measures. The monitoring plans should be included in the EMP for specific sub-projects. Moreover, for all type of monitoring, a comprehensive **database of the site specific Environmental Impact and Monitoring information** should be created, which will help to evaluate the impacts easily.

## Institutional Responsibility and Report Requirement

The PMU will have a dedicated Senior Environmental Specialist (SES) and Social Specialist to ensure implementation of EMP and other environmental management responsibilities. The SES will maintain liaison with WB safeguards team, regulatory agencies, and other stakeholders during the Project implementation. The Senior Environment Specialist has to be on Board as soon the PMU is set up. S/He will be responsible for ensuring the adequacy of environmental component in the Bidding Document (BOQ) and ensure the quality of Environmental Action Plan (EAP) submitted by the contractor. The field level environmental specialist should be on board before commencement of the field work.

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 Supervision Consultants will have dedicated, properly qualified and experienced, site-based Environment Monitor (EM) at each construction site. The EMs will monitor and supervise the EMP implementation at the field level.

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.

DG-Food will prepare the Half Yearly Progress Report on environmental management and will share with World Bank for review. The contributing development partners may also join the field visit to understand the environmental compliance of the project. In addition, the effectiveness of screening, monitoring and implementation of EMP will be carried out by the third party monitoring firm along with the project component activity monitoring annually. The **Annual Environmental Audit Report** prepared by the third party monitoring firm will be shared with the safeguards secretariat.

### **Key Stakeholders and Consultation**

According to the objectives of the project, the population in the disaster prone areas of Bangladesh is the prime beneficiary of the project and they are spread all over the country, in the coastal zone, in the flood prone areas, and in the drought prone areas. Concentrated to the proposed silo sites, the residents attached to the 8 selected sites will be impacted during construction and operation of the silos facilities. Local leaders, traders, transporters and wage laborers have expressed their interest to the project. Key stakeholders of the project at various levels include: DG-Food and its officials at HQ and in the field offices, local administration (district and upazila level government officials), local government institutions (municipalities, union and upazila Parishad), beneficiaries of the project (i.e., farmers, traders, wage laborers, and other villagers) and the likely affected persons, millers, transporters and transport workers. There have been consultations throughout the project preparation by the environmental and social assessment consultants.

### **Disclosures**

Detailed Environmental and Social Assessment reports, including stakeholder consultation deliberations, are available with the PMU. Impact Assessment checklists and the simple social screening matrix, prepared as a part of the project preparation, are also available with the PMU. The ESAMF on policy issues and impact mitigation measures will be translated into Bengali language and disseminated locally. In accordance with the Bank's disclosure policy, the ESAMF will also be uploaded in the DG-Food's website and in the Bank InfoShop before appraisal. Any subsequent EMP/SMP/RAP will be discussed locally with the stakeholders and disseminated widely and made available on the project's portal and in the Bank InfoShop before aware of civil works contract.

## **SECTION A: GENERAL**

# 1 INTRODUCTION

## 1.1 Background

1. Bangladesh is a densely populated country. About 160 million peoples live in land areas of only 144,000 sq km crisscrossed by numerous rivers flowing to the Bay of Bengal. The country is prone to natural disasters and effect of climate change, and therefore facing frequent extreme weather events that cause serious damage to infrastructure, crops, and the overall economy. Bangladesh is exposed to widespread floods, severe droughts and super cyclones, and these are particularly acute for the rural poor. Almost 80% of the country's population lives in the rural areas, with around 53% of them classified as poor. Reliance to subsistence agriculture for many rural poor means that the impact of climate shocks and stresses are likely to have negative implications for their food and livelihood security, human capital and welfare.<sup>1</sup>

2. 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. This pressure on nutrition and health will be particularly acute for women and children, who face difficulties in the aftermath of a natural disaster event. 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, on the other hand, not only do losses occur during the cyclone but production is also severally hampered in the following year because saline sea water from storm surges is often deposited on agricultural lands, resulting in food stock shortages for at least two years.

3. The recurrence period for a major cyclone and widespread flooding in Bangladesh is around three years, necessitating an improved food storage system that can adequately distribute food aid during emergencies and disasters. This improved system would make use of modernized technologies that could store food grain (rice) for between two and three years, and would limit food storage losses significantly. This, combined with efforts to improve the efficacy and accountability of the grain distribution systems in post-disaster periods, could serve to significantly address food shortages experienced as a result of natural disaster events.

4. In consideration to the above facts the Government of Bangladesh (GOB) approached the World Bank to assist in development of modern silo facilities for storage of about one million tons of food grains. The precise amount to be stored will be largely dependent on the projected increasing frequency and intensity of extreme weather events as well as growing variability currently predicted under climate change projections. Thus, a phased approach that addresses improving the storage systems and

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<sup>1</sup> Davies, Mark, Katy Oswalk and Tom Mitchell (2009) "Climate Change Adaptation, Disaster Risk Reduction and Social Protection," in *Promoting Pro-Poor Growth: Social Protection*, Organization for Economic Cooperation and Development (OECD) 2009.

distribution networks could act as a first step in the projected growing demand for grain stocks. GOB, with this intension, has been preparing the Bangladesh Modern Food Storage Phase – I Project (BMFSP-I).

## 1.2 Need of the Report

5. Bangladesh Environmental Conservation Act (ECA, 1995) requires the proponents of every development project in the country to obtain Environmental Clearance Certificate (ECC). Environmental Conservation Rule (ECR'97 (Rule 7)) of Bangladesh classifies industrial units and projects into four categories depending on environmental impact and location for the purpose of issuance of ECC. ECR'97 requires the proponents of development project in the country to submit to Department of Environment (DoE) an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA), based on level of environmental impact and categorization.

6. The World Bank Operational Policy 4.01 (OP 4.01) states that “The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making”<sup>2</sup>.

7. The present report has been prepared in line with the requirement of Government of Bangladesh and World Bank.

## 1.3 Report Structure

8. This report has been prepared by Ministry of Food. The report has been broadly divided into four sections.

9. **Section A** is termed as “General” which discusses the legislative, regulatory, and institutional setup that exists in the Country, as well as the World Bank’s safeguard policies relevant to the environmental and social assessment and project description. The section also includes alternative analysis which presents the overall aspect of environmental benefit in terms of site selection and technology selection.

10. **Section B** presents the Environmental and Social Management Framework which provides an overall guideline for implementation and operation of similar activities in future.

11. Site specific Environment and Social Assessment has been provided in **Section C**.

12. Environmental and social management plan is presented in **Section D**. This section also includes institutional assessment and disclosure requirement.

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<sup>2</sup> Excerpts from OP4.01 – Environmental Assessment. January, 1999.

## 2 PROJECT DESCRIPTION

### 2.1 Project Objectives

13. The objective of the project is to increase the grain reserve available to households to meet their post-disaster needs and improve the efficiency of grain storage management. The objective is also to improve efficacy of the grain storage system, and monitoring and management of the food stock in the country. The following key results are expected from the project:

- (i) Increased availability of grain stocks immediately following a major disaster;
- (ii) Increased number of households whose grain needs can be met immediately after the disaster;
- (iii) Change in cost per ton in storing grain relative to pre-project cost;
- (iv) Reduced loss in grain stocks relative to pre-project losses; and
- (v) Better monitoring, and improved governance and management of food stocks.

### 2.2 Project Components

14. Improving the food distribution and post-disaster relief timings is a longer term objective that will need to be gradually adjusted as the impacts of increasing climate variability and natural disasters continue to grow. With the existing storage capacity, the Government of Bangladesh will face increasing pressure to ensure the supply of food grains in the country, such as in the case of Cyclone Sidr in 2007. However, the precise amount to be stored will be largely dependent on the projected increasing frequency and intensity of extreme weather events as well as growing variability currently predicted under climate change projections. Thus, a phased approach that addresses improving the storage systems and distribution networks could act as a first step in the projected growing demand for grain stocks. The project, for the first phase construction, has selected suitable sites having lands currently owned by the FD. However, in the subsequent project phases, private lands or public lands from private uses may need to be acquired. The project will avoid sites inhabited by tribal peoples, land acquisition and physical displacement of peoples to the extent feasible. The project will be implemented over a period of 3 years.

15. The project components in the first phase includes (i) construction of modern public food grain storage silos (ii) procurement and distribution of household silos, (iii) implementation of social and environmental management plans, (iv) support for food planning and monitoring program and (v) program management, construction supervision, technical assistance, training and strategic studies. The physical components of the project in Phase I those involve social and environmental impacts includes (1) Public Storage Facilities in the form of modern grain storage silos; and (2) Household level storage facility or family silos particularly in the disaster prone areas of the coastal zone.

#### 2.2.1 Component A – Construction of Modern Grain Storage Silo Facilities

16. This component would have two parts: (A1) Public Storage Facilities in the form of modern grain storage silos; and (A2) Household level storage facility or family silos particularly in the disaster prone areas of the coastal zone. A third party (A3) would focus on the implementation of social and environmental management plans.

17. **Component A1: Construction of Modern Public Food Grain Storage Silos.** This component would finance an improved storage silo system to store milled rice with a total capacity of around 550,000 tons. The silos would be constructed on about 8 sites all over the country. All sites have land

currently owned by the DG-Food or the Government of Bangladesh. No new sites, requiring land acquisition, would be undertaken in the Project.

18. **Component A2: Household Silos.** Under ECRRP household level silos or grain storage bins have been developed in Bangladesh. These are specially designed 70 liters (about 40 kg) food grade plastic bin with a water tight lid. Once rice is stored, the seal tight lid prevents the contents from damage due to water from surges and floods. These silos are being provided to people in Sidr-affected areas and they are extremely popular. People use them to store rice seeds (which is more valuable than rice) for safekeeping of critical inputs for future planting seasons, in the event of floods or storm surges, as well as for rice storage. The cost of such a Silo is about US\$50. The project would make this Silo available at a discounted price of US\$25 per piece for households. A manufacturer would be encouraged to produce such silos, and eligible households would be able to purchase them at a discounted price through a voucher system, administered by project consultants and contracted NGOs. Selected households would receive a voucher based on agreed criteria (such as in coastal areas, with certain income levels, etc) and would ensure that only one silo is purchased at half price per household. The contracted NGOs will carry out household needs assessment survey and prepare a list of eligible households based on eligibility criteria for location, grain/food storage needs, level of income and vulnerability (social, political, gender, and ethnicity). It is estimated that about one million household silos would be provided under the project, creating about 40,000 tons of storage of rice seed (or rice) in surge-prone areas of the coastal zone.

19. **Beneficiary Selection Criteria.** Beneficiary selection will be given adequate consideration while distributing such household (HH) Silos. The project would ensure a credible beneficiary list/database with ID numbers, names, sites, locations, and gender. Selected households would receive vouchers based on agreed criteria and would ensure that only one silo is purchased at discounted price per household. The payment procedure is outlined in the agreed Financial Manual that would be updated time to time and at least once every year. Selection of such beneficiaries would be endorsed by Upazila Agriculture Officer and Upazila Agriculture Rehabilitation and Implementation Committees (UAR&ICs). A robust transparent beneficiary selection criterion has been established. Guiding principles for the selection of beneficiaries would take the following priority selection criteria into consideration:

- household is located in zone experiencing repeated natural disasters, such as cyclone and floods;
- marginal and land-poor farmers (0.02-0.20 Ha);
- landless households (less than 0.02 Ha);
- members of both formal and informal farmer groups and other production groups (e.g. Union Farmers Associations, CBOs);
- female-headed households and youth; and
- communities located in remote and in the least accessible areas not receiving any other external support, such as assets from other sources/projects or remittances from outside the district;
- not receiving remittances from other sources;

20. The strategy for selection of eligible households for receiving vouchers is discussed in section 6.4.1.

21. **Component A3: Implementation of Social and Environmental Management Plans.** The sites selected for public silos are already owned by the Government. Therefore, no major social or resettlement issues are expected. However, in order to ensure that, if any such issues arise, they could be addressed. These issues could be, for example, increased traffic congestion, or environmental or social

issues that could emerge during construction of silos. Also, the component would support the enhancement of the environment, such as improved landscaping, plantation of trees to improve the aesthetics of tall steel silos, etc..

## **2.2.2 Component B – Support for Food Planning and Monitoring Program**

22. Improvements are needed in the monitoring and management of food storage/stock and this system needs to be modernized. This component would finance these improvements and introduce a modernized system that would assist the Government of Bangladesh in better planning and monitoring of food stocks. These investments would assist in significantly reducing losses, and would ensure a timely distribution network for grain stocks in the event of an emergency. In general FPMU acts as a central coordinating authority and information clearing house for all food security related policy and program activities. FPMU could intervene more actively to improve the DG-Food's management information systems and reporting of rice and wheat distribution under all the different schemes include those designated for disaster relief. Right now it is apparent that there is no division level data generated for these programs. The information system would help in improve the transparency and accountability of the entire food distribution system.

## **2.2.3 Component C –Project management, construction supervision, technical assistance, training and strategic Studies.**

23. This component would finance costs associated with: (C1) project management of the task, incremental staff and expenditures of the DG Food in implementation of the Project, the costs for implementing the Governance and Accountability Action Plan (GAAP), including a panel of experts, as needed, a procurement panel, audit and other such costs; (C2) cost of consultants for preparation of detailed designs, bidding documents, construction supervision and updating of designs required during the construction. This would include costs for construction supervision, monitoring and evaluation of project impacts; (C3) provision of technical assistance, training, institutional capacity building, preparation of future projects, and any strategic studies needed during project implementation.

24. Detail project description will be found in the Project Appraisal Document (PAD) of the project.

## **2.3 Project Beneficiaries**

25. The Project would provide benefits to a wide range of people. In particular, the vulnerable and poor people in disaster prone areas, affected by floods and cyclones in coastal zone (about 19 districts) would benefit from the project. About 31.5% of the people are considered poor while about 17.6% are ultra-poor. About 21% of the total population is on various safety net program (not all are on food safety net) and about 1.66 million tons of rice and 0.74 million tons of wheat are on feeding program. At least 10 million people would directly or indirectly benefit from the project primarily in coastal and floods zones. About 1.2 million households (5 million people) would directly benefit from distribution of household level Silos. Over half of the beneficiaries would be women and children.

## **2.4 Selected Technology Description**

### **2.4.1 Modern Public Food Grain Storage Silos**

26. The silos would allow storage handling of large volumes of food grains particularly rice for 2-3 years. The steel bolted silos that are used in all climate zones would be used. These types of silos allow for speedy construction, and would have temperature control and fumigation systems, automated mechanical handling, and a central computerized control system. These types of silos have highly competitive supply consisting of at least 20 manufacturers active in the international market.



Figure 2-1: Modern Grain Steel silo

27. **Selection of Bin Size.** Large volumes of wheat, soybeans and maize are storage silos of 100,000 tons usually consist of a bin size of 10,000 to 15,000 tons of grain. In this case, the bin size is optimized considering foundation conditions as well as cooling requirements (described below) and bin size of about 3,000 tons and generally 60 feet diameters and 40 feet height would be used.

28. **Drying of Rice before Storage.** As the case is in Bangladesh, it is expected that storage sites would receive milled, parboiled rice which has moisture contents of 14%. To ensure efficient chilling for long term storage it would be necessary to reduce the moisture content to 12%. This would be done by drying center installed at the silos site. Two continuous drying systems would be installed at the site with a drying capacity of 600 tons per day which is the targeted rate of receiving milled rice during 4 to 5 months period following the *Borro* harvest. With circulating type dryer the rice would be dried in three passes at a low temperature of 38°C to 40°C to avoid cracking of and breakage and about 0.75% moisture would be removed in each pass. A higher temperature would be used for paddy.

29. **Grain Chillers.** With proper control of temperature and humidity it is possible store any grain including milled, parboiled rice almost indefinitely without spoilage. To prevent infestations and rancidity during extended storage periods in a humid climate such as Bangladesh it is essential to lower and maintain the temperature of the grain put into storage to 15°C or below. This is done with the use of a grain chiller, which is a very powerful refrigeration unit consisting of a compressor, condenser, evaporator, high power fan, frequency inverter and electrical controls. The chiller blows cold, dehumidified air through the grain mass cooling it progressively in layers from bottom to top. The warm moist air in the rice mass is steadily pushed upwards by the entering cold dry air until it exits from the top.

30. **Bagging.** Each storage will have two baggage stations at the discharge area for filling 50 kg bags at a rate of 500 bags per hour per station or 50 tons per hour bagging at the two stations combined. These two bagging stations will be installed in a bagging house with two truck lanes below such that trucks or hand trolleys can be loaded from above my means of a vertically adjustable slide or hoistable belt conveyer ramp. Each bagging station will be fed by a 33 ton capacity surge bin allowing bagging to be continued even during stoppages of the main conveying equipment. A third load out station in each discharge area will be equipped to load trucks with rice in bulk or to fill one ton “jumbo” bags in trucks or on hand trolleys.

31. **Packaging** Each silo storage facility will have a packaging line for filling 5 and 10 kg packages of rice. One existing warehouse at each site can be converted for this purpose. Packaging capacity at each

site will be 10 tons per hour. Three packaging machines per site will be used. The packaged rice can be pre-positioned or held at the storage facility for emergency relief operations and can be rotated when necessary through open market sales.

## 2.4.2 Household Silos

32. The containers are made of food grade plastic bins with a storage capacity of 70 liters (40 kg). The lid is water tight. The sealing ring placed in the mouth lid is made from such durable flexible material as to enable air/water-tightness of the silo. The mouth lid of the drum must have an air tight closing arrangement (gasket in lid) allowing to hermetically seal the seed/grain silo. The lid is threaded in the inner circular part and rubber gasket is provided at the mesh point.



Figure 2-2 Popular Household Silo Used for ECRRP

33. There are 2 symmetrical inner grooves on both sides of the silo/drum body to allow and facilitate holding/pulling/carrying by hand. The choice of silo material should consider the heat generated from the grain/seed storage.

## 2.5 Scope of BMFSP-I Intervention for Environment and Social Study

34. Of the three main components, all three sub-component of Component A, **Component A1: Construction of Modern Public Food Grain Storage Silos** and **Component A2: Household Silos** and **Component A3: Implementation of Social and Environmental Management Plans** are expected to trigger environmental and social impact.

### 2.5.1 Component A1: Construction of Modern Public Food Grain Storage Silos

35. Additional modern food grain storage facilities of capacity 600,000 tons will be developed across the country at the existing sites. Potential locations for the Modern Grain Silo in the first phase are Barisal, Narayanganj, Dhaka, Ashuganj, Madhupur, Mymensingh, Mahesh war Pasha and Chittagong. No new sites would be undertaken in this first phase project. The sites already possess conventional godowns but enough extra space is available at each site to fit the new silo cluster. Although most of the sites are already developed, new technology construction and deployment may require land filling and put pressure on utility supply like gas and electricity. The drainage and sewerage facility may also need to be enhanced. For the subsequent phases, the specific site locations and their physical characteristics relevant to the safeguard analysis will be known only after finalizing the silo sites.

36. Activities under construction of modern public food grain silo which may have environmental and social foot print include: (i) construction of foundation of Silo with high dead load and live load; (ii) construction of high rise superstructure with prefabricated steel and bolt. The construction method will follow top down approach to reduce occupational risk associated with high rise construction; (iii) a 2 to 3 story elevated bagging house with two to three lanes of truck loading at ground level; (iv) construction and operation of a drying center; (v) construction of a laboratory; (vi) operation of the silo including fumigation.

### **2.5.2 Component A2: Household Silos**

37. The cost per ton for household storage proposed under this project is higher than for large silos. However, the ready available stocks in very remote areas immediately following a disaster makes this type of storage the most effective to address nutrition needs. In addition, it also reduces the burden of the government to carry such stocks to fairly distribute in remote areas. Finally, the ability to store rice seeds for the next agricultural season provides an additional value to households.

38. Activities under household silo which may have environmental and social foot print include: (i) choice of drum material which needs to food grade plastic can (ii) gasket material to make the lid air tight (iii) user friendly design to facilitate holding/pulling/carrying in a safe way (iv) social benefit to withstand natural calamity.

### **2.5.3 Component A3: Implementation of Social and Environmental Management Plans**

39. This sub-component will incorporate a wide range of need based activity in the project surrounding area for social and environmental benefit. The component would support the enhancement of the environment, such as improved landscaping, plantation of trees to improve the aesthetics of tall steel silos, etc.. Need based communal structure development under this sub-component can range from public toilet, small structure for community health facilities to widening of the approach road to minimize traffic congestion due to the construction of Silos. In short, the activities will be need based community infrastructure whose environmental and social impact can be addressed only during the small scale need based activities identification.

## **3 ENVIRONMENTAL & SOCIAL POLICIES, LEGAL AND ADMINISTRATIVE FRAMEWORK**

### **3.1 General Description of Environmental Policies and Legislation in Bangladesh**

40. 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 (BECA, 1995), and the Environment Conservation Rules (ECR, 1997). In addition to the Bangladesh Environment 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 Strategy 1992; 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.

#### **3.1.1 Bangladesh Environment Conservation Act, 1995**

41. 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.

42. 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.

#### **3.1.2 Environment Conservation Rules, 1997**

43. The Environment Conservation Rules provide a first set of rules under the Environment Conservation Act, 1995. This rules is further amended in 2002 and 2003. 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

44. 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, Yanguar Haor, Marzat Baor and Gulshan-Baridhara Lake as ecologically critical areas and accordingly has prohibited certain activities in those areas. has also declared four rivers surrounding Dhaka city respectively Buriganga, Balu, Turag and Dhaleshwari as ecologically critical area.

45. 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.

46. **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.

### 3.1.3 Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009

47. 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.

#### 3.1.4 National Environment Action Plan, 1992

48. 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*

a. 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.

b. Proper and regulated use of chemical fertilizers will be ensured. Use of organic fertilizers will be increasingly emphasized.

c. Imported seeds, seedlings and plants will be properly quarantined to exercise necessary caution against probable adverse environmental impact.

d. Natural methods of pest control will be encouraged through ensuring protection and safety.

e. Steps should be taken to establish an agricultural system based on local ecosystem, rate of population growth and demand of national economy.

#### 3.1.5 National Water Policy 1999

49. 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 resources 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.

#### 3.1.6 Standing Orders on Disaster, 2010

48. 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.

49. 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.

50. 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.

### **3.1.7 National Integrated Pest Management Policy, 2002**

51. 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 measures:

- 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.

### **3.1.8 National Fisheries Policy, 1996**

52. 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.

### 3.1.9 National Adaptation Programme of Action (NAPA)

53. 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

### 3.1.10 Bangladesh Labor Act, 2006

54. 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

### **3.1.11 Bangladesh National Building Code, 2006**

#### **3.1.11a Demolition of Structure**

55. BNBC sets guideline for demolition of structure. The highlight 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.

#### **3.1.11b Occupational Health and Safety**

56. Part-7, Chapter -1 of the Bangladesh National Building Code (BNBC) 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 put in writing. 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).

57. 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”.

58. 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.

59. 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”.

60. 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.”

61. 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.

### 3.1.12 National Agricultural Policy, 2010

62. 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 to create 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 problem 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.

### 3.1.13 National Food Policy 2006;

63. 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).

64. 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:

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

65. 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 offtake requirements, the Government has decided to maintain a public stock of 1.0 million tons of food grains.

66. 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.

67. 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:

- i. ensure quick distribution of food in affected households in times of disaster;
- ii. 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;

68. 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:

- i. formulation of uniform arrangement, development of testing techniques, setting of standards and their application and compulsory enforcement;
- ii. investment in development of packing or packaging and safe storage facilities;
- iii. increase laboratory facilities and impart practical knowledge for development of the quality of food and food products;
- iv. training for concerned officials and institutions in protecting the grades and standards of food products;
- v. campaign for nutrition enhancing quality and safe food; and

- vi. 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

### **3.1.14 National Food Policy Plan of Action, 2008-2015**

69. 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, 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.

### **3.1.15 Bangladesh Country Investment Plan (CIP), 2011**

70. 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.

## **3.2 World Bank's Environmental Safeguard Policy**

71. 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

72. 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.

#### **3.2.1 OP/BP 4.01 Environmental Assessment**

73. 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.

74. 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, siting, 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 transboundary 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.

75. 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 mitigatory 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.

### 3.2.2 OP/BP 4.04 Natural Habitats

76. 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.

### 3.2.3 OP/BP 4.09 Pest Management

77. 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.

78. 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).

### 3.2.4 OP/BP 4.11 Physical Cultural Resources

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

### 3.2.5 OP/BP 4.36 Forests

80. 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.

### 3.2.6 OP/BP 4.37 Safety of Dams

81. When the World Bank finances new dams, the Policy Safety on Dams requires that experienced and competent professionals design and supervise construction, and that the borrower adopts and implements dam safety measures through the project cycle. The policy also applies to existing dams where they influence the performance of a project. In this case, a dam safety assessment should be carried out and necessary additional dam safety measures implemented.

### 3.2.7 WBG/ IFC Environmental, Health and Safety Guidelines

82. The Environmental, Health and Safety (EHS) Guidelines of the World Bank Group (WBG)/International Finance Corporation (IFC), 2008 is the safeguard guidelines for environment, health and safety for the development of the industrial and other projects. They contain performance levels and measures that are considered to be achievable in new facilities at reasonable costs using existing technologies.

## 3.3 General Description of Social Policies and Legislation in Bangladesh

83. 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.

### **3.3.1 Constitution of Bangladesh**

84. 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.

### **3.3.2 The Acquisition and Requisition of Immovable Property Ordinance, 1982**

85. 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).

86. 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.

87. 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).

### **3.3.3 The East Bengal State Acquisition and Tenancy Act, 1950 (Revised 1994)**

88. 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 (nadi sikosti) 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.<sup>3</sup> 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.

### **3.3.4 Constitutional Right of the Tribal Peoples Rights**

89. 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.

### **3.3.5 The Chittagong Hill Tracts Regulation 1900**

90. 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.<sup>4</sup> They are governed through Revenue Circle Chiefs<sup>5</sup> who are local revenue collectors vide an amalanama (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.

### **3.3.6 The Chittagong Hill –Tracts (Land Acquisition) Regulation, 1958**

91. 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

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<sup>3</sup> The Assistant Commissioner of Lands (AC Land) in respective districts demarcates the AD Line each year in areas where rivers frequently erode their banks. According to law, if the land classified by an AD Line re-appears within 30 years from the date of erosion, the original owner(s) can claim the land.

<sup>4</sup> The CHT districts comprise the reserved forests, the circle of the three Chiefs, viz. the Chakmas Chief, the Bohmong Chief and Mogh Chief and the Maini Valley (rule 35).

<sup>5</sup> The Circle Chiefs form an Advisory Council to the Deputy Commissioner (DC) for administration of their respective circles and exercise their authority as Chiefs in the prompt enforcement in the mouzas of their circles of all orders of the DC.

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.

### **3.3.7 The CHT Regional Council Act, 1998**

92. 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.

93. 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.

### **3.3.8 Ethnic Minority Rights in PRSP 2005**

94. 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:

- i. 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.
- ii. Proper actions for protecting the rights of ethnic minority people, particularly their rights to land and forests.
- iii. Transfer of land administration in CHT to the hill districts councils in accordance with the ‘Hill District Councils Acts of 1989’.
- iv. Provide education to ethnic minority people with a curriculum that allows learning in their own language at the primary level.
- v. Strengthen their competence in job markets through affirmative actions at higher levels of education and skill training to promote their inclusion in mainstream economic life.
- vi. 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.

- vii. Increase and utilize property the fund available in the Prime Minister's office for the development of the ethnic minority people of the plain lands.
- viii. Provide wider access to electrification and telecommunications for ethnic minority communities, particularly in the Hill Tracts.

### **3.3.9 GOB Laws on Land Acquisition**

95. 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.

## **3.4 World Bank's Social Safeguard Policy**

### **3.4.1 Involuntary Resettlement (OP 4.12)**

96. 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.<sup>6</sup>

97. 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.

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<sup>6</sup> Excerpts from WB OP 4.12. WB Operational Manual. December 2001.

- 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.

### **3.4.2 Indigenous People (OP 4.10)**

98. 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:<sup>7</sup> 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.

### **3.5 Implications of National Polices and Legislations on the Project**

99. 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 use of fumigants 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.

### **3.6 Implication of Environmental Safeguard Policies of WB on the Project**

100. 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 and use of low dose of fumigants 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. DG Food is already using fumigants in the existing godowns. Fumigants may be needed to be used during the operation phase of the Silo. A fumigant application mechanism should follow the USEPA and WHO guideline. As per Bank requirement, the

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<sup>7</sup> Excerpts from the OP 4.10. WB Operational Manual. July 2005.

borrower needs to consult project-affected groups and local nongovernmental organizations (NGOs) 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.

### **3.7 Implication of Social Safeguard Policies of WB on the Project**

101. The legislatives 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).

102. 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.

## 4 ALTERNATIVE ANALYSIS

### 4.1 Introduction

103. From the environmental safeguard view point, alternative analysis is an important tool for the best selection of the project site, technology to be followed, and operational mechanism in terms of environmental acceptability of the chosen method. Alternative analysis provides information about the advantages and disadvantages, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible for each alternative considered. The alternative analysis for BMFSFP project will be conducted into the following sections.

- (a) "no action" alternative of the project.
- (b) Alternative Analysis for Selection of Sites
- (c) Alternative Analysis for Technology Options

104. The Alternative Analysis for Technology options also include the comparative analysis based on the option during construction and operation.

### 4.2 "No Action" Alternative of the Project

105. Bangladesh is a disaster prone country. Almost every year this country is devastated by cyclone, flood or drought. In all cases the devastation is on the crop, particularly rice, the main staple of the people. An interval of three years has been observed when shortage of rice occurs in the country, particularly in the coastal area and a major shortfall occurs every ten years. The situation is likely to aggravate due to global warming reflecting its effects on the erratic climatic behavior. Against the backdrop of such emerging issues like the natural calamities and disasters, the increasing food prices and the shortages of food during the times of urgent need develops food insecurity in the country. If Bangladesh Government does not increase food storage capacity, at the time of food shortage, the country will need to import food at a higher price. The current storage capacity of the country is 16 lakh tons. But will be reduced to 13 lakh Tons by 2013 due to further deterioration of the old godowns. It is estimated the requirement of storage capacity for the food grain is 30.5 lakh tons by the end of 2020. If the storage facility is not increased immediate with the increasing frequency of natural disaster, decreasing storage facility due to deteriorated existing godown, the country will face shortage of food during emergency need of food. The trend of storage need is presented in Figure 4.1.

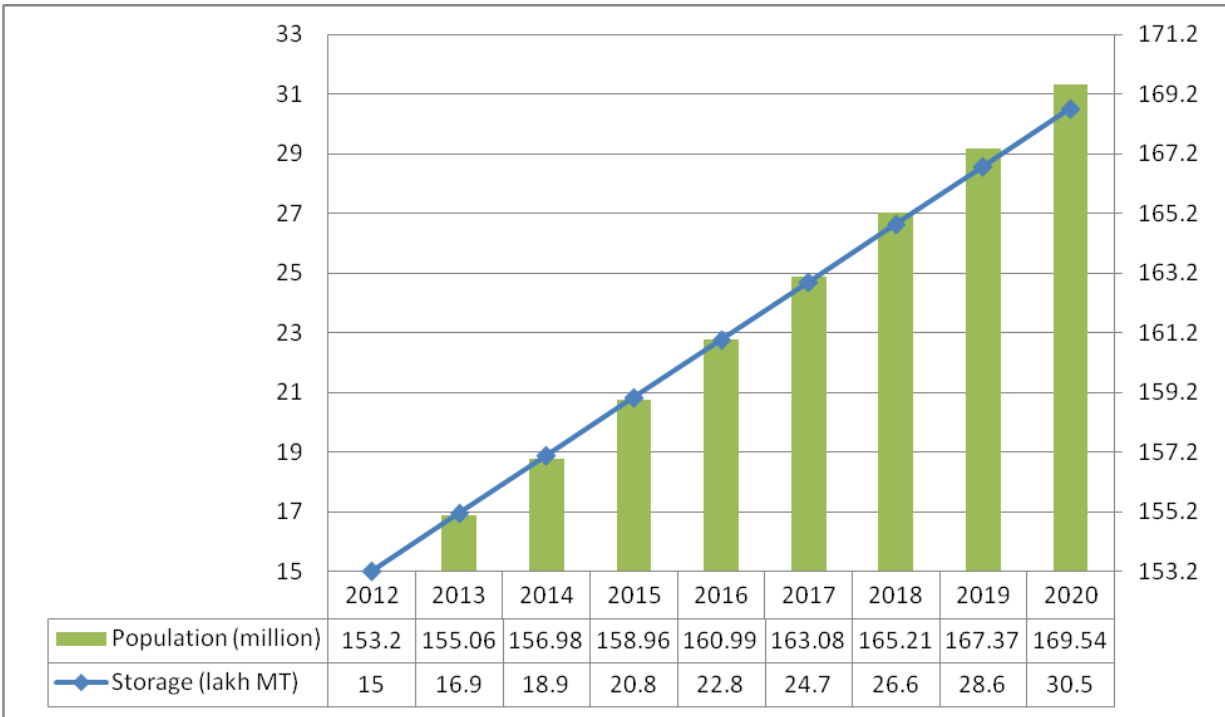


Figure 4-1 Trend of Storage Need

### 4.3 Alternative Analysis for Selection of Sites

106. Several sites were analyzed all over Bangladesh. The site selection criteria are as follows:
- d. Strategic value of the storage location for distribution of food grain stocks in emergency relief situations or for the pre-positioning of such stocks
  - e. Rationality of increased storage capacity at the site based on existing and anticipated food grain movements by the client for all uses in order to ensure proper rotation of stocks
  - f. Avoidance of land acquisition issues that could delay the start of construction and therefore a focus on existing Food Department storage sites
107. Initially fourteen sites were taken into account. Considering the above conditions, 8 sites have been selected for the first phase. Table 4.1 shows the comparative analysis of the site for environmental consequences.

**Table 4-1 Alternative Analysis for Site Selection Considering Major Environmental and Social Factors to be Impacted**

Sites	Land Ownership	Risk Associated with Land Acquisition/ Social Impact	Mode of Transportation	Strategic Location For distribution of grain during emergency (Number of Mode of transport 1= +, 2= ++, 3=+++ , 4=++++)	Demolition of structure triggerin g dust pollution , health & safety	Pile driving into GW= Pile length – GW depth (m)	Total Trees to be cut possibly	Natural drainage facility	Apparent Environmental Impact
Barisal CSD	DG Food	Low	The site has both road and river transport. The site is linked to the 20'-0" wide pucca road of CSD & the Kirthan khola river.	++	No	30	69	Yes	Low
Narayanganj CSD	DG Food	Low	The site is linked the 16'-0" wide a branch road of Dhaka- Chittagong High Way & adjacent to the Shitalakshya river. Facilities for communication are road & river are being used.	++	No	19.75	10	Yes	Very Low
Dhaka CSD	DG Food	Low	The site is linked to the Farida bad police station road and Buriganga river	++	Yes	29.75	9	Yes	Moderate
Ashuganj Silo	DG Food	Low	The site is linked with Dhaka Brahmanbaria, Dhaka Sylhet high way, Dhaka Chittagong Railway and adjacent to The Meghna river. Road, railway & river are being used for communication	+++	No	19.8	30	Yes	Low
Mymensingh CSD	DG Food	Low	The site is linked to the 20'-0" wide of Mymensingh-Tangail High way.	+	Yes	27.73	159	Yes	Moderate
M'Pasha CSD (Food grain)	DG Food	Low	The access to site is 32'-0" wide pucca road of the CSD connected with Khulna-Jessore Highway. River and railway are other mode of transport.	+++	No	37.1	97	Yes	Moderate
Chittagong (Food grain)	DG Food	Low	Communications of site are rail, road, air, sea etc. The site is linked to Kathghor road-sea beach/Airport road.	++++	No	29.58	16	Yes	Low
Madhupur (Khas Land)	DG Food and some Government	Moderate	The access to site is 16'-0" wide pucca road which is running beside the proposed silo site. The site is adjacent to	+	No	17.84	60	No	Moderate

Sites	Land Owner ship	Risk Associat ed with Land Acquisiti on/ Social Impact	Mode of Transportation	Strategic Location For distribution of grain during emergency (Number of Mode of transport 1= +, 2= ++, 3=+++ , 4=++++)	Demoliti on of structur e triggerin g dust pollution , health & safety	Pile driving into GW= Pile length – GW depth (m)	Total Trees to be cut possib ly	Natur al draina ge facility	Appar ent Enviro nment al Impac t
	Khas Land may be needed		the Mymensingh-Tangail-Jamalpur high-way.						
Mongla Silo (Food grain)	DG Food	Low	The site is well connected by the road ways as the existing concrete silo (ongoing construction) is in place and doing the inbound. The site is at the bank of Pashur River, but there is no jetty.	+	No	33.	No tree or vegetat ion at all	Concre te silo is already under constru ction	-
Gobindaganj (New Site)	Private Land	<b>Very High</b>	The site is attached by Dhaka-Rangpur high way.	+	No	Not checked since silo site will not support acquiring private land	-	-	-
Khulna CSD	DG Food, Site May need to acquire for Ancillary facilities. Existing godowns are used Save the Children and World Food	<b>Very High</b>	There are good road connections to the site and no restrictions on movements of trucks to the site. There is also a railway connection with the CSD site. The godowns are so designed and constructed that every alternate godown is connected by rail road and the other alternative is by the trucks.	++	Yes	Not checked since silo site will not support acquiring land	-	-	-

Sites	Land Ownership	Risk Associated with Land Acquisition/Social Impact	Mode of Transportation	Strategic Location For distribution of grain during emergency (Number of Mode of transport 1= +, 2= ++, 3=+++ , 4=++++)	Demolition of structure triggering dust pollution , health & safety	Pile driving into GW= Pile length – GW depth (m)	Total Trees to be cut possibly	Natural drainage facility	Apparent Environmental Impact
	Program								
Dinajpur CSD	DG Food, But for silo construction lands need to acquire	<b>Very High</b>	The campus is linked with rail and road connection. The road connection is maintained through a 12 feet wide pucca road which is connected with the wide station road and then to the high way.	++	No	Silo site will not support acquiring land	-	-	-
Baghabari (BIWTA Land)	BIWTA Land	<b>High</b>	It has both good road and river connection	++	No		-	-	-
Naogaon (Khas land)	Government Khas Land	<b>High</b>	The site is situated by the side of the Rajshahi-Naogaon highway that ensures its connectivity with the rest of the country by using road transports.	+	No	Silo site will not support acquiring land	-	-	-

#### 4.4 Alternative Analysis for Technology Options

108. In Bangladesh, conventional godowns/warehouses and concrete built silos were constructed in different locations of the country and are now being used to store rice and other food grains. On the other hand, steel built silos are widely used in many countries of the world as modern food storage technologies as alternatives of concrete built silos and conventional godowns. The options are:

- 1) Steel Silo
- 2) Concrete Silo
- 3) Conventional Godowns




109. Moisture and Temperature control are the critical aspects for bulk storage of parboiled rice. The optimum temperature for growth of most grain moulds is between 25°C to 30°C and some moulds develop best at around 37°C. The minimum air relative humidity (RH) for mould germination is 65%. Thus to prevent mould growth on food grains at any temperature, the RH of the air in the grain mass must be less than 65%. Insect development is enhanced by high moisture content (MC) conditions (above 14%) and insect activity hardly occurs in food grains at MC contents below 10%. Most insects are dormant below 10°C and are killed at temperature above 38°C. Moreover, presence of dust in food grains facilitates germination of insects inside the food grain. Dust also reduces the nutrition value of the food grains.

110. The outside walls of both concrete and steel silo bins offer thermal insulation and the temperature of the outside air can be transferred to both the grains and the air inside the walls. In this way, the outside temperature variations make the initial grain storage conditions change. When the temperature outside the bin decreases, a temperature gradient is created across the walls<sup>8</sup>. The air in the silo develops a continuous convection movement. The air near the walls is cooled, raising its RH and resulting in an increase of the MC in the bottom of the silo. This increase in moisture can create a deterioration spot. Then the dry air rises through the central part of the bulk mass and picks up moisture from the grain. When this warm, moist air contacts the cool upper grain surface, the moisture is deposited and another deterioration zone can occur. The inverse air movement pattern may occur if the air outside the bin warms up, causing the MC to increase near the floor of the bin. In the tropics, where seasonal temperature changes are not very large, the main problem occurs with daily temperature changes or day to night temperature variations and high RH of the air. The high daytime temperature heats the inside of the bin causing moisture transport from the grain to the surrounding air. At night, the outside temperature drops very rapidly and the water vapors in the air spaces condense on the internal surface of the bin, mainly on the roof. The grain can act as a condensing surface if its temperature is reduced to below the dew point temperature of the air. This condensation problem may cause deterioration areas on the top of the grain and sometimes on the walls. This will create some hotspots or caking of grains inside the silos.

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<sup>8</sup>Brooker, D. f., Bakker Arkema, and C. Hall, 1981. Drying cereal grains, AVI published company, Inc., 3<sup>rd</sup> printing.

Table 4-2 Comparative Analysis of Food Grain Storage

	Steel Silo	Concrete Silo	Conventional Godowns
<b>View of Super Structure</b>			
<b>Description</b>	The steel Silos are the containers for storage of bulk volume of grains. The super structure of steel silo is made of galvanized steel.	The Concrete Silos are the containers for storage of bulk volume of grains. The super structure of concrete silo is made of concrete.	The conventional godown/ ware house is made of brick wall and galvanized tin top
<b>Space Requirement</b>	Corrugated steel bins are mainly designed to resist tensile stress and the only efficient shape is circular bins to counteract bending/flexural stresses. Bulk storage in silos eliminates the need for pallets and other dunnage on which bags of grain are usually stacked. This reduces use of lumber and saves trees.	Concrete bins are built in different shapes, the most common being circular, rectangular and hexagonal. Diameters vary typically from 5m to 12m and heights from 15m to 55m. The wall thickness varies from 15cm to 20cm. Rectangular concrete bins have covered 90.5% area whereas Steel Silos cover 75% of the area for the same capacity. Concrete silo is also used for bulk storage.	The conventional ware-house/godown with dimensions 100ft X 80ft X 20ft space will make possible storing 1000 mt of rice grains, which is more than 8 times the area than the same of concrete silos considering the same capacity. This is not efficient in terms of bulk storage.

	Steel Silo	Concrete Silo	Conventional Godowns
<b>Temperature, Moisture and dust control Technology</b>	Grain chilling, grain drying and grain cleaning equipment are used for Steel Silo.	Grain chilling, grain drying and grain cleaning equipment can be used for Concrete Silo. But in Bangladesh thermal insulation is provided with very thick (15 to 20 cm) concrete walls of the silos which only consider energy transport by mechanism of conduction without use of any other controlling	Grain chilling, grain drying and grain cleaning are problematic or impossible when grain is held in bags in warehouses
<b>Alternatives assessment considering impacts during construction</b>			
<b>Required amount of Concrete Volume (m<sup>3</sup>/mt)</b>	Foundation = 26 Superstructure = nil Foundation of the structure is important and rigorous and requires technical skill set for construction.	Foundation = 28 Superstructure = 15 Foundation work is equally rigorous like steel silo. The superstructure will be built in the convention building method bottom up approach.	Foundation = 4 Superstructure = 8 Comparative Simple method to construct
<b>Skill set</b>	Required Skilled Manpower for Foundation = 100 Required Skilled Manpower for Superstructure = 2800	Required Skilled Manpower for Foundation = 100 Required Skilled Manpower for Superstructure = 3000	Does not require highly skilled manpower. Unskilled manpower may create significant delay of work.
<b>Locally Available manpower</b>	No for superstructure.	Yes	Yes
<b>Dust Pollution during Superstructure Construction</b>	Superstructure will be built with prefabricated steel. The factory fabricated galvanized steel sections of the silos and other steel structural members will be bolted with the vertical members of the silo bins to form the round outer skin of the silo as per the diameter of the bin. The upper cone of the silo will then be placed and constructed on top of this. Once the	Constructing concrete silos superstructure require large volume of concrete works where cement, fine and coarse aggregates are to be mixed to prepare concrete throughout the construction period.	Constructing warehouse/godowns also require large volume of concrete works.

	<b>Steel Silo</b>	<b>Concrete Silo</b>	<b>Conventional Godowns</b>
	<p>top cone has been placed on the first section the entire structure will be raised by a battery of special jacks placed at the base of the silo and another circular section added beneath it. The entire construction, till it reaches the required height, will thus be completed. The conveyor belts and other equipment of the silos will be connected with the system as the construction works progress. Dust is not a problem during superstructure construction.</p>		
<b>Temporary Work Camps</b>	<p>Steel Silos require mainly technically skilled labors. The waste management and sanitation facilities can be maintained adequately</p>	<p>Construction of both concrete silos and godowns requires many unskilled laborers for which temporary camps for the laborers are needed throughout the construction period. Consequently, the waste management and sanitary facilities are may not be maintained adequately.</p>	
<b>Hiring of Local Labors</b>	<p>Local labors may be hired during foundation construction. Super-structure requires only skilled labors. Local labors will be hired at smaller extent.</p>	<p>Local labors will be hired at a higher extent.</p>	<p>Local labors will be hired at a higher extent.</p>
<b>Safety Issue</b>	<p>Top to bottom approach will be followed. Erection of steel silos is done completely at ground level using hydraulic jacks to lift the cylindrical structure as each ring of steel panels is bolted together. Therefore there is little risk associated with falling from height.</p>	<p>Bottom up approach is followed. Concrete silo construction using slip forms is done partially with workers high off the ground.</p>	<p>Conventional method is followed for warehouse construction.</p>

	Steel Silo	Concrete Silo	Conventional Godowns
<b>Alternatives assessment considering impacts during operation</b>			
<b>Dust Control</b>	Dust collector can be integrated with the steel silo which can reduce the dust from grains.	Dust collector can be integrated with concrete silo as to control dust from grains.	Grains are stored in bags in the warehouse. It is difficult to control in the warehouse.
<b>Insects and other pests control</b>	Grain chillers used for chilling the grains can be integrated with steel silo which keeps the grains at lower temperature. Mould will not occur and insects will not reproduce at the lower temperature. This is important to facilitate long term storage of food grains as well.	By providing grain chiller, insects and pests can be controlled in concrete silo.	Temperature cannot be controlled in the conventional godowns. Insects and pests cannot be controlled adequately. Therefore, long term storage of food is difficult in conventional warehouse.
<b>Rodent Control</b>	Both steel and concrete silo structures prevent the rodents and birds which are often a major problem for grain storage.	Grains are protected from rodents and birds in the concrete silo.	Poisons and other measures need to be adopted for rodent and bird control.
<b>Infestation due to fumigation (Fumigant Aluminum Phosphide 12gm/mt)</b>	It is expected grain chiller will be used properly to control the temperature which will reduce the possibility of infestation.	Currently used once in a month. Since the grain chiller are not working in the existing Silo.	Fumigant is used once in every week with the mentioned dosage.
<b>Power Consumption</b>	Power consumption is high for steel silo. The steel silos are operated and monitored through electronically controlled devices and they consist of chiller and dryer. For the BMFSFP, It is estimated that at an average 10 kwt is required power consumption/month for each mt of rice grains.	Concrete silos usually require 5 to 6 kwt/month for each mt of rice grains.	Warehouse/godowns usually require 0.1 to 0.2 kwt/month for each mt of rice grains. Power consumption is least for conventional godowns.
<b>Fewer plastic and jute bags</b>	The steel silo will be used for bulk storage of grains which will eventually reduce the	Concrete silo also reduces the use of jute and plastic bags.	Grains are storage in bags in warehouse which generates environmental problem due

	<b>Steel Silo</b>	<b>Concrete Silo</b>	<b>Conventional Godowns</b>
<b>in storage</b>	use of plastic and jute bags.		to disposal of more worn out bags.
<b>Elimination of dunnage and wooden pallets</b>	No use of dunnage and wooden pallets	No use of dunnage and wooden pallets	In the godowns, bagged grains must be stored on dunnage and wooden pallets that wear out and need replacement every few years. This promotes tree cutting.
<b>Reuse of rice husk</b>	The steel silos will have dryers that will make good quality rice husks which may be also pressed into briquettes.	If dryer is used, good quality briquettes can be made.	Briquettes from rice husk cannot be prepared.
<b>Dust Explosion</b>	The possibility of dust explosion is less for steel silo.	The risk of catastrophic collapse of the grain storage due to grain dust explosion are much higher in concrete silos than in steel silos due to the confined area in the basement where dust concentrations can be high and easily ignited by a spark.	-

## **SECTION B: ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)**

## 5 ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)

### 5.1 Objectives of the EMF

111. The purpose of the EMF is to prepare an outline for Environmental Assessment and Management describing brief details of potential Environmental issues typically associated with the planning, designing, implementation and operational activities envisaged under the Bangladesh Modern Food Storage Facilities project and provide guidelines on how to carry out Initial Environmental Examinations (IEE), Environmental Impact Assessment (EIA) and prepare Environmental Management (Mitigation and Monitoring) Plan to mitigate project induced negative environmental impacts and enhance positive environmental and social impacts due to the project interventions.

112. An EMF is needed for the ancillary facilities which will be decided during project implementation and the tasks to address under component A3. Food silos will be established at 8 locations with a total capacity of around 600,000 tons. Environmental Impact Assessment (EIA) for 8 locations have already been conducted and are presented in Section C of this report. This EMF presents the guideline to conduct Environmental Impact Assessment (EIA) of the undecided tasks and the preparing the Environmental Management Plan.

113. The EMF highlights the guidelines, codes of practice and procedure to be taken into consideration for integration of environmental and social aspects into the project design. Adhering to the principles and guidelines and using the potential environmental issues layout in EMF will help the implementing agencies (viz. PMUs) to ensure compliance with the related Government Policies and associated rules regulations and also with the environmental safeguard policies of World Bank. The EMF is only applicable to Component A, as the other components *do not* require infrastructure interventions. The project will be considered as “Category B” project.

114. The objectives of the EMF is to ensure that Bangladesh Modern Food Storage Facilities project activities will ensure the following aspects:

- Ensure that environmental and related social issues are thoroughly evaluated and necessary interventions are incorporated in the planning, designing, implementation and operation phase of project activities through environmental and social impact assessment.;
- Ensure compliance and due diligence with World Bank environmental and social safeguard policies as well as with related Government Policies, regulations, guidelines and procedures as applicable to the cold storage and associated infrastructure development of the project;
- Preventing and/or mitigating any negative environmental impact that may emerge from any project component;
- Enhancement of positive environmental impact;
- Protecting human health

### 5.2 General Principles of the EMF

115. The project will have positive environmental and socio-economic benefits, as its objective is to provide facilities for efficient food storage which will ensure supply of adequate food supply during the natural disaster period. The technology will also ensure prolonged time of rice storage for 2-3 years which is generally 3-6 months in the conventional method. However, some of the physical investments will have construction-related environmental and social issues that will impact the neighborhood. These impacts are not expected to be significant and irreversible. With appropriate management (mitigation and

monitoring) measures, these impacts can be mitigated as set about in this EMF. General principles are as follows:

- The Project Director of the implementing agency shall be responsible for the environmental and social compliance in their respective components and the Sr. Environmental Specialist & Senior Social Specialist of PMU will be responsible for monitoring and seeing oversight in order to ensure overall project environmental and social compliance.
- The Sr. Environmental and Sr. Social Specialist shall be on board before awarding the contract. They will review the Environment Action Plan submitted by the Contractor.
- The Contractor will submit an Environmental Action Plan prepared in line with this EMF and construction schedule.
- The executing agencies and involved sectors, if any, shall follow the related Government rules (laws, ordinances, acts, etc) and the World Bank operational policies and guidelines. This EMF will serve as the basis for ensuring their compliance.
- Implementing agencies shall ensure the participation of local community in planning and execution of the sub-projects and document it.
- Implementing agencies shall be responsible for ensuring clearance from the DOE, local government agencies/ local committee as necessary.
- No project activities shall be carried in any disputed lands or land restricted for development.
- The project will ensure that environmental considerations are given sufficient attention, weight and influence over design decisions of Silos. To this end, it will carry out Initial Environmental Examination (IEE) for all Silos.
- The implementing agency will ensure that environmental screening/assessment of subprojects addresses all potential environmental and social direct and indirect impacts of the project (and any potential sub-project) throughout its life: pre-construction, construction and operation stages and mitigation measures have been taken to mitigate negative consequences and enhance positive impacts.
- The environmental assessment of the subprojects under Component A will require Bank clearance before implementation.

### **5.3 Environmental Assessment Methodology**

#### **5.3.1 Environmental Assessment**

116. The **Environmental Assessment (EA)** process makes sure that environmental issues are raised when a project or plan is first discussed and that all concerns are addressed as a project gains momentum through to implementation. It is essential that an environmental assessment is carried out to determine significant impacts early in the project cycle so that recommendations can be built into the design and cost-benefit analysis without causing major delays or increased design costs. Once implementation has commenced, the EA should lead to a mechanism whereby adequate monitoring is undertaken to realize environmental management. An important output from the EIA process should be the delineation of enabling mechanisms for such effective

management. An EA is a process comprising a series of steps. The key steps for environmental assessment are:

- Environmental Screening and Initial Environmental Examination (IEE)
- Environmental Impact Assessment (EIA)
- Environmental Management (Mitigation and Monitoring) Plan

### **5.3.2 Step 1: Identification of Project Influence Area**

117. The project influence area spreads over four levels to justifiably defining the safeguard boundaries. The four tiers of project influence area are (i) immediate area of impacts (footprint) (ii) direct project influence, where project is key impact factor (iii) area where direct project impact is less intensive and (iv) induced, indirect (or perceived impacts), often reputation risk. The proponent needs to identify the impact zones clearly during project location identification as the first step of environmental assessment. The baseline analysis and impacts identification should be carried out in the direct and indirect impact zones. The project area of influence should also consider all its ancillary aspects. Potential for cumulative impacts needs to be considered both in “direct” and “indirect” areas of influence. However, perceived impacts and associated potential for reputational risk need to be considered as appropriate but should not dictate the boundaries of EIA.

### **5.3.3 Step 2: Environmental Screening and Initial Environmental Examination (IEE)**

118. The purpose of the environmental screening is to get relevant concerns addressed early on before further design of a project and to ensure that actions to mitigate environmental impacts or enhance environmental opportunities are budgeted for. The environmental screening is about taking stock in time and to avoid losing later opportunities. The participation and consultation with local communities are important to identifying the potential impacts of the project interventions. Environmental screening is part of the Initial Environment Examination (IEE). IEE is considered as the first level of assessment applied project identification and pre-feasibility stage. The IEE addresses the issues at project (sub-project) identification and pre-feasibility planning stage. The main objective at this stage is to help define the project (sub-project) in terms of locations, components and designs. Projects with potential impacts will require environmental impact assessment as per DOE act and rules. Small projects or those with little impact will not require Environmental Impact Assessment (EIA). An environmental screening matrix is attached in Annex 2. The main activities of environmental screening and IEE are to:

- assess regional resources and the effects of past interventions;
- examine the likely project-environment interactions;
- establish an effective people’s participation program;
- identify the key environmental issues and the range and potential severity of impacts;
- compare the environmental consequences of project alternatives;
- prepare an initial Environmental Management Plan (EMP)

### **5.3.4 Step 3: Environmental Impact Assessment**

119. EIA will be used by the implementing agencies as a decision-making tool to ensure that the project design and implementation of activities such as construction of foundation and superstructure for silo are environmentally sound and sustainable. During the preparation phase, the objective of the EIA is to provide inputs to the feasibility study; preliminary and detailed design of the project including institutional capacity needs and barriers to be addressed. During the implementation phase, environmental management plans (developed as a part of the EIA during the preparation phase) serve

as a framework for strengthening the mitigation, enhancement and environmental monitoring measures and system in the food storage and silo sector. In the preparation phase, the EIA shall achieve the following objectives:

- To establish the environmental baseline in the study area, and to identify any significant environmental issue;
- To assess these impacts and provide for measures to address the adverse impacts by the provision of the requisite avoidance, mitigation and compensation measures;
- To integrate the environmental issues in the project planning and design;
- To develop appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.

#### 5.3.4.1 Assessment Methodology

120. The assessment of effects and identification of residual impacts takes account of any incorporated mitigation measures adopted due to any potential impact of Project activities, and will be largely dependent on the extent and duration of change, the number of people or size of the resource affected and their sensitivity to the change. Potential impacts can be both negative and positive (beneficial), and the methodology defined below will be applied to define both beneficial and adverse potential impacts.

121. The criteria for determining significance are generally specific for each environmental and social aspect but generally the magnitude of each potential impact is defined along with the sensitivity of the receptor. Generic criteria for defining magnitude and sensitivity are summarized below.

122. **Magnitude:** The assessment of magnitude has been undertaken in two steps. Firstly the key issues associated with the Project are categorized as beneficial or adverse. Secondly, potential impacts have been categorized as major, moderate, minor or negligible based on consideration of the parameters such as:

- Duration of the potential impact;
- Spatial extent of the potential impact;
- Reversibility;
- Likelihood; and
- Legal standards and established professional criteria.

123. The magnitude of potential impacts has generally been identified according to the categories outlined in Table 5.1.

**Table 5-1: Parameters for Determining Magnitude**

Parameter	Major	Moderate	Minor	Negligible/Nil
Duration of potential impact	Long term (more than 35 years)	Medium Term Lifespan of the project (5 to 15 years)	Less than project lifespan	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond immediate project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact

Parameter	Major	Moderate	Minor	Negligible/Nil
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions	Occurs under worst case (negative potential impact) or best case (positive potential impact) operating conditions	Occurs under abnormal, exceptional or emergency conditions	Unlikely to occur

124. **Sensitivity:** The sensitivity of a receptor has been determined based on review of the population (including proximity / numbers / vulnerability) and presence of features on the site or the surrounding area. Criteria for determining sensitivity of receptors are outlined in Table 5.2.

**Table 5-2: Criteria for Determining Sensitivity**

Sensitivity Determination	Definition
Very High	Vulnerable receptor (human or terrestrial) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
High	Vulnerable receptor (human or terrestrial) with little or no capacity to absorb proposed changes or limited opportunities for mitigation.
Medium	Vulnerable receptor (human or terrestrial) with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low / Negligible	Vulnerable receptor (human or terrestrial) with good capacity to absorb proposed changes or/and good opportunities for mitigation

125. **Assigning Significance:** Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the potential impact significance matrix shown in Table 5.3

**Table 5-3: Assessment of Potential Negative Impact Significance**

Magnitude of Potential impact	Sensitivity of Receptors			
	Very High	High	Medium	Low / Negligible
Major	Critical	H	M	0
Moderate	H	H	M	0
Minor	M	M	L	0
Negligible	0	0	0	0

### 5.3.5 Environmental Management Plan

126. The Environment Management Plan (EMP) outlines the environmental management procedures that will be implemented during the project period and also in the operation & maintenance period to minimize the negative impacts and implementation of enhancement measures. An Environmental Management Plan (EMP) should be drawn up as part of the EA at both IEE and EIA stages, to deal with follow-up activities during subsequent stages of project development: detailed design, construction, implementation, maintenance and decommissioning. The EMP should be developed with full people's participation, with the aim of achieving consensus between the EA practitioners, project design and planning engineers, local government agencies, NGOs and local communities. The main contents of an EMP are:

- a. Developing a Mitigation Plan
- b. Monitoring, Supervision and inspection Plan
- c. Plan for Institutional Strengthening
- d. Schedule
- e. Institutional Arrangements

#### 5.3.5.1 Developing a Mitigation Plan

127. Once the impacts have been analyzed, their significance will be determined, i.e., whether they are acceptable, require mitigation, or are unacceptable. Subsequently, measures will be devised to mitigate anticipated environmental changes and consequential impacts during project implementation and operation, or further reduce the residual environmental changes inherent in the selected project design. They normally include technical, social, and institutional measures to be implemented as integral elements of the project.

128. The Environmental Management Plan (EMP) sets about the mitigation measures, and needs to not only include clear recommendations for action and the procedures for their implementation but must also define a program and costs. Different environmental impacts require mitigation measures and approaches. The same impact may require multiple mitigation measures and also mitigation measures of one activity can help to mitigate other activity. In designing the mitigation measures, the following factor should be taken into consideration:

*The feasibility of mitigation measures should be evaluated in terms of practicality, manageability and cost. Cost effective structural mitigation activities should be incorporated in the design and should be estimated and both activities and associated technical specifications will be incorporated in the bidding document.*

129. A sample mitigation plan matrix is presented below.

**Table 5-4 Mitigation Plan Matrix**

Phase	Issue	Mitigating Measures	Applicable Standard (Country, WB etc)	Mitigation Cost	Responsibility (To be specified in the Bid Document)	Schedule	
						Start Date	End Date
Design							
Construction							
Operation							
Decommissioning							

**5.3.5.2 Monitoring, Supervision and inspection Plan**

130. Monitoring requires laboratory facilities, equipment, and technicians. As a general principle, measure only parameters necessary for managing the system, safeguarding its staff and equipment, and protecting the environment. These measures are usually set out in a plan, which covers all phases of the project from preconstruction through decommissioning, and outlines mitigation and other measures that will be undertaken to ensure compliance with environmental regulations and reduce or eliminate adverse impacts. The monitoring activities (i) measures the incremental impacts due to various project activities in the “Life cycle of the project”; (ii) analyzes the incremental impacts to find any issues of concern and takes necessary actions accordingly and (iii) keeps a record for learning, informing stakeholders, comparing for the next steps and resolving disputes. A sample monitoring and supervision plan matrix is presented below.

**Table 5-5 Monitoring and Supervision Plan Matrix**

Phase	Parameters to be monitored	Location of the parameters to be monitored	Method of Monitoring	Time of Monitoring	Monitoring Cost	Responsibility	Schedule	
							Start Date	End Date
Construction								
Operation								
Decommissioning								

**5.3.5.3 Institutional Strengthening Plan**

131. Institutional Strengthening Plan describes institutional needs to assure successful implementation of the mitigation and monitoring plans. Institutional strengthening plan identifies the need for the environmental and social specialists in the Project Implementation Unit for supervision and successful implementation, the training requirement for the EMP implementation including supervision, redesign and conflict resolution etc.

**5.3.5.4 Schedule**

132. Schedule establishes the links among mitigation, monitoring and institutional strengthening plan with the overall Project Implementation Plan (PIP). The contractor should provide the Environmental Action Plan (EAP) in line with the EMF, EMP and construction schedule.

#### *5.3.5.5 Institutional Arrangement*

133. The institutional arrangement describes the roles and responsibilities of the borrower, construction contractors, supervision consultants, stakeholders, third party monitoring and the Banks role for seamless implementation and supervision of the Environmental Management Plan.

## **6 SOCIAL MANAGEMENT & RESETTLEMENT POLICY FRAMEWORK (SMRPF)**

### **6.1 Objectives of SMRPF**

134. The 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 silos facilities in phases. The objectives 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.

135. To achieve the objectives, social management plans (SMP) will be prepared for each phase following the principles, guidelines and procedures outlined in this SMRPF and implemented before construction of civil works. The SMPs may include resettlement action plan (RAP) where private lands or public land from private uses are taken for sites.

### **6.2 Basic Planning Principles**

136. 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, DG-Food will select, design and implement all activities in accordance with the following principles:

(1) Prior to selection of specific site, DG-Food will undertake 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 key actors to influence project design and implementation.
- The persons, such as landowners, business owners, traders, embankment settlers (squatters on embankment) and the like, 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.

(2) Unless absolutely required, the project will avoid 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.

(3) DG-Food will avoid, to the extent feasible, project activities that will 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.).

(4) DG-Food will undertake 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.

(5) Special attention will be given 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.

(6) Special attention will be given 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.

### **6.3 Social Screening and Impact Assessment**

137. DG-Food will screen each site under each phase to identify potential safeguards compliance issues and social impacts associated with the construction of silos facilities, in order to determine applicability of the OP 4.12 and the required Social Management Plan (a screening format is provided in Annex 8). Where adverse impacts cannot be avoided entirely, DG-Food will select, design and implement the project in accordance with the following guidelines:

#### **6.3.1 Exclusion Criteria**

138. 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 will constitute criteria for the exclusion of silo sites from project finance:

- Require involuntary 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.).

#### **6.3.2 Social Impact Assessment Methodology**

139. Social impacts and risks including land acquisition, resettlement and other social impacts will primarily be identified during the initial social screening of silo sites. Once social impacts are noted, census of affected persons and assets will be conducted following the site boundary and where applicable land acquisition plan in compliance with the SMRPF guidelines. The affected persons and their communities will be consulted during the census survey to understand the risks and options and devising mitigation of social impacts. Land acquisition process will be initiated by DG-Food well

ahead of time so that assessment of social impacts and risks can be done for preparation and approval of RAPs before award of civil works contract and implementation of the same before displacement of people. The screening of social/resettlement impacts will be done using the format in Annex-8. Land acquisition proposal for respective sites will provide information on land and the census (by DG-Food) and joint verification (jointly by DC and DG-Food) will provide data on inventory of losses and risks recognized in the SMRPF.

140. Land acquisition plan will be prepared following the site boundary and the ownership of land (if not owned by the DG-Food/Ministry of Food). Land acquisition proposal for respective sites will provide information on land and the census (by DG-Food) and joint verification (jointly by DC and DG-Food) will provide data on inventory of losses and risks recognized in the SMRPF.

141. With this SMRPF in place, when sites for construction of silo facilities are determined, detailed social impact assessment (SIA) following the initial social screening, will be undertaken to identify all project beneficiaries, impacted people and other relevant stakeholders. The SIA will utilize 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 may be adopted.

- (a) The SIA will be carried out for the first phase and subsequent works packages in accordance with the civil works time table.
- (b) Community/stakeholder consultations at locations with habitations and documentation of such consultation.
- (c) Focus group discussions with beneficiaries, key affected persons and their community.
- (d) Census and socioeconomic survey among the project affected households.
- (e) Assimilation and analysis of data and information to address key issues following SMRPF.
- (f) The information gathered shall be recorded on strip maps and computerized, and photography/ video-graph will be used to document existing structures and land holding and other impacts in the corridor of impact.
- (g) Update the final alignment on the Mouza maps and finalize the land acquisition plans.
- (h) All data will be disaggregated by gender, age and ethnicity where necessary. A gender analysis will also be undertaken.

142. Deputy Commissioner at respective districts, where a site will involve land acquisition, will 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 will 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.

## **6.4 Social Management and Resettlement Policy**

### **6.4.1 Social Inclusion and Equity Management**

143. The project includes provision of household silo bins for grain/seed storage at family level to meet emergencies and needs at post disaster situations in the surge-prone areas of the coastal zone in the country. The project would make this Silo bins available at a discounted price to households in the

coastal zone including landless, small and marginal farmers, socially excluded groups, and religious and ethnic minorities. The project is expected to ensure their food security, nutritional status and general welfare through improved storage and safe stock of food grains and seeds to withstand the shock of disasters. It was understood at the community consultation meeting that farmers preserve own seeds and also purchase seeds from the neighboring farmers at low cost. Cost of farm inputs will be higher when they are forced to purchase imported seeds due to disaster or any other form of calamities.

144. All the poor and vulnerable families will be in the need of food grain stock and those having farm lands under their cultivation will need safe stock of seeds during disaster. The DG Food will contract in local NGOs for selection of beneficiaries of household silo bins. The NGOs will adopt all inclusive consultative process in carrying out surveys for identification of target group beneficiaries as per selection criteria given by the DG Food in agreement with communities. The selection procedure will first screen out those who are economically able to have safe grain/seed storage against shocks of disasters like cyclonic surges. The remaining households in the selected coastal villages will be classified into various groups for ethnicity, gender and age of household heads, farm size (own and rented in), storage needs for food grain and seeds and ability and willingness to pay the reduced price of silo bins.

145. DG Food will develop a strategy for distribution of the household silo bins in consultation with the target communities, local public administration and local government institutions. The contracted NGO will assist DG Food in development of inclusive distribution strategy. The selection criteria will be finalized through discussion with the beneficiary communities to avoid elite capture and exclusion of households with potential needs and willingness to pay. DG-Food will share the strategy with the Bank for review and concurrence before distribution of the household silo bins.

#### **6.4.2 Resettlement Policy Guidelines**

146. 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. As the legal framework falls short of the provisions of the World Bank OP 4.12 on Involuntary Resettlement, the project will 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 prices<sup>9</sup>. 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 awards<sup>10</sup>.
- *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.

## 6.5 Eligibility and Entitlements Policy

147. Under project resettlement policy framework, the affected persons and groups eligible for compensation and assistance will include: (i) owners with legal titles/agreements to the affected lands and other properties (tenants, share-croppers); (ii) squatters/encroachers<sup>11</sup> and others using public/khas lands; (iii) sponsors/beneficiaries of development programs using public/khas lands (e.g., social/community forestation and other land-based income generation programs for socioeconomically vulnerable groups); (iv) persons with usufruct rights; and (v) communities/groups where impacts are community-wide. Eligibility of project affected persons for compensation and assistance recognized under the project include the following:

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<sup>9</sup>According to the law, the 'market price' is calculated by averaging the sales prices recorded in the previous one year, in terms of land characteristics by land administration units or mouzas. But it is a widely accepted fact that prices determined as such hardly reflect the true market value of the lands. As the sale/acquisition prices are grossly under-reported to evade on sale taxes, assessment of legal compensation almost always fall far too short of the real market prices.

<sup>10</sup>In the present land administration system, which is widely accepted as antiquated, land transactions, especially in the rural areas, often remain incomplete. Even after the sale/purchase deeds are legally executed, the sellers continue to remain as owners in the legal records until mutations are completed. As the transaction process is cumbersome and involves costs beyond those mandated by the law, and the practice that lands can be used with the deeds alone, most land transactions do not follow the process beyond deed execution. Many land purchasers are even not aware of the mutation or its significance.

<sup>11</sup>Household or person occupying public lands without legal arrangements with the GoB or any of its concerned agencies is a squatter to the lands. Households/persons those displaced by riverbank erosion, cyclones or landlessness squat embankment slopes for residential, commercial and community purposes. In this project, many embankment squatters have their own land elsewhere inside the polder but they took refuge on the embankment during a natural disaster. Squatters having land of their own attached to the public land/embankment or elsewhere are defined as encroacher.

- a) Compensation for the acquired private lands, which includes homesteads, agricultural and other lands, including ponds and similar developments, will be paid at 'replacement costs' to be determined through market surveys.
- b) All affected non-land properties, such as houses and other structures, trees, seasonal and perennial crops, orchards and other immovable items of value will be compensated at replacement costs at the time of dispossession.
- c) Eligibility for compensation and assistance will be governed by Cut-Off Dates. These are the dates on which census of the affected persons and their assets will be taken. Assets such as houses/structures and others which are created, and the persons or groups claiming to be affected, after the cut-off dates will be ineligible for compensation.
- d) Where acquisition causes displacement from homesteads where the affected persons may or may not have title to the land, the project will encourage, compensate for and assist with self-relocation. Where self-relocation is infeasible, the project will arrange for lands to relocate to, and provide for basic social and physical infrastructure.
- e) Where project interventions cause to displace squatters on the executing agency's own land (DG-Food's land), compensation will be provided for any physical assets (structure, trees, crops, & perennials) on the land owned by them.
- f) Assets like equipment, machinery and parts/components thereof which can be dismantled and moved away, will not be eligible for compensation. But the owners will be paid a reasonable amount to cover the dismantling and moving costs.
- g) Owners of the affected businesses will be compensated for temporary loss of income for a reasonable period of time. However, if a business, which is recorded in the census, closes down or moves away for reasons unrelated to the project, it will not be eligible for this compensation.
- h) Employees of the affected businesses will be compensated for temporary loss of income for a reasonable period of time. However, an employee, who is recorded in the census to be employed with a business, will not be eligible for this compensation if (i) the person leaves the business because of personal reasons, or (ii) if the employee is a minor member of the business owner's household and helps him/her on a part-time basis, or (iii) the business closes down or moves away for reasons unrelated to the project.
- i) Compensations/entitlements due to the PAPs will be paid in full before they are evicted from the acquired private and public lands.
- j) The project will identify and implement policies to mitigate any adverse impacts that are unique to the project and have so far remained unknown.

148. The eligibility and entitlement matrixes under the provisions of national law (ARIPO 1982) and the Bank policy on Involuntary Resettlement (OP 4.12) are given at Annex-9.

## **6.6 Preparation of SMP/RAP**

149. The results of the census, socioeconomic survey and community consultation will be decisive element in selection of the design, size and location of the sites. Once the sites are selected and boundaries finalized, inventory of assets and PAP census will be carried out to identify the impacts for

mitigation measures in line with the SMRPF. Resettlement Action Plan (RAP) will be prepared for each phase having any site requiring land acquisition and/or population displacement using the data from the SIA and consultation with PAPs and all other relevant stakeholders. In case the sites for silos facilities under a phase of civil works construction affect less than 200 people an abbreviated RAP may be prepared. Contents of a RAP or an Abbreviated RAP will include the following:

Contents of RAP

- Brief description of the improvement and rehabilitation works undertaken on the individual site (or contract in cases of multiple contracts) with location of major impact spots, .;
- Results of census survey and summary of impact details (PAP/household level raw data will be computerized to prepare the entitlement files);
- An account of the alternatives considered to avoid and/or minimize the adverse impacts;
- An account of the consultations with the affected persons/households about the mitigation measures and implementation procedure;
- Specific compensation rates and standard of entitlements and entitled persons/households for different types of losses as per the principles and guidelines adopted in this SMRPF;
- An account of impacts by gender and vulnerability due to site development and construction of silo facilities in each phase and the special assistance that is to be provided;
- Description of resettlement sites and programs for improvement or restoration of livelihoods and standards of living;
- Grievance redress mechanism;
- Resettlement budget with breakdowns by loss categories and the number of persons entitled to compensation/assistance, and a RAP implementation schedule; and
- Monitoring and evaluation.

Contents of abbreviated RAP

- Documentation of the private and public lands, including DG-Food's own, required for the civil works in each phase, a census survey of affected persons, and valuation of the affected assets;
- Description of compensation and other resettlement assistance that will be provided according to the principles and guidelines adopted in this SMRPF;
- An account of the consultations with the displaced persons/households about acceptable alternatives;
- Grievance redress mechanism;
- A resettlement budget with breakdowns by loss categories and the number of persons entitled to compensation/assistance, and an Abbreviated RAP implementation schedule;
- Monitoring and evaluation.

150. DG-Food will prepare and submit to the Bank for safeguards review, clearance and public disclosure of SIA including RAP for each phase of civil works program. A social screening report will be prepared for all specific sites based on the SMRPF. All project' SIA and RAP will be disclosed locally and in Bank Info Shop in due course for finalization of the documents before award of civil works contracts.

## **6.7 SMP Implementation and Monitoring Arrangement**

151. The Project Management Unit (PMU) in DG-Food's office will include a Senior Social Specialist and Senior Communication Specialist for community engagement, social screening of silo sites and preparation and implementation of social management plans. The Project Director, with assistance from the Senior Social Specialist, will carry out the following specific tasks related to land acquisition and resettlement, where applicable: (i) liaison with district administration to support land acquisition; (ii) day-to-day management, supervision, monitoring of resettlement work; (iii) ensure timely availability of budget for all activities; (iv) synchronize resettlement activity and handover land as per the construction schedule; (v) initiate to form necessary participatory bodies including Property Assessment and Valuation Committee (PAVC) for assessment and valuation of affected assets. A grievance redress mechanism (GRM) will be available for the communities and affected persons to address their complaints related to resettlement and quality of construction and provide suggestions on implementation (as described in section 9.8).

152. The first phase construction will not involve any land acquisition or population displacement. Given that there is likelihood of land acquisition and population displacement in some of the sites for construction of silos facilities in subsequent project phases, DG-Food has kept a provision for land acquisition, resettlement and other social mitigation measures for the project. An estimated amount BDT 172.40 million has been proposed for land acquisition and resettlement measures and implementation of SMPs including any RAP. All funds for land acquisition, resettlement and social actions will be provided from counterpart financing from the Government of Bangladesh.

153. The local level staff of DG-Food will be provided with capacity building training on social safeguards compliance as per Bank policy on Involuntary Resettlement (OP 4.12).

154. The PMU, DG-Food will carry out monitoring of community engagement, social impact assessment, land acquisition (if any), and preparation and implementation of any RAP with assistance from the Senior Social Specialist and the local level staff. The activities on social management will be included in the project progress reports, will be reviewed under third party monitoring also at periodic Bank missions.

## **SECTION C: ENVIRONMENTAL AND SOCIAL ASSESSMENT (ESA)**

## 7 BASELINE STUDY OF THE PROPOSED SITE

### 7.1 Project Locations and Sites

155. Locating the storage and logistics is extremely important to minimize cost, causing minimum environmental disturbance, losses, to reach target beneficiaries and to ensure effective and timely distribution. Use of food stocks in the case of emergencies and disasters would require that distribution can be done promptly, leaving more time available for transporting or for restocking. In order to locate the public silos at the best location considering, logistics, availability of rice, distribution and constructability, etc., several sites were examined all over Bangladesh. Out of these sites detailed site analysis was carried out in the 8 potential sites listed in Table 7.1. The locations of the possible sites are shown in Figure 7.1.

**Table 7-1 Potential Sites for Modern Silo Facilities**

No.	Site	Bin Size (Feet)	Number of Bins	Capacity (Tons)
1.	Barisal	60 D X 40 H	16	50,000
2.	Narayanganj Central Supply Depot (CSD)	60 D X 40 H	16	50,000
3.	Dhaka CSD	60 D X 40 H	19	57,000
4.	Ashuganj	60 D X 40 H	33	100,000
5.	Mymensingh	60 D X 40 H	16	50,000
6.	Maheswarpasha (Wheat)	90 D X 78 H	6	76,200
7.	Chittagong (Wheat)	90 D X 78 H	9	114,300
8.	Madhupur	60 D X 40 H	24	72,000
	<b>Sub-Total</b>		<b>139</b>	<b>569,500</b>

Source: Draft Feasibility Report, BMFSP, September 2012

156. About 569,500 tons of modern grains storage capacity would be constructed on 8 sites under the first phase. Two sites are expected to be for wheat storage or paddy storage-- Maheswarpasha and Chittagong-- and the remaining six would be for milled rice.

157. Annex 3,1 to 3.8 presents the environmental screening checklist.

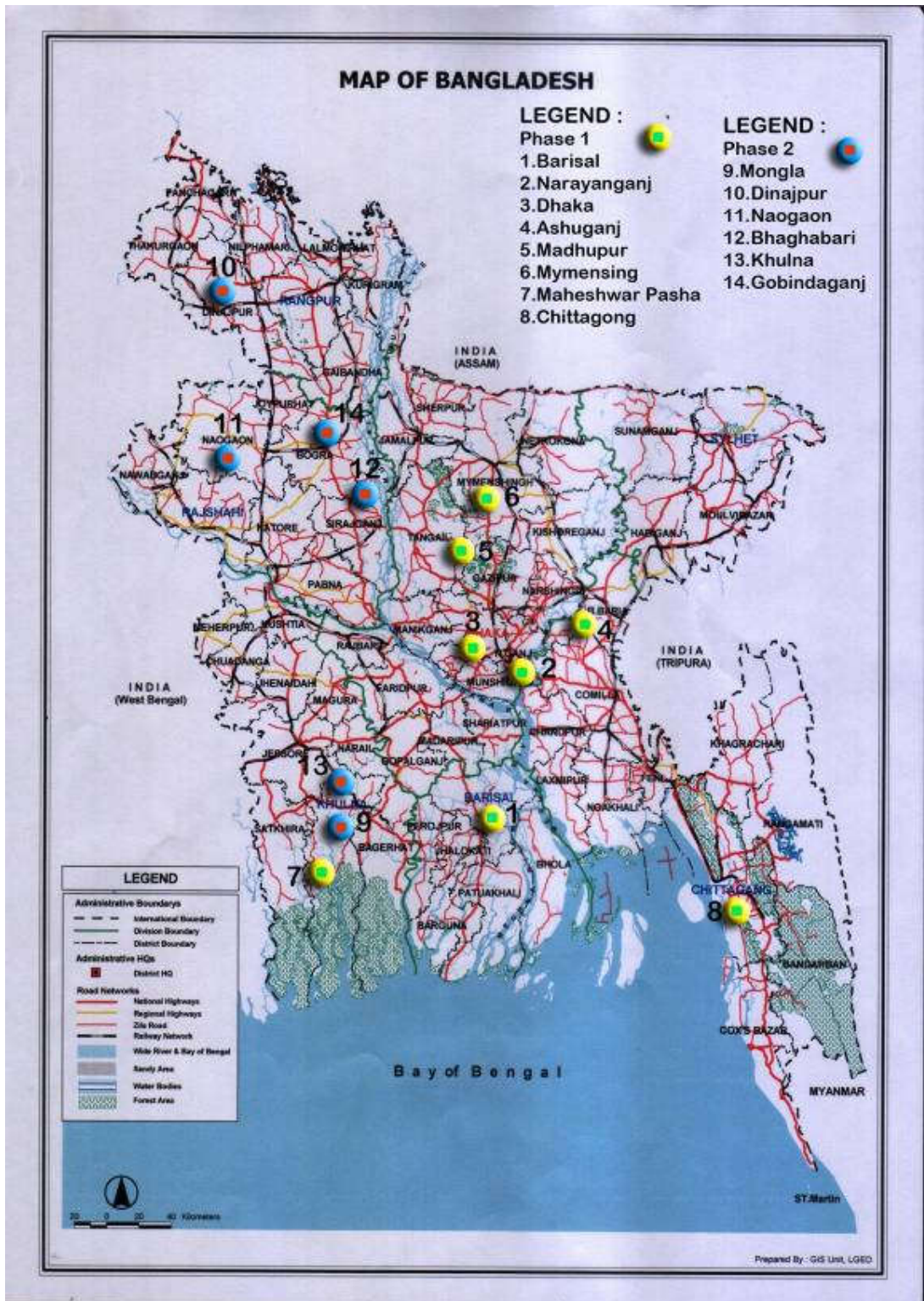


Figure 7-1 Map Showing Possible Silo Locations

## 7.2 Environmental Aspect of Barisal CSD Campus Silo Site

### 7.2.1 Site Description

158. The proposed Barisal CSD Campus Silo Site belongs to the Barisal Division of Bangladesh, constituting the south central coastal area of the country. The location of the Barisal CSD is well known as “Trish Godown” for having its 30 go-downs in it. It is about 2 km away from the city center near the Barisal Medical College and attached to the Armed Police Battalion Center. The site is located at a distance of about 300 km from Dhaka in the city corporation area of Barisal City. The CSD area is situated in tidal (high & low tide) area but it is free from usual flood or high tide level. The whole CSD area is surrounded by private land owners housing in the southern side, government offices (e.g. Bangladesh police) on the northern side, the Kirtonkhola River on the eastern side and South Alekhanda road on the western side. The total CSD area is divided into two parts, one is surrounded by a boundary wall and the remaining part is an open land constituted mostly by a water-filled low lying area and a connecting road. A Martyr monument is also situated near the bank of Kirtonkhola adjacent to the CSD jetty. A freedom-fighter’s grave is also situated along the road leading towards the river. The site location is shown in Figure 7.2.



Figure 7-2 Location of Barisal CSD Site

### 7.2.2 Physiography, Geology & Topography

159. The subproject area falls within active Ganges Flood Plain area of southern region of Bangladesh. The CSD site 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 acre 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 and a shallow marshy land ( in total 3.78 hectares/ 9.34 acre) and other marginal lands. The location of the site is at the coordinate of N22°40'50'' and E90°21'41''. The pontoon of the CSD is very close to the place. This rectangular open area is targeted to be used as the construction of Food Grain Silo. The soil of proposed site was found to be alluvial in nature.

160. The natural drainage pattern is from the low-lying/ditch land towards the Kirtonkhola River within the CSD premise area, which is connected to a concrete pipe. The overall topography is flat in the sub-project area.

161. The marshy land at the proposed site was created as a result of taking off soil from the area for different uses inside the surrounded go-down area. When water penetrates from the river during the high tide to this land through a concrete drain, it looks like a pond; but it is not pond from any technical aspect. At least 0.3m depth of water always logged at that area (about 120m X 180m). This particular area may have been designated for construction of a modern steel silo storage facility with for long term storage of food grains.

### 7.2.3 Existing Structure

162. The existing CSD campus has a total of 28 go-downs for food grain storage. The two salt go-downs are in a dilapidated condition. 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.

**Table 7-2 Summary of Barisal CSD**

<b>CSD area</b>	10.55 hectares	26.08 acres
<b>Covered with go-downs</b>	5.3 hectares	13.08 acres Inside boundary walls
<b>Open area (contiguous)</b>	5.26 hectares	13.0 acres
<b>Contiguous area</b>	3.78 hectares	9.34 acres
<b>Existing Structures</b>		
Total Godowns	28	7 recently repaired
Storage capacity	22,700 tons	
Residential units	9	

### 7.2.4 Transportation Link

163. There are interior roads and also a link road (6m width) from the Kirtonkhola River up to the entry of the surrounded campus. At the river bank, there are two jetties (one big and one small) and one pontoon owned by the BIWTA.

164. 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. The example of traffic data from this survey is presented in the Annex 2.1

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

165. The sources of power supply are western zone electric power supply. 11KV transformer was seen at gate of Barisal 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.

### 7.2.6 Status of Food Production in Barisal

166. The Division is comparatively a new one, created by dividing former Khulna Division in to Khulna and Barisal Divisions. The Division is subdivided into 06 districts (Zilas) and thence into 39 upazila (sub-districts) level administrative areas are 353 Union Parishad (Union Council). At the bottom level, there are 4,273 villages. The Division has an estimated population of 8,147,000 as per 2011 Population Census. Barisal Division's population has increased by only 9% in the last 20 years compared to 34% overall population growth for Bangladesh in the same period. This low rate of growth has much to do with the abandonment of rice farming in many areas due to soil Salinization, and continued outward migration to Dhaka, other large cities and abroad for employment opportunities.

#### Rice

167. Rice production is at around 2 million tons per year for the last five years. Salinization is an issue in Barisal. However, these production losses have been offset to some extent by introduction of new varieties that have increased yields on the remaining land. If there is continued success with development of new varieties, particularly those resistant to saline soils and flooding, Barisal has the potential to regain its status as a zone of surplus production.

**Table 7-3 Barisal Division - Paddy Rice Production (MT)**

Crop Year	Boro	Aman	Total
2007-08	489,754	1,421,891	1,911,645
2008-09	573,693	1,457,809	2,031,502
2009-10	607,458	1,452,600	2,060,058
2010-11	581,554	1,591,387	2,172,941
2011-12	597,390	1,375,908	1,973,298

Source: Regional Controller of Food, Barisal

#### Rice milling

168. There are now 42 rice mills in Barisal Division according to the DGF Divisional Controller. Of these the Food Department contracts with 18 for the milling of paddy which it buys locally. There are 11 husking mills and 9 semi-automated mills in the district according to a Food Department Report 2006.

#### Wheat milling

169. There are four wheat flour mills in Barisal city. These are the only wheat mills in the entire division. All four mills produce atta flour for the Food Department. Flour is distributed by FD only in Barisal city.

### 7.2.7 Seismicity

170. Bangladesh itself is divided into three seismic zones, based on the ranges of the seismic coefficient. 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. Zone 3 is in the most seismically active area with a seismic coefficient on 0.25, and Zone 1 is the least active with a significantly lower seismic coefficient of 0.075. The subproject area, Barisal CSD, is located in Zone 1, the least vulnerable to earthquake disaster.

### 7.2.8 Hydrology and drainage

171. Water usually accumulates up to 0.5m (average) in the low land area/ditch during monsoon. The location of the proposed silo is situated in the tidal zone but tidal water is 0.3m below the bank of the river. Existing CSD food grain storage facilities have 28 godowns which are well protected from flood and constructed on high land (sand fill). The new proposed silo construction site is mainly on ditch land and connected with natural drainage system by CC pipe drain. Therefore, when tidy water enters from the river to the ditch land, fish and flora species migrate to the site from the river through this connectivity and moves with the flow of tidal water. The groundwater depth is **0.5 m** below the existing ground.

172. There is no sewerage and drainage system. Natural drainage system was found.

### 7.2.9 Air quality

173. 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. Air quality was measured under this project. The samples were collected at the boundary of the north and south side of the site. The present condition of the air quality is presented in Table 7.4. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-4 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
09/12/12	North end	8 hours	265	675	27	38
09/12/12	South end	8 hours	235	625	35	44
<b>Bangladesh Standard for Industrial &amp; Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.2.10 Water quality of the nearby river

174. The CSD area is located near the bank of Kirtonkhola River and in order to test the quality of the water of the river, water samples were collected from one sampling points in the Kirtonkhola River near the proposed site. The present situation of the water quality is presented in the following Table. The samples were collected on 09 December, 2012

**Table 7-5 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	22.3	20-30	Ok
Turbidity	NTU	10	<10	Not ok
Color	TCU	18	<15	Not ok
pH	--	6.8	6.5-8.5	Ok
TDS	mg/l	650	<1000	Ok
DO	mg/l	7.2	>5	Ok
BOD	mg/l	3.2	<6	Ok
Fe	mg/l	0.2	0.3-1	Ok
Zn	mg/l	2.5	5	Ok
Al	mg/l	0.1	0.2	Ok

### 7.2.11 Noise quality

175. Noise pollution in the subproject area occurs mainly from the movement of heavy trucks/vehicles that carry food grains to and from the CSD. It is found from the initial screening that the place is very calm. The construction work may create noise pollution. For the baseline environmental data, noise levels were measured at the center of the sub project area which is presented at the following Table 7.5.

**Table 7-6 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
09/12/12	Centre of the CSD	9:00 am	45	42
		9:30 am	48	44
		10:00 am	42	40
		10:30 am	48	45
		11:00 am	40	36
		11:30 am	38	34
		1:00 pm	35	32
		1:30 pm	38	34
		2:00 pm	32	30
		2:30 pm	36	32
		3:00 pm	38	36
		3:30 pm	35	32
Bangladesh standard: 70dBA				

### 7.2.12 Monument/Memorial Structure

176. During the 1971 Liberation War the occupation army and their local collaborators made their camp in this campus. They reportedly killed here many such people here, in memory of whom a monument was constructed by the Government at one side of the river bank. Since operations of the CSD, particularly by river transport are currently minimal; many unauthorized people loiter here neglecting the sign indicating the place as a restricted area. Recently, the Barisal City Corporation has constructed a road across the unused CSD land, outside the boundary wall. This road is used publicly. The monument is shown below:



Figure 7-3 Martyr Monument

### 7.2.13 Terrestrial ecology

177. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the CSD premise and in open spaces. The tree species within the CSD area include: banana (*Musa sapientum*), mahogany (*Swieteniamahogoni*), banyan tree (*F. religiosa*), coconut (*Cosos nucifera*), betel nut (*Areca catechu*), jackfruit (*Artocarpus heterophyllus*) etc. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopuscompressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazizanioides*, etc.). In total, there are **100 of the above tree species** can be found in this sub-project area but due to construction of silos, **69 trees** including mahogany will be affected directly.

178. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, dove, cuckoo, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.2.14 Fisheries

179. The ditch situated in the sub-project area may have some wild fish like puti, tengra, carp, koi, taki, bain etc. Since this ditch is connected with a concrete pipe with the Kirtonkhola River to facilitate drainage of the CSD premise, the fish always move in and out from the river with the tidal flow.

### 7.2.15 Cyclones and flooding

180. Barisal Division constitutes the Middle Coastal Zone of the country and along with the other coastal zones is highly vulnerable to cyclones originating in the Bay of Bengal during the months either preceding or following the summer monsoons. Since 1960 about 28 events categorized by the Bangladesh Meteorological Department as either “severe cyclonic storm” or “cyclonic storm” have occurred.

181. On November 15, 2007 the Khulna – Barisal coastal area was struck by SIDR, a “severe cyclonic storm with core of hurricane winds”. Atmospheric pressure was recorded at 942 mbs. The highest wind speed was 223 km per hour. The tidal surge reached 5m to 7m (15 ft – 20 ft). Loss of life from this event is reported at 3447, and the livelihoods of millions of people were affected.

182. In late May 2009 Cyclone Ayla, also category 1, struck the same coastal zone bringing another storm surge of 7 m (20 feet). While loss of life was not high, press reports indicated that 2 million to 3 million persons were affected.

183. The site is not affected by flood water. The proposed site is located on the western bank of the river Kirtonkhola. The highest tidal water level is 1ft below the top of the river bank.

## 7.3 Environmental Aspect of Narayanganj CSD Campus Silo Site

### 7.3.1 Site Description

184. The proposed Narayanganj CSD Campus Silo site administratively belongs to Dhaka Division of Bangladesh. It stands on the bank of Shitalakshya River connected to the Meghna and the Padma River. The river port of Narayanganj is one of the oldest in Bangladesh. It is also a center of business and industry, especially the jute trade and processing plants, and the textile sector of the country. Narayanganj District is bounded by Gazipur and Narshingdi Districts on the north, Brahmanbaria and Comilla Districts on the east, Munshiganj District on the south, and Dhaka District on the west. Geologically, the area lies on the edge of the Madhupur Tract and Holocene floodplain deposits from the aquifer. The total area of the district is 759.57 km<sup>2</sup>, of which 48.56 km<sup>2</sup> is reverie and 0.60 km<sup>2</sup> is under forest. The district lies between 23°33' and 23°57' north latitude and between 90°26' and 90°45' east longitude. The population of the District is 2.9million with density of 3,800<sup>12</sup> per sq km. The site location is shown in the figure below.



Figure 7-4 Location of Narayanganj CSD Site

185. The city of Narayanganj has a population of 1.5 million and is located some twenty kilometers southeast of Dhaka, on the flat Ganges Delta and alluvial plain. The Shitalakshya River divides the town into two parts, the Narayanganj Municipal Area and Kadam Rasul Municipal Area. Our CSD lies in Kadam Rasul Municipal Area, on the other side of the river.

<sup>12</sup> Source: Wikipedia, Narayanganj

### 7.3.2 Physiography, Geology & Topography

186. The subproject area located at the edge of the Madhupur tract at the bank of the Shitalakshya River. The Soil condition of the proposed site is clayey in nature. The total CSD area is about 17.1 acre land falls under mostly flat and ditch land. There is no agricultural land or forest area in its premise. A large area is located outside the boundary wall of the CSD, which was constructed basically as a flood protection wall. There are two ponds inside the campus and a big ditch outside the boundary wall. All other areas, excepting some by the side of the river bank are raised land. There is a big vacant area outside the protection wall and between the wall and the river bank.

187. The road from the jetty passed through the middle of this vacant land. The land to the left side of the divider road (about 100 meterx100 meter) road is completely vacant and currently used as a play ground. The land to the right side has some trees primarily planted to continue the possession of the CSD authority. The whole combined land, adjacent to the river bank may be used for constructing a rice silo and other facilities for long term storage.

188. The subproject location is situated at the north-east side of kalirbazar, kadam Rasulpur; west side is Shitalakshya River. The natural drainage pattern is from the CSD premise area towards the Shitalakshya River through soils. The soil condition of the proposed site is clay in nature. The overall topography is rather flat in the whole sub-project area.

### 7.3.3 Existing Structure

189. Out of the 17.1 acre of the total CSD campus area, less than a half (about 6.0 acre to the eastern side is surrounded by the food storage facilities and the ancillary structures. The remaining area (about 11.1 acre) is vacant and outside the boundary wall. Out of the vacant area about one third is a ditch and rest is a filled in plain surface high land above the flood level. This area is recommended for construction of the steel silo for storage of 50,000 mt rice.

190. The whole CSD area is surrounded by private land and structures on north and south sides. The Madanpur-Madanganj road passes by the eastern side of the CASD campus and the river Shitalakshya flows by the western side of the campus.

191. The existing CSD campus has a total of 35 go-downs for food grain storage. Of those 18 godowns are usable. The campus has two apartment buildings of 48 units in total, two houses for management staff, a mosque and a guardroom. The summary of Narayanganj CSD area is presented in Table 7.7

**Table 7-7 Summary of Narayanganj CSD**

<b>CSD area</b>	17.0966 acres	Divided in to two parts
<b>Covered with go-downs</b>	About 6.00 acres	Inside boundary walls
<b>Open area (contiguous)</b>	About 11.1 acres	Outside boundary walls
<b>Contiguous area</b>	About 1.0 acres	Ditch area- to be developed
<b>Existing Structures</b>		
Total Godowns	35	18 are now usable
Total godowns	20,630 mt (of all 35 godowns)	17 godowns are not usable any more.
Storage capacity	9,000 mt now	Many unusable ones are currently in dilapidated

		condition and under a process of demolition
Useable capacity	48 units in 02 apartment buildings	Two more houses for management staff
Residential units	Mosque, guard rooms, Jetty at the river bank	The ditch land remains unprotected without effective demarcation lines.

### 7.3.4 Transportation Link

192. **Interior roads:** A public road runs from the north-south towards the river bank in the CSD's own land at the right lane. But this was separated by a wall for the CSD campus. But it goes up to the half way. For construction of the new silo in the vacant land, the wall will have to be extended up to the river bank. Another walk way is there from the Jetty of the CSD to the CSD exit way, but it is a way only for the CSD Staff including workers who carry the food grains to the godowns or godown to the jetty.

193. **River:** The Narayanganj CSD Campus site is well facilitated for river transport. There is a medium size Jetty and a pontoon owned by the CSD on the river bank. In addition there are two more approach ghats by the two sides of the jetty for use by the small river transports. There are many industries like cement factory, oil refinery, salt refinery, etc in upstream of the river. Small and medium lighters/barges up to the capacity of 2000 mt are found in using the river all the seasons.

194. **Rail:** Previously there was a railway connection with Narayanganj from Narshingdi and from there to Chittagong/Dhaka. This was extended up to the CSD campus for food grain transportation. Finding the rail link uneconomic, the authority uprooted the rail connection and transformed it into road.

195. **Road** The existing roads are not very much in good road condition to the site. The roads pass through highly densely populated areas. However, there is no restrictions on movements of trucks from or to outside road network.

196. The lane width of the road outside of the CSD that connects the branch of Dhaka-Chittagong highway is 4.5 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, when the traffic volume was expected to be high. The identified peak rate of traffic flow was 224 vehicles/hour, where 10% of them are trucks. The example of traffic data from this survey is presented in the Annex 4.

### 7.3.5 Utility (Power, Gas, Water) Supply at the Site

197. The power supply to the Narayanganj CSD is ensured through the national grid under the Power Development Board with 440V, 3 phase, 50Hz overhead line. Frequent power cuts have been a continuous problem for the CSD. Gas line is available there. Deep tube-well is the sources of water supply for CSD's staff.

### 7.3.6 Status of Food Supply in Narayanganj

#### Rice supply and distribution

198. The sources of rice supply for distribution was the local procurement particularly from the middle and northern districts of the Division and trans-loaded at Baghabari ghat in barges for delivery to Narayanganj silo and other storage facilities. In addition, rice import from outside countries is supplied through the food storage facilities (including Narayanganj silo, Dhaka and Narayanganj

CSDs) in the Division. These facilities together with other CSDs and LSDs distributed the rice for use under monetized schemes including essential priorities (e.g. Army, police, RAB, Ansar-VDP), other priorities (e.g. fire service, prisoners and Open Market Sale – OMS for price stabilization) and non-monetized schemes under varied food safety programmes like Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD), Test Relief, Food for Works FFW), etc

**Rice milling**

199. Dhaka and North zone is one of them that has about 1500 (37%) rice mills. Narayanganj district that includes one of the probable steel silo site area, is included in this zone. For local procurement of rice by the Food Department (FD) offices, required number of rice mills are engaged on competitive basis for milling paddy for producing rice and supply it to the relevant FD office. The same practice is also being followed in Narayanganj district. Mir Kadam is a hub of more than 200 big and medium size rice mills in the nearby Munshiganj district, just on the other side of the proposed steel silo site in the Narayanganj CSD campus.

**Wheat Milling**

200. Narayanganj is also a hub of about 100 big and small flour mills. In the absence of operation of FD’s own mill, out of the private sector mills, 285 have been enlisted with the FD for wheat milling. Required number of enlisted mills is selected on competitive basis for producing the atta for the FD in lieu of wheat allocated to them. The mills in and around the city of wheat allocation gives back to the FD 77 % of the allocated wheat as atta and the mills located outside this area gives back 70% as atta (because of higher transport cost).

**7.3.7 Seismicity**

201. Narayanganj CSD, is located in Zone 2 is the medium vulnerable to earthquake disaster.

**7.3.8 Hydrology and drainage**

202. Water usually accumulates in the ponds inside the compound and natural flow towards the river. Existing CSD food grain storage facilities are well protected from flood and constructed on paved high land. Deep tube-well is the sources of water supply for CSD’s staff. The groundwater depth is 0.5m below the existing ground level.

203. Soak well & septic tank is used as sewerage system natural slope are working as drainage system.

**7.3.9 Air quality**

204. 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 samples collection points are located at the ¼ th and ¾ th crossed points of the centerlines of the proposed site. The present condition of the air quality is presented in Table 7.8. 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 for the industrial and mixed.

**Table 7-8 Air Quality Monitoring Data**

<b>Date dd/mm/yy</b>	<b>Sampling point</b>	<b>Duration</b>	<b>SPM µg/m<sup>3</sup></b>	<b>CO µg/m<sup>3</sup></b>	<b>SOx µg/m<sup>3</sup></b>	<b>NOx µg/m<sup>3</sup></b>
05/12/12	¼ th CL	8 hours	185	380	21	36

05/12/12	¼ th CL	8 hours	172	355	24	41
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.3.10 Water quality of the nearby river

205. The CSD area is located near the bank of Shitalakshya River and in order to test the quality of the water of the river, water samples were collected from one sampling points in the Shitalakshya River near the proposed site. The present situation of the water quality is presented in the following Table. The samples were collected on 05 December, 2012

**Table 7-9 Water Quality Monitoring Data**

Parameter	Unit	Test value of the	Bangladesh	Remark
Temperature	°C	25	20-30	Ok
Turbidity	NTU	26	<10	Not ok
Color	TCU	24	<15	Not ok
pH	--	7.1	6.5-8.5	Ok
TDS	mg/l	1750	<1000	Not ok
DO	mg/l	6.5	>5	Ok
BOD	mg/l	4.8	<6	Ok
Fe	mg/l	0.2	0.3-1	Ok
Zn	mg/l	2.5	5	Ok
Al	mg/l	0.1	0.2	Ok

### 7.3.11 Noise quality

206. Noise pollution in the subproject area occurs mainly from the movement of heavy trucks/vehicles that carry food grains to and from the CSD. The construction work may create noise pollution. For the baseline environmental data, noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-10 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
06/12/12	Centre of the area	9:00 am	21	28
		9:30 am	24	26
		10:00 am	35	37
		10:30 am	26	32
		11:00 am	35	38
		11:30 am	38	42
		1:00 pm	45	45
		1:30 pm	36	40
		2:00 pm	28	35
		2:30 pm	26	28
		3:00 pm	35	38
		3:30 pm	26	30
Bangladesh standard: 70dBA				

### 7.3.12 Terrestrial ecology

207. The tree species within the CSD area include: banana (*Musa sapientum*), mahogany (*Swieteniamahogoni*), mango tree (*M. indica*) etc. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopuscompressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazizanioides*, etc.). In total, there are 100 of the above species can be found in this sub-project area but due to constructing silos at the open land, very few trees may be affected directly.

208. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, doel, shalik, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.3.13 Fisheries

209. The ponds situated in the sub-project area should have some natural fishes like puti, tengra, boal, carp, koi, taki, bain etc. But, these ponds are located near the existing residential area and are expected not to be affected, if the silos are constructed in the designated open field and inside the boundary CSD premise.

### 7.3.14 Cyclones and flooding

210. Dhaka Division constitutes the northern high land, haors and rivers in the eastern side and riverine south west flood prone areas covering several districts. The rivers, their erosion, seasonal cyclones damage the assets, property and crops creating sufferings of the rural people pushing them down to the poverty line. Severe cyclones or tornados are not frequent in this region. But localized areas like Demra, Manikganj, Faridpur Narayanganj and Gazipur experienced devastating cyclones at least once in a decade causing loss of property and lives. Highest flood water level was two feet above the internal road level in 1998.

## 7.4 Environmental Aspect of Dhaka CSD Campus Silo Site

### 7.4.1 Site Description

211. The Public Food Distribution System (PFDS) was introduced by the British rulers in the undivided Indian sub-continent for storage and distribution food materials, especially grains. Bangladesh after its independence inherited the system and the Dhaka Central Storage Depot (CSD) is such an old establishment of the Food Department of the Government of Bangladesh that has been catering to the needs of food storage and distribution under various food related government programmes in the city of Dhaka and around. The Dhaka CSD is located at the Mill Barrack area by the side of the river Buriganga under Gandaria thana of the Dhaka Metropolitan city in Dhaka district. It is one of the oldest CSDs situated just by the side of the left bank of the river Buriganga. The location of the site is at the coordinate of N23°41'49'' and E90°25'10''. The CSD campus is surrounded by a security wall though its condition is very poor showing the symptoms of very less maintenance. Being located by the side of the river, previously its river way connection was used largely for which a jetty was constructed connecting the river with the CSD for taking in and delivery of the grains from the CSD. Siltation of the river, low flow of water and construction of a number of bridges across the river for improving land transportation with the Dhaka city have restricted the river transport of the food grains to and from the CSD overtime. The location of Dhaka CSD is shown in figure below.



Figure 7-5 Location of Dhaka CSD Site

212. Dhaka CSD Campus is a very strategic and potential location. It has the tremendous need for meeting the food needs of the distressed people in the Dhaka city slums, dwellers of which are the migrated poor people who left their original village homes after being affected by river erosion, flood and landlessness. Hence, current CSD campus occupied by the old dilapidated godowns having poor effective capacity may be demolished and utilized for construction of a steel silo for rice storage.

213. The site is situated within the area of the Sutrapur thana of the metropolitan area and the river Buriganga flows just by the southern side of the depot. The road and the main entry to the site are at

the north side. From two other sides, the CSD is surrounded by private establishments. The whole site is designated by the Government as a restricted area, prohibiting entry and stay of the general public.

#### **7.4.2 Physiography, Geology & Topography**

214. The proposed site falls at the northern boundary of active Ganges Flood Plain area of Bangladesh. The sub-project site is located at the bank of the Buriganga River. The total CSD area is around 4 acres land falls under mostly flat and high paved-land. There is no agricultural land or forest area in its premise. Soil of proposed site is found to be clayey in nature.

215. The road from the jetty passed through the middle of this vacant land. The land to the left side of the divider road (about 100 meterx100 meter) road is completely vacant and currently used as a play ground. The land to the right side has some trees primarily planted to continue the possession of the CSD authority. The whole combined land, adjacent to the river bank may be used for constructing a rice silo and other facilities for long term storage.

216. The subproject location is situated at the north-east side of kalirbazar, kadam Rasulpur; west side is Shitalakshya River. The natural drainage pattern is from the CSD premise area towards the Shitalakshya River through soils. The soil condition of the proposed site is clay in nature. The overall topography is rather flat in the whole sub-project area.

#### **7.4.3 Existing Structure**

217. The size of the CSD campus is 4 acre. The campus has 15 (fifteen) almost similar tin-shed godowns with pucca floor and walls. The structures are constructed in the campus in two rows. Physical condition of all of them is very poor. At least two godowns are not usable at all because of the damage of roof, wall and floor. Another 5 to 6 godowns are being used for food storage after partial repair. But since the joints of the old-day tin sheets could not be repaired, polythene sheets are used on the grain bags to protect them from rain water. The remaining ones also have various types of problems that need to be addressed soon.

218. As the godowns are tin-sheds, food grains are heated very much during the summer time. Since tins of roofs in many cases are perforated, water leaks in to the godowns during the rainy season causing damage of grains and walls, and creating holes in the floor. A protection wall has been erected by the side of the river bank road to protect the godowns from on rush of flood water that was experienced in 1988. Temporary protection walls also have been made in several entry points to the godowns also for protection purpose.

219. At the corner of the road connecting the jetty, a Pneumatic Unloading Plant (PUP) known as a small silo of the capacity of 200 MT was constructed to ease the loading system. But much earlier it went out of operation and now exists as a dilapidated structure, not fit for any use.

220. The CSD exists in its location in an engulfed situation surrounded by privately owned structures leaving no scope for any sort of horizontal expansion. The summary of Dhaka CSD area is presented in Table 7.11.

**Table 7-11 Summary of Dhaka CSD**

<b>CSD area</b>	04.00 acres	Surrounded by protection wall
<b>Covered with go-downs</b>	More than 3.0 acres	The rest is covered by ancillary structures
<b>Open area (contiguous)</b>	Almost nil	Office and weighing bridge are also congested
<b>Contiguous area</b>	Marginal	Located between jetty and main entrance from river bank
<b>Existing Structures</b>		
Total Godowns	15	02 are now not usable at all
Total godowns	Hardly 6,000 mt (though originally it was 6,500 mt)	02 godowns are not usable any more.
Storage capacity	Hardly 6,00 mt now	11 godowns that are called usable have undergone many times repair. The present storage after covering the bags with polythene sheets during raining is not acceptable.
Useable capacity	Nil	Because of paucity of land inside
Residential units	Guard rooms, Jetty at the river bank	Though land in the site is very small, but bin capacities may be big to accommodate more quantity of rice.

#### 7.4.4 Transportation Link

221. **Interior roads:** The proposed Dhaka CSD Campus for rice storage is connected by a semi paved 8 m wide road, which is connected at a distance with the high ways through both ends. The connecting road is however, is not very wide and has characteristic traffic congestion of old Dhaka. In order to avoid traffic congestion, road vehicles like trucks and other heavy vehicles are not allowed to commute in the area from morning to 9:00 pm. The interior space for transport parking and the interior roads are adequate for transports.

222. **River:** The main strength of communication with the site is the riverside road and the river that has a jetty owned by the FD. Barges and other river vehicles can transport the food grains to and from the site any time. There are many industries or establishments on both sides of the river, both in the up and down streams, who use the river for transportation of their commodities and the personnel. Small and medium lighters/barges up to the capacity of 2000 mt are found in using the river all the seasons.

223. **Road** There are road connections to the site from the north and the south (river side road) sides, worth for truck movement with 15 to 20 mt load in each direction

#### 7.4.5 Utility (Power, water, gas) supply at the site

224. The power supply to the Dhaka CSD is ensured through 11KV power supply line passing along property line of CSD. Dhaka WASA is being used as main sources of water supply. Gas supply line is running along the adjacent road.

#### 7.4.6 Status of Food Supply in Dhaka

225. **Grain supply and distribution:** Wheat comes here from Narayanganj and Chittagong by road and river and dispatched to other LSD's of the country in the same way. Rice comes to Dhaka CSD from the northern districts and dispatched to the others districts and LSDs. The Dhaka CSD is the main supplier of open market sale operations in Dhaka City and for the huge local consumptions for police and other departments.

#### 7.4.7 Seismicity

226. Dhaka CSD, is located in Zone 2 is the medium vulnerable to earthquake disaster.

#### 7.4.8 Hydrology and drainage

227. The natural drainage pattern is from the CSD premise land towards the Buriganga River. The overall topography is almost flat in the area. The site has no experience of water logging during monsoon as it is located 1.0 m above of maximum water level of the river. The groundwater depth is **0.75** m from the existing ground level.

228. The site has existing sewerage and drainage facilities. However, those are not well maintained.

#### 7.4.9 Air quality

229. Severe odor problem persists in the area. 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 samples were collected from the boundary of the north and south side of the proposed area. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-12 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
06/12/12	North end	8 hours	212	410	23	42
06/12/12	South end	8 hours	230	465	28	37
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

#### 7.4.10 Water quality of the nearby river

230. The CSD area is located near the bank of Buriganga. Water samples were collected from one sampling points in the Buriganga River near the sub project site. The present situation of the water quality is presented in the following Table. Buriganga River water near to the project site at Dhaka CSD is already polluted. The water quality will be regularly monitored during project construction and operation phase to oversee the impact of the project.

**Table 7-13 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	23	20-30	Ok
Turbidity	NTU	65	<10	Not ok
Color	TCU	35	<15	Not ok
pH	--	7.4	6.5-8.5	Ok
TDS	mg/l	2600	<1000	Not ok
DO	mg/l	3.1	>5	Not ok
BOD	mg/l	12	<6	Not ok
Fe	mg/l	0.2	0.3-1	Ok
Zn	mg/l	4.5	5	Ok
Al	mg/l	0.35	0.2	Not ok

#### 7.4.11 Noise quality

231. The construction work may create noise pollution. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-14 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
06/12/12	Centre of the CSD	9:00 am	32	27
		9:30 am	35	32
		10:00 am	35	28
		10:30 am	38	30
		11:00 am	35	28
		11:30 am	35	30
		1:00 pm	28	27
		1:30 pm	30	26
		2:00 pm	35	32
		2:30 pm	33	32
		3:00 pm	40	32
3:30 pm	35	28		
Bangladesh standard: 70dBA				

#### 7.4.12 Terrestrial ecology

232. Since the whole area is paved, no such endangered species of matured trees are identified. However, the site has three jackfruit (*Artocarpus heterophyllus*) and some guava (*Psidium guajava*) trees.

233. The terrestrial common faunal species: field mouse (*Musboodga*), common cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow and pigeon. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exists in the potential site.

#### **7.4.13 Fisheries**

234. There is no water body inside the project area, the river is also at a safer distance from the impact of the construction work.

#### **7.4.14 Cyclones and flooding**

235. Severe cyclones or tornados are not frequent in this region. The site is above flood level. However, the site was inundated by 3'-6" during 1988 flood.

## 7.5 Environmental Aspect of Ashuganj Concrete Silo Site

### 7.5.1 Site Description

236. The Ashuganj Concrete Silo Campus Site for construction of a steel silo for rice storage is situated within the administrative division (extreme north point) of Chittagong Division of Bangladesh. The Ashuganj Silo is located about 75 km north-east of Dhaka and near the eastern bank of the river Meghna. The site is situated parallel to the railway that passes over the river Meghna. There is a railway land with planned tree plantation between the railway and the Silo structure. The silo and the ancillary facilities are surrounded by boundary wall. At the back side of the wall, private lands are there cultivated by the owners. To the left side of the campus, the river Meghna flows down. The campus is protected from all sides. 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 Ashuganj Silo is shown in Figure below.



Figure 7-6 Location of Ashuganj Silo Site

### 7.5.2 Physiography, Geology & Topography

237. The soil condition of the proposed site is sandy in nature. The overall topography is rather flat with some undulated land outside the boundary at near the bank of the river. The proposed land for construction of silo is 3'-0" below the plinth level of exiting silo. The uneven surface of the site will require land development. The maximum annual average temperature is 33.3°C, minimum 12.1°C; annual rainfall 1698 mm with 90-95% rainfall between May and October.

### 7.5.3 Existing Structure

238. As per record, the total area of land under the ownership and control of the Directorate General of Food and Ashuganj Silo authority is 39.00 acre, out of which 23.50 acre is located within the boundary wall. The land area outside the wall is about 15.50 acre – divided into four different locations e.g. (a) long strip outside the south wall : 3.29 acre (150 feet wide), (b) outside the east wall : 1.62 acre (ditch/pond), (c) Outside the north wall : 2.49 acre (a non-straight area, 320 ft away from an embankment) and (d) a sandy land near the west wall and the river : 8.06 acre (nearest distance of the wall from the river is 160 feet, though a considerable area inside the wall and in continuity with the outside land remains empty and unutilized).

239. The site has concrete silo, office, residential buildings and the road connection passing through the site from east to west. Inside the boundary wall, there is a designated block called garden where planned plantation was made. Close to the entry gate of the campus, there is almost a vacant space which is 400 feet long and 96 feet wide. The space has a dilapidated and unused structure (possibly used for accommodation of laborers during initial construction) and few haphazardly grown timber trees. The summary of Ashuganj CSD area is presented in Table 7.15.

**Table 7-15 Summary of Ashuganj CSD**

<b>Total Silo Campus Area</b>	39. acres –whole area owned by FD & its possession established	15.50 acre in 04 slots are outside the existing silo’s boundary wall
<b>Coverage of existing Silo and its ancillary facilities</b>	23.50 acre occupied by the existing silo, its ancillary facilities and planned plantation of trees	The biggest slot of 8.06 acre outside the wall and near to the river seems appropriate as a suitable site for steel silo. If needed, the area may be extended by adding two more acres vacant land inside the wall.
<b>Open area readymade area</b>	Almost nil	-
<b>Contiguous area</b>	7.44 acres in three different locations without good access road	Located between jetty and main entrance from river bank
<b>Existing Structures</b>		
Total units of Storage Structure	01	An integrated structure
Storage capacity	50,000 mt	
Usable capacity	Full 50,0000 mt	Types of Grain Stored :Wheat
Staff Residential unit	02	For Silo Manager and Assistant Manager
Other structures	Guard rooms, Jetty at the river bank, bagging unit, conveyer belt, etc	Some of the ancillary structures are out of order

240. The existing facility of Ashuganj site is presented in the next figure.



(a) Conveyer gallery to receive food grains from river vessels (presently not in operation)



(b) Receiving point of dropping wheat grains after opening the bags of wheat (in operation at present)



(c) Receiving unit of food grain baggage (not in operation at present)



(d) Bagging unit of food grains at Ashuganj silo

**Figure 7-7 Snapshot Existing Facilities of Ashuganj concrete Silo Site**

#### 7.5.4 Transportation Link

241. **Interior roads:** The campus has wide interior roads from the entry gate up to the rear exit gate. There are also other internal connecting roads. The entry/exit roads are also connected with the outside road network.

242. **River:** The Ashuganj Concrete Silo Site has good links for river transport. There is a medium size Jetty with conveyor belt for transporting the food grain mechanically from the river vessel to the silo. At the river bank there is a pontoon. But the system is not working now.

243. **Rail:** There is a railway connection of the silo, through which wheat is transported by special wagons from Chittagong concrete silo. The movement of food grains by train is, however, slow and irregular. For this reason, most of the food grains are transported by road.

244. **Road** There are good road connections to the site and no restrictions on movements of trucks from or to outside road network.

245. The lane width of the road outside of the Silo site that connects the branch of Dhaka-Sylhet highway is 4.5 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, when the traffic volume was expected to be high. The identified peak rate of traffic flow was 256 vehicles/hour. The traffic data from this survey is presented in the Annex 4.

### 7.5.5 Utility (Power, water, gas) supply at the site

246. The power supply to the Ashuganj Silo site is ensured through Ashuganj Power Station with 11KV overhead line. However, 33 KV power line will have to be ensured in this site for construction and uninterrupted operation of steel silo to store food grains.

247. Deep tube-well is being used as sources of water. Gas line is available adjacent to the site.

### 7.5.6 Status of Food Supply in Ashuganj

248. **Grain supply and distribution:** The sources of rice supply for distribution was the local procurement particularly rice from the non-hilly districts and supply from imports through Chittagong port and supplied , often directly to Ashuganj concrete Silo.

249. **Rice Milling:** Ashuganj river port is a hub of about 300 rice mills owned by the members of an Association. The hinterland that supplies the paddy to these rice mills consist of all the surplus (particularly the haor areas) of Sylhet Division and other districts namely Netrakona, Mymensingh, Jamalpur, Narshingdi and Kishoregonj. Most of the paddy are transported by the engine operated boats like those used for transporting wheat from the Silo. Some are transported by trucks. Within a period of 11 months in a year, all these mills process more than one million MT paddy to produce about 660,000 MT of rice. The usual process of rice drying and packaging at a rice mill is shown in the following figure.



Figure 7-8 Common way of drying rice paddy at a rice mill located at Ashuganj



**Figure 7-9 Packaging of parboiled rice at a rice mill at Ashuganj**

250. **Wheat Milling:** The production and local procurement of wheat in Chittagong Division is very marginal. Imported wheat mostly comes through Chittagong port usually directly after being lightered from ocean vessels and then to Chittagong concrete silo and Ashuganj Concrete Silo.

### **7.5.7 Seismicity**

251. The subproject area, Ashuganj Silo site, is located in Zone 3 which is the most vulnerable to earthquake disaster. Therefore, the designer needs to consider high standard of design in foundation work against seismic affect following BNBC standard.

### **7.5.8 Hydrology and drainage**

252. The natural drainage pattern is from the Silo Site premise towards the Meghna River. Soak well & septic tank is used as sewerage system and natural slope is working as drainage system. Water logging is usually not a problem during monsoon. Deep tube-well is the main sources of water supply for Silo's staff. The ground water depth is 0.5 m.

### **7.5.9 Air quality**

253. 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 samples were collected from the boundary of the north and south side of the proposed area. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-16 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
12/12/12	North end	8 hours	350	650	20	48
12/12/12	South end	8 hours	380	635	24	45
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.5.10 Water quality of the nearby river

254. The CSD area is located near the bank of Meghna. Water samples were collected from one sampling points in the Meghna River near the sub project site. The present situation of the water quality is presented in the following Table. The water has very high turbidity and total dissolved solid, the color is also more than the acceptable limit. The water quality will be regularly monitored during project construction and operation phase to oversee the impact of the project.

**Table 7-17 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	21.5	20-30	Ok
Turbidity	NTU	30	<10	Not ok
Color	TCU	25	<15	Not ok
pH	--	7.1	6.5-8.5	Ok
TDS	mg/l	1250	<1000	Not ok
DO	mg/l	6.4	>5	Ok
BOD	mg/l	4.8	<6	Ok
Fe	mg/l	0.15	0.3-1	Ok
Zn	mg/l	2.5	5	Ok
Al	mg/l	0.15	0.2	Ok

### 7.5.11 Noise quality

255. The construction work may create noise pollution to the surrounding area. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-18 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
12/12/12	Centre of the	9:00 am	35	30
		9:30 am	38	34
		10:00 am	35	32
		10:30 am	35	32
		11:00 am	38	34
		11:30 am	40	35
		1:00 pm	45	40
		1:30 pm	40	36

	site	2:00 pm	38	35
		2:30 pm	36	31
		3:00 pm	38	35
		3:30 pm	38	31
Bangladesh standard: 70dBA				

### 7.5.12 Terrestrial ecology

256. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the Silo premise and in open spaces. The total number of such trees in the campus is 480, out of which 280 are mahogany (*Swieteniamahogoni*), 60 are teak (*Tecktona grandis*), 40 are eucalyptus (*Eucalyptus*) and the remaining 100 are various types of fruits including banana (*Musa sapientum*), , mango tree (*M. indica*) etc trees. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopuscompressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazizanioides*, etc.).

257. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, doel, shalik, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.5.13 Fisheries

258. There is no water body inside the project area, the river is also at a safer distance from the impact of the construction work.

### 7.5.14 Cyclones and flooding

259. Chittagong Division includes depressed and flood prone areas in the north-east and the southern coastal areas. Hence there are localized flood and tidal charge some times that cause damage to crop, assets and sometimes human life. The site is above flood level. However, the site was inundated by 1ft during 1998 flood.

## 7.6 Environmental Aspect of Mymensingh CSD Campus Site

### 7.6.1 Site Description

260. The proposed Mymensingh CSD Campus Silo site administratively belongs to Dhaka Division of Bangladesh. Mymensingh, one of the oldest districts of Bangladesh, is located in the central north part of Bangladesh stands on the bank of the Brahmaputra River. Mymensingh is bounded by the Garo Hills and Meghalya State of India in the north, Gazipur District in the south, Netrakona and Kishorganj District in the east and Sherpur, Jamalpur and Tangail District in the west. The present Mymensingh CSD is situated on Tangail to Mymensingh Highway connected to road and rail way line built in 1959. The river Brahmaputra flows by the eastern side of the Mymensingh city. The Mymensingh CSD site is situated on the western bank of the river. It is situated very close to the zero point of Mymensingh town. The location of the site is at the coordinate of N24°46'39'' and E90°21'48''. The location of Mymensingh CSD campus site is shown in Figure below.



Figure 7-7-10 Location of Mymensingh Silo Site

### 7.6.2 Physiography, Geology & Topography

261. The subproject area falls within active Brahmaputra-Jamuna Flood Plain area of northern region of Bangladesh. The sub-project site is located at the bank of the Brahmaputra River. The soil condition of the proposed site is sandy clay in nature. The site is situated near the Brahmaputra River at Mymensingh district. The natural drainage pattern is from the low-lying/ditch land towards the Brahmaputra River within the CSD premise area. The overall topography is flat in the surrounding of the sub-project area. The maximum annual average temperature is 35.1°C, minimum 14.8°C.

262. The CSD area is surrounded by private land owners at two sides, on side by the road and the other by the Office of the Bangladesh Border Guard, a para-military force.

### 7.6.3 Existing Structure

263. Out of the 21.0 acre of the total CSD campus, about 6.0 acre is vacant inside the boundary wall. There is a pond/water body inside the boundary area, which is 116m X 93m that occupies about 2.66 acre of land. The average depth of the pond is 3.1 m. This ditch area including the water body/pond will be used as the project site. There are 54 Godown of which are:

- a) Dhaka type: 24x500=12000 MT
- b) Kolkata type : 8x750=6000 MT
- c) Danish type : 6x500=3000 MT
- d) Salt Godown: 4x640=2560 MT
- e) Japan type : 4x1000=4000 MT
- f) New Godown: 2x1000=2000 MT
- g) New Godown: 6x500=3000 MT.

264. There are also an Office, one Manager's Quarter ,one Asst.Manager's Quarter & 2 Darawan's Quarters and a Mosque. The summary of Mymensingh CSD area is presented in Table 7.19.

**Table 7-19 Summary of Mymensingh CSD**

<b>Mymensingh CSD area</b>	21.00 acres	Surrounded by a wall from all sides
<b>Covered with go-downs</b>	About 15.00 acres	Besides the open area
<b>Open area</b>	About 6.0 acres	A ditch like water body inside the boundary wall
<b>Contiguous area</b>	Very minimum	The CSD is constructing some new godowns in an outside area newly taken up.
<b>Existing Structures</b>		
Total godowns	54	08 are under construction
Storage capacity	35,000 mt (including the unusable godowns)	10 godowns are not usable any more.
Useable capacity	27,560 mt now	Unusable ones are currently in dilapidated condition and need demolition
Residential units	02 residential units for management staff and one dormitory.	Two more houses for management staff, but not in good shape.
Other buildings	Mosque, guard rooms.	The ditch land created through lifting soil during construction of various godowns remains unprotected without effective demarcation lines.

### 7.6.4 Transportation Link

265. **Interior roads:** Interior roads for the present requirement of the CSD are enough, though they need repair. For construction of the new silo in the vacant land, new connecting roads need to be constructed.

266. **River:** The Mymensingh CSD Campus is situated by the side of the Brahmaputra river, but it is not navigable at that point. Hence there is no opportunity for river transport for the food grains.

267. **Road** There are good road connections to the site as it is located in the corner of two inter district roads. There is no restrictions on movements of trucks from or to outside road network.

268. The lane width of the road outside of the CSD that connects the Mymensingh-Tangail highway is 6.1m. 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, when the traffic volume was expected to be high. The identified peak rate of traffic flow was 244 vehicles/hour, where less than 10% of them are trucks. The traffic data from this survey is presented in the Annex 4

### 7.6.5 Utility (Power, water, gas) supply at the site

269. The power supply to the Mymensingh Silo site is ensured through the national grid with 11KV overhead line. However, 33 KV power line will have to be ensured in this site for construction and uninterrupted operation of steel silo to store food grains. Transformer is available near CSD Compound.

### 7.6.6 Status of Food Supply in Mymensingh

270. The sources of rice supply for distribution, rice milling and wheat milling facilities are same as the Dhaka and Narayanganj CSD.

### 7.6.8 Seismicity

271. The subproject area, Mymensingh Silo site, is located in Zone 3 which is the most vulnerable to earthquake disaster. Therefore, the designer needs to consider high standard of design in foundation work against seismic affect following BNBC standard.

### 7.6.9 Hydrology and drainage

272. Water usually accumulates in the monsoon up to 0.5m (average) in the low land area/ditch/water body. The new proposed silo construction site is mainly on ditch land. The whole CSD area experienced 0.15m (6 inch) inundation during 1988 flood.

273. The main Source of water is Deep tube well water which is supplied by electric pump to Staff Quarters & Office building of CSD. Groundwater is **2.75** m below the surface.

### 7.6.10 Air quality

274. 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 samples were collected from the boundary of the north and south side of the proposed area. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-20 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
19/12/12	North end	8 hours	310	475	48	38
19/12/12	South end	8 hours	325	510	44	36
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.6.11 Water quality of the nearby water body

275. Water samples were collected from the pond located at the site to assess baseline environmental data. The present situation of the water quality is presented in the following Table. The samples were collected on 19 December, 2012. Other than turbidity and color, other parameters meet the Bangladesh standard.

**Table 7-21 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	23.1	20-30	Ok
Turbidity	NTU	12	<10	Not ok
Color	TCU	16	<15	Not ok
pH	--	7.1	6.5-8.5	Ok
TDS	mg/l	715	<1000	Ok
DO	mg/l	6.6	>5	Ok
BOD	mg/l	2.9	<6	Ok
Fe	mg/l	Nil	0.3-1	Ok
Zn	mg/l	Nil	5	Ok
Al	mg/l	Nil	0.2	Ok

### 7.6.12 Noise quality

276. The construction work may create noise pollution to the surrounding area. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-22 Noise Quality Monitoring Data**

Date	Location	Time	dBA	
			Highest	Lowest
19/12/12	Centre of the site	5:00 am	15	14
		5:30 am	16	16
		6:00 am	20	18
		7:30 am	24	22
		8:00 am	28	26
		8:30 am	35	30
		9:00 am	32	30
		9:30 am	35	34
		10:00 am	36	35
		10:30 am	38	36
		11:00 am	45	43
		11:30 am	40	36
		1:00 pm	48	45
		1:30 pm	38	35
		2:00 pm	38	34
		2:30 pm	40	36
		3:00 pm	38	35
		3:30 pm	42	38
		6:00 pm	30	28

Date	Location	Time	dBA	
			Highest	Lowest
		6:30 pm	28	27
		7:00 pm	26	24
		9:00 pm	24	22
		9:30 pm	26	20
		11:00	18	17
		11:30	16	16
		20/12/12	Centre of the site	00:00 am
00:30 am	17			15
1:00 am	16			15
2:00 am	14			14
3:00 am	16			15
4:00 am	20			18
Bangladesh standard: 70dBA				

### 7.6.13 Terrestrial ecology

277. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the CSD premise and in open spaces. There are about 500 trees in the whole CSD area. The tree species within the CSD area include: eucalyptus (*eucalyptus*), banana (*Musa sapientum*), mahogany (*Swieteniamahogoni*), banyan tree (*F. religiosa*), coconut (*Cocos nucifera*) etc. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopuscompressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazizanioides*, etc.).

278. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, dove, cuckoo, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.6.14 Fisheries

279. The pond situated in the sub-project area have some common fish like puti, tengra, carp, koi, taki, bain etc. It is found from the discussion with the local people that no endangered/rare species of fishes were identified so far by the local people.

### 7.6.15 Cyclones and flooding

280. Severe cyclones or tornados are not frequent in this region. However, the location of the Mymensingh CSD Campus is very strategic as it is located at a place surrounded by a number of districts and other upazila of Mymensingh district that are known as surplus rice production areas. Construction of the silo will enable the FD to procure a substantial amount of surplus rice and thereby ensure fair price to the farmers.

## 7.7 Environmental Aspect of Maheswarpasha CSD Campus Site

### 7.7.1 Site Description

281. Maheswarpasha is situated in the south-west part of Bangladesh in Khulna Metropolitan Area under the Daulatpur Police station. The site is located on The western Bank of the River Bhairab and Eastern side of Khulna & Jessore High way & railway Line. The location of the site is at the coordinate of N22°53'03'' and E89°30'53''. The location of Maheswarpasha Silo is shown in figure below.

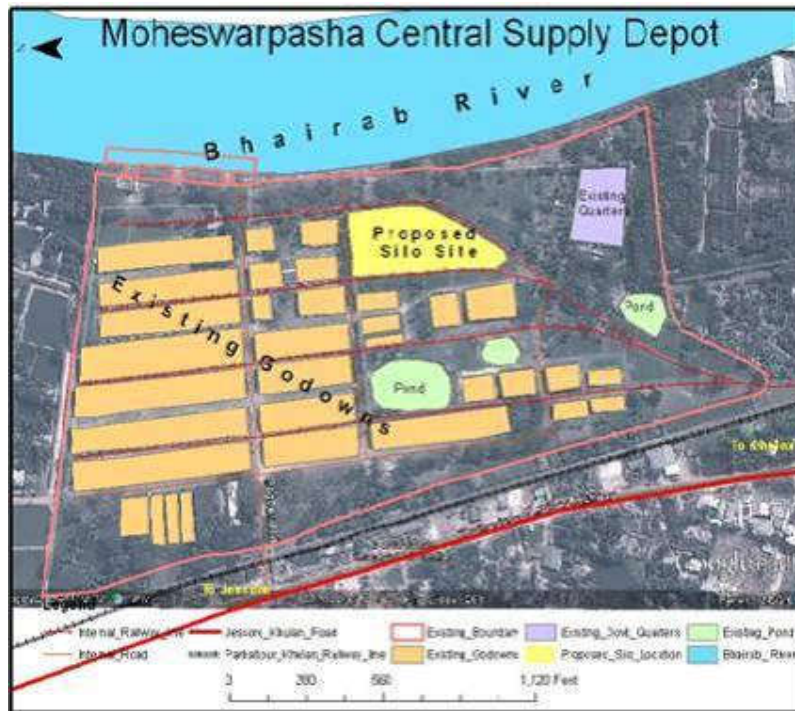


Figure 7-11 Location of Maheswarpasha Silo Site

### 7.7.2 Physiography, Geology & Topography

282. The subproject area falls within active Ganges Flood Plain area of southern region of Bangladesh. The sub-project site is located at the bank of the Bhairab River. The total area of the CSD/silo is 58.14 acres but the prospective steel silo will be constructed at the northern portion of the site taking about 6 acres of land. The Northern Portion of the proposed Silo site is low laying area. The dimension of the ditch is 25m X 20m at the north-eastern side of the site. Water accumulates in this ditch of 0.5m height. There is no agricultural land or forest area in its premise. The plinth level of Northern side godown is 4'-6" high from the existing G.L.

### 7.7.3 Existing Structure

283. The location of the site is at the coordinate of N22°53'03'' and E89°30'53''. Though the Maheswarpasha campus is a big one, the number of structures including unused godowns, unused silo and administration building has occupied most of the areas. Still, inside the campus there are two almost vacant sites for probable construction of a steel silo for storage of food grains. The priority

area is situated to the right side of the exit gate towards the jetty, which is very near to the Jetty in the bank of the river for river connectivity. Rail road is also very close just to the right side of the area for ensuring rail connectivity. The road connectivity is ensured through movement of trucks. For smooth entrance of trucks, some work for improving the quality of the road will have to be made. The size of the area is about 06 acres, but inside the area it has the dilapidated administration (very old) building and two other dilapidated unused godowns. These will have to be demolished for construction of the silo. Also, it has a small shallow ditch land of height 0.5m water, which will have to be filled up.

284. There are 3 Nos Calcutta type godown, 3 nos. Japan types godown in the western side but the 3 nos Calcutta types godowns are dilapidated and there is an abandoned building in the north-east side. The summary of Maheswarpasha CSD area is presented in Table 7.23.

**Table 7-23 Summary of Maheswarpasha CSD**

<b>Total Silo Campus Area</b>	58.14 acres	
<b>Existing Structures</b>		
Total units of Storage Structure	CSD : 59 Silo (small): 01	The only concrete silo is non-functional
Storage capacity	58,827 mt (including the unusable godowns)	12 godowns are not usable any more.
Usable capacity	27,560 mt now	47 godowns are functional
Staff Residential unit	02 residential units for management staff and one dormitory.	The physical condition is very poor
Other structures	Dilapidated office building, guard room	The shallow water body in the site was created through lifting soil during construction of various structures earlier.

#### 7.7.4 Transportation Link

285. **Interior roads:** Interior roads of the present CSD are enough, though they need repair. For construction of the new silo in the vacant land, new connecting roads need to be constructed.

286. **River:** The site has good links for river transport. There is a wide river frontage at the site with two jetties, one large and one small, and a pontoon dock belonging to the BIWTA. Most of the food grains received at Maheswarpasha CSD arrives by river barge. Vessels sizes average 600 tons for food grains, but the river can accommodate vessels up to 2000 tons. Wheat is transported by river barge from Mongla or Chittagong. Rice arrives from Baghabari where it is transloaded from trucks to barges at Baghabari LSD usually without intermediary storage. There is only about one meter of tidal variation.

287. **Rail:** There is a railway connection with the CSD site. The godowns are so designed and constructed that every alternate godown is connected by rail road and the other alternative is by the trucks.

288. **Road** There are good road connections to the site and no restrictions on movements of trucks from or to outside road network.

289. The lane width of the road outside of the CSD is 10.0 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, when the traffic volume was expected to be high. The identified peak rate of traffic flow was 244 vehicles/hour, where less than 10% of them are trucks. The traffic data from this survey is presented in the Annex 4

#### 7.7.5 Utility (Power, water, gas) supply at the site

290. The power supply to the Maheswarpasha campus is supplied by western zone of electric power supply through two separate 11 KV lines, each for CSD and silo. For continuous power supply on priority basis through the 33 KV power line will have to be ensured in the probable site at Maheswarpasha CSD/silo for construction and uninterrupted operation of a silo.

291. There is no connection of city corporation water supplied. Shallow tube-well water is supplied by electric pump to staff quarter of CSD.

#### 7.7.6 Status of Food Supply in Maheswarpasha

292. **Grain supply and distribution:** The sources of rice supply for distribution was the local procurement particularly from the middle and northern districts of the Division and trans-loaded at Baghabari ghat in barges for delivery to various storage facilities. These facilities distributed the rice for use under monetized schemes including essential priorities (e.g. Army, police, RAB, Ansar-VDP), other priorities (e.g. fire service, prisoners and Open Market Sale – OMS for price stabilization) and non-monetized schemes under varied food safety programmes like Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD), Test Relief, Food for Works (FFW), etc. Khulna zone has about 2540 (62%) rice mills.

293. The proportion of local procurement of wheat is small and is usually transported to the local storage facilities in the Division using the similar mode of transports as used in rice transportation. Imported wheat mostly comes through Mongla port usually directly after being lightered from ocean vessels. Only if no wheat deliveries are available in Mongla port, wheat is supplied to Khulna Division from Chittagong port either directly lightered from ocean vessels or from CSDs in Khulna Division.

#### 7.7.7 Seismicity

294. Maheswarpasha CSD, is located in Zone 1 is minimum vulnerable to earthquake disaster.

#### 7.7.8 Hydrology and drainage

295. Water usually does not accumulate in the monsoon, but the site is located at the tidal zone. During the tidal period, tidal water level reached 0.3m below of the existing concrete jetty. Existing CSD /silo food grain storage facilities are well protected from flood and constructed on high land (sand fill). The new proposed silo construction site is at the northern portion of the site which is mostly flat in nature but associated with some undulation and ditch land. The groundwater depth of the site is **1m** below surface. Public sewerage and drainage system is available at the site.

### 7.7.9 Air quality

296. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-24 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
10/12/12	North end	8 hours	275	550	30	36
10/12/12	South end	8 hours	260	575	34	38
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.7.8 Water quality of the nearby river

297. The CSD area is located near the bank of Bhairab. Water samples were collected from one sampling points in the Bhairab River near the sub project site. The present situation of the water quality is presented in the following Table. The water has very high turbidity and total dissolved solid, the color is also more than the acceptable limit. The water quality will be regularly monitored during project construction and operation phase to oversee the impact of the project.

**Table 7-25 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	22.2	20-30	Ok
Turbidity	NTU	26	<10	Not ok
Color	TCU	21	<15	Not ok
pH	--	7.6	6.5-8.5	Ok
TDS	mg/l	1460	<1000	Not ok
DO	mg/l	6.8	>5	Ok
BOD	mg/l	3.8	<6	Ok
Fe	mg/l	0.1	0.3-1	Ok
Zn	mg/l	2.7	5	Ok
Al	mg/l	0.11	0.2	Ok

### 7.7.9 Noise quality

298. The construction work may create noise pollution to the surrounding area. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-26 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
		9:00 am	40	36
		9:30 am	37	34
		10:00 am	36	32
		10:30 am	35	30

10/12/12	Centre of the site	11:00 am	38	36
		11:30 am	42	38
		1:00 pm	46	42
		1:30 pm	42	38
		2:00 pm	38	34
		2:30 pm	40	37
		3:00 pm	38	36
		3:30 pm	36	32
Bangladesh standard: 70dBA				

### 7.7.10 Terrestrial ecology

299. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the CSD premise and in open spaces. The tree species within the CSD area include: banana (*Musa sapientum*), mahogany (*Swieteniamahogoni*), banyan tree (*F. religiosa*) etc. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopuscompressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazanioides*, etc.).

300. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, dove, cuckoo, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.7.11 Fisheries

301. But there is no rare/endangered species of fishes located at that ditch land.

### 7.7.12 Cyclones and flooding

302. Khulna Division was severely affected by Cyclone Sidr in November 2007 and by Cyclone Ayla in May 2009. Khulna division is prone to be affected by tropical storm. In case of incidence of disasters like flood, cyclone, tidal charge in and around the area, food supply from the Maheswarpasha silo will be of much benefit to ensure the food security of the affected people.

## 7.8 Environmental Aspect of Chittagong Port Concrete Silo Campus

### 7.8.1 Site Description

303. The silo facility project of Chittagong falls in Chittagong City Corporation Area near the Karnaphuli River in Patenga. The present Chittagong Silo is situated in between Karnaphuli Export Processing Zone and TSP complex in North Patenga, in a land of 25.00 acre and linked with the Airport Road. The site has communication network rail too. The location of the site is at the coordinate of N22°16'36'' and E91°47'36''. The location of Chittagong Silo is shown in figure below.



Figure 7-12 Location of Chittagong Silo Site

### 7.8.2 Physiography, Geology & Topography

304. The subproject area falls within Chittagong Hill track zone of the country. The sub-project site is located at the ocean area at the close proximity of Patenga road. The soil is sandy in nature. The topography of the land is mostly flat with some ditches. There is no agricultural land or forest area in its premise.

### 7.8.3 Existing Structure

305. Chittagong Silo is the country's only grain terminal at an ocean port. The existing concrete grain elevator holds 100,000 tons of wheat received from vessels making it the largest grain storage facility of the Food Department. There are four pneumatic ship unloaders on the jetty. Two 200 ton per hour unloaders were installed in 2010. The remaining two unloaders are original equipment at the silo installed 40 years ago. Though nominally 200 mt per hour capacity the older ones can only function at a top rate of 125 mt per hour due to a decline in their water column pressure. One is in the

process of being dismantled, leaving only 3 operational. These old unloaders have much higher energy consumption than the newer ones.



**Figure 7-13 Chittagong – Concrete Silo**

306. The conveyer gallery houses three 200 mt/hour belt conveyers that bring wheat from the jetty to the existing silo. One of these is a two-way conveyer that can be used to fill coasters with wheat from the silo. The effective conveying capacity from the jetty to the silo is about 275 mt/ hour. The silo cells can be filled from three top conveyers simultaneously.

307. The proposed site for the steel silos is on the northeast corner of the site with bagging house and truck staging to the east of the existing grain elevator. The existing conveyer gallery sits on a band of land that is 200 ft wide at the river but narrow to 160 wide at the silo boundary wall.

308. As per record, the total area of land under the ownership and control of the Directorate General of Food and Chittagong Silo authority is 25 acre.

309. Existing Structure description area is presented in Table 7.27.

**Table 7-27 Summary of Chittagong Silo**

<b>Total Silo Campus Area</b>	13.73 Acres	The biggest slot of 8.06 acre outside the wall and near to the river seems appropriate as a suitable site for steel silo. If needed, the area may be extended by adding two more acres vacant land inside the wall.
<b>Coverage of existing Silo and its ancillary facilities</b>	6.88 Acres	-
<b>Open area readymade area</b>	9 Acres	Located between jetty and main entrance from river bank
<b>Contiguous area</b>	29.613 Acres	15.50 acre in 04 slots are outside the existing silo's boundary wall
<b>Total Silo Campus Area</b>		15.50 acre in 04 slots are outside the existing silo's boundary wall
<b>Existing Structures</b>		
Total units of Storage Structure	Round bin: 88 nos Star bins: 54 nos	Round bin capacity: 1000 ton/bin Star bin capacity: 225 tons/bin
Storage capacity	100150 tons	
Usable capacity	100150 tons	

Staff Residential unit	6 units	
Other structures	-	-

#### 7.8.4 Transportation Link

310. **Interior roads:** About 1.25 km of internal road exists within the silo area. The road is 20 feet wide.

311. **River: River** Karnaphuli flows about 200 yards from the silo site and is the main route of transportation for water transport by which the grains arrive at the silos.

312. **Rail:** A railway track enters inside the silo site from New Mooring rail point thus connecting the Silo with the railway system also.

313. **Road:** Two roads connect the silo from outside. These roads ultimately connect the national Highway system.

314. The lane width of the road outside of the CSD is 10.0 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, when the traffic volume was expected to be high. The identified peak rate of traffic flow was 264 vehicles/hour, where less than 10% are trucks and cargos. The traffic data from this survey is presented in the **Annex 2.4**

#### 7.8.5 Utility (Power, water, gas) supply at the site

315. The power supply to the Chittagong silo campus is supplied by power development board with 11 KV line.

316. Chittagong silo has its own deep tube well but the water is saline and as such mostly used for washing purpose. The campus has its own underground water reservoir which is supplied by WASA. Gas is available inside the silo.

#### 7.8.6 Status of Food Supply in Chittagong Silo

317. **Grain supply and distribution:** Average annual grain volumes received at the silo has been 300,000 tons since 1999 for an annual throughput of 3 times the storage capacity or grain held just an average of 4 months. The Chittagong Silo is the main unloading point for wheat imported by the Food Department as shown below:

**Table 7-28**Yearly Receipt & Dispatch Position of Chittagong Silo

Year	Receipt (MT)	Dispatch (MT)
1999	466,561	433,806
2000	149,218	237,633
2001	403,604	321,416
2002	164,892	242,413
2003	185,086	161,161
2004	220,679	177,276
2005	248,475	245,651

2006	98,091	168,521
2007	257,925	221,084
2008	319,691	330,336
2009	209,629	206,858
2010	496,990	461,837
2011	650,554	648,954
2012 (Till May' 12)	122,959	206,551

### 7.8.7 Seismicity

318. The subproject area, Chittagong Silo site, is located in Zone 2 which is moderately vulnerable to earthquake disaster.

### 7.8.8 Hydrology and drainage

319. Existing silo food grain storage facilities are well protected from flood and constructed on high land (sandy soil). The groundwater depth is 1m below from the existing ground. Internal drainage system for the silo exists. The sewerage is dependent on the septic tanks within the silo campus.

### 7.8.9 Air quality

320. 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 during shipment with heavy trucks from Chittagong to Ashuganj or Shantahar DGF silos that carry food grains/wheat. The samples were collected from the boundary of the north and south side of the proposed area. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed. However, relatively high concentration of SO<sub>x</sub> at the Chittagong silo site comparing to other sub project locations is due to mainly presence of TSP complex located near to sub project area.

**Table 7-29 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
12/12/12	North end	8 hours	410	460	120	50
12/12/12	South end	8 hours	425	475	112	48
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

### 7.8.10 Water quality of the nearby Karnaphuli river

321. The CSD area is located near the bank of Karnaphuli. Water samples were collected from one sampling points in the River near the sub project site. The present situation of the water quality is presented in the following Table. The water has very high turbidity and total dissolved solid, the color is also more than the acceptable limit. The water already contains high Aluminum. The water quality will be regularly monitored during project construction and operation phase to oversee the impact of the project.

**Table 7-30 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	21	20-30	Ok
Turbidity	NTU	22	<10	Not ok
Color	TCU	24	<15	Not ok
pH	--	7.1	6.5-8.5	Ok
TDS	mg/l	1200	<1000	Not ok
DO	mg/l	6.2	>5	Not ok
BOD	mg/l	4.4	<6	Not ok
Fe	mg/l	0.15	0.3-1	Ok
Zn	mg/l	3.4	5	Ok
Al	mg/l	0.15	0.2	Not ok

### 7.8.11 Noise quality

322. The construction work may create noise pollution to the surrounding area. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-31 Noise Quality Monitoring Data**

Date dd/mm/yy	Location	Time	dBA	
			Highest	Lowest
12/12/12	Centre of the site	9:00 am	55	52
		9:30 am	50	48
		10:00 am	48	45
		10:30 am	54	50
		11:00 am	60	56
		11:30 am	62	56
		1:00 pm	52	50
		1:30 pm	46	45
		2:00 pm	44	42
		2:30 pm	50	46
		3:00 pm	52	48
		3:30 pm	45	42
Bangladesh standard: 70dBA				

### 7.8.12 Terrestrial ecology

323. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the Silo premise and in open spaces. The tree species within the sub project area include: banana (*Musa sapientum*), betel nut tree (*Areca catech*) etc. Natural vegetations occurring in the subproject site areas include: grasses (*Axonopus compressus*, *Cynodondactylon*, *Dicanthium annulatum*, *Digitariasanguinalis*, *Eleusine indica*, *Oplismenus burminii*, *Veteveriazanioides*, etc.).

324. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, doel, shalik, owl, etc. no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

#### **7.8.13 Fisheries**

325. There is no water body inside the project area, the river is also at a 200 yards distance from the impact of the construction work.

#### **7.8.14 History of Cyclones and flooding in the Project area**

326. As informed by the silo superintendent the silo campus area was never flooded but occasional cyclones generated in the Bay of Bengal would be of concern in the future.

## 7.9 Environmental Aspect of Madhupur CSD Campus Site

### 7.9.1 Site Description

327. Madhupur is one of the 12 upazila in Tangail District of Dhaka Division. The upazila is a part of the Madhupur highland of the greater Mymensingh area. Madhupur has a Government khas land area of 7.80 acre which is 3.5 km away towards north from the Madhupur upazila road. The proposed site is located at the coordinate of N24°37'43'' and E90°03'39''. The site is adjacent to Mymensingh-Tangail-Jamalpur high-way. The location of Madhupur Silo is shown in the figure below.



Figure 7-14 Location of Madhupur Silo Site

### 7.9.2 Physiography, Geology & Topography

328. Madhupur site is located in the high land of Madhupur Tract. The site is located about 13.5 km away towards north from Madhupur Upazila Sadar of Tangail district. The overall topography is rather flat, located in high land. The soil of proposed site was found to be clay in nature. The maximum annual average temperature is 33.3°C, minimum 12.°C; annual rainfall 1467 mm with 90% rainfall between May and October.

### 7.9.3 Existing Structure

329. The present Madhupur LSD has 4 go-downs in all, out of which 1 is unworkable and rest are workable having its maximum capacity of 3,250 tons. All the working go-downs are fully loaded with rice. Rice comes from the northern districts and distributed locally. To the east of the plot, Government khas lands under District Commissioner are used to cultivate for production of banana and pineapple as shown in the following figure.



**Figure 7-15 East Side of Proposed Madhupur Silo Site**

330. The office of the Bangladesh Forest Industries Corporation (BFIDC) is in the north, and the land at the south side, leased from Government, is used for seed production for Bangladesh Agriculture Development Corporation (BADC), at the west Dhaka-Tangail high-way & at the east Government land are using for producing Banana & Pine apple. Other than the LSDs, there is no other existing structure in the Madhupur campus.

#### **7.9.4 Transportation Link**

331. **Interior roads:** The site is currently a vacant land with no structure or underground installation. For construction of the new silo in the vacant land, new connecting roads need to be constructed.

332. **Road:** Road is the only mode of transportation. The lane width of the road of the site that connects the branch of Mymensingh-Tangail-Jamalpur highway is 4.5 m. There are very few bicycles and motor cycles run regularly but large vehicles like trucks and cars ply occasionally. New traffic is expected, as a result of new silo construction.

#### **7.9.5 Utility (Power, water, gas) supply at the site**

333. 11 KVA Electric line of palli biddut is running along the adjacent road and there is no water and gas supply.

## 7.9.6 Status of Food Supply in Madhupur

334. **Grain supply and distribution:** Madhupur upazila and Tangail district are the administrative units in Mymensingh upland belonging to Dhaka administrative Division of the country. Almost the full upland is a flood free area. Introduction of irrigated agriculture system has made most of the upland area a new rice surplus area. Wheat is also produced in a limited scale. The estimated annual production of these two major food grains during the period is presented in the table below:

**Table 7-32 Estimated Food Grains Production in Dhaka Division (mt)**

Sl No	Agriculture Region	Rice Varieties			Total Rice	Total Wheat	Total Food Grains
		Aus	Amon	Boro			
1.	Dhaka Ag. Region	9,359	2,68,366	10,65,615	13,43,340	15,732	13,,59,072
2.	Faridpur Ag. Region	40,517	2,82,742	8,63,262	11,86,521	1,30,494	13,,17,015
3.	Jamalpur Ag. Region	17,175	3,62,476	7,25,244	11,04,895	11,709	11,16,604
4.	Kishoregonj Ag. Region	40,458	3,73,126	13,31,254	17,44,838	9,154	17,53,992
5.	Mymensingh Ag. Region	1,06,457	5,50,642	8,01,190	14,58,289	4,055	14,62,344
6.	Tangail Ag. Region	1,163	2,32,731	6,37,268	8,71,162	13,341	8,84,503
	Grand Total				77,09,045	1,84,485	78,93,530

Source: BBS, Year Book of Agricultural Statistics of Bangladesh, 2010

## 7.9.7 Seismicity

335. Madhupur Silo Site, is located in Zone 2 which is minimum vulnerable to earthquake disaster.

## 7.9.8 Hydrology and drainage

336. The site is located in the Madhupur high land. Being a high land long term flood is not an issue for the project site. During monsoon, rain water does not accumulate for long time. The area is fairly level. However, there is no sewerage and drainage system in the area. Tube well is the only source of water. The groundwater depth of the site is **3.5m** below surface.

## 7.9.9 Air quality

337. The present condition of the air quality is presented in the following Table. From the test results, it is found that SPM, CO, SO<sub>x</sub> and NO<sub>x</sub> of the ambient air in the sampling points are far below the atmospheric environmental standards for the industrial and mixed.

**Table 7-33 Air Quality Monitoring Data**

Date dd/mm/yy	Sampling point	Duration	SPM µg/m <sup>3</sup>	CO µg/m <sup>3</sup>	SO <sub>x</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>
21/12/12	North end	8 hours	220	390	30	32
21/12/12	South end	8 hours	210	410	28	30
<b>Bangladesh Standard for Industrial and Mixed</b>			<b>500</b>	<b>5000</b>	<b>120</b>	<b>100</b>

## 7.9.10 Water quality of the nearby river

338. Since, there is no surface water body near to the sub project area; water samples were collected from the tube-well of the site to assess baseline environmental data. Tube-wells are not

marked with red color for which they are considered as arsenic free tube-wells. The present situation of the water quality is presented in the following Table. The samples were collected on 21 December, 2012

**Table 7-34 Water Quality Monitoring Data**

Parameter	Unit	Test value of the sample	Bangladesh Standard	Remark
Temperature	°C	21.1	20-30	Ok
Turbidity	NTU	3.5	<10	Ok
Color	TCU	3.8	<15	Ok
pH	--	6.8	6.5-8.5	Ok
TDS	mg/l	820	<1000	Ok
DO	mg/l	7.5	>5	Ok
BOD	mg/l	1.8	<6	Ok
Fe	mg/l	0.1	0.3-1	Ok
Zn	mg/l	0.2	5	Ok
Al	mg/l	Nil	0.2	Ok

### 7.9.11 Noise quality

339. The construction work may create noise pollution to the surrounding area. The site was found very foggy and extremely calm after 11:30 pm on the day of experimentation that the noise data after 11:30 pm was not possible to be taken. For the baseline environmental data, the current noise levels were measured at the center of the sub project area which is presented at the following Table.

**Table 7-35 Noise Quality Monitoring Data**

Date	Location	Time	dBA	
			Highest	Lowest
21/12/12	Centre of the site	5:00 am	20	18
		5:30 am	22	20
		6:00 am	25	24
		7:30 am	26	22
		8:00 am	30	26
		8:30 am	38	35
		9:00 am	32	31
		9:30 am	36	34
		10:00 am	36	35
		10:30 am	42	40
		11:00 am	40	38
		11:30 am	46	42
		1:00 pm	50	45
		1:30 pm	38	35
		2:00 pm	32	30
		2:30 pm	34	32
		3:00 pm	38	36
		3:30 pm	36	35
6:00 pm	38	35		
6:30 pm	32	28		
7:00 pm	25	24		

Date	Location	Time	dBA	
			Highest	Lowest
		9:00 pm	24	20
		9:30 pm	26	25
		11:00 pm	22	20
		11:30 pm	23	22
Bangladesh standard: 70dBA				

### 7.9.12 Terrestrial ecology

340. The terrestrial floral habitats in the project area include various types of trees and natural vegetation in common, fairly common and frequent distributions in and around homesteads, along inside roads of the Khas land premise. The total number of matured trees in the area is surveyed to 60, which are at the edge of the boundary of the site. Out of 60 trees, 47 are Akashmoni (*Acacia auriculiformis*). Natural vegetations occurring in the subproject site areas include: grasses (*Axonopus compressus*, *Cynodondactylon*, *Dicanthiumannulatum*, *Digitariasanguinalis*, *Eleusineindica*, *Oplismenusburminii*, *Veteveriazanioides*, etc.).

341. The terrestrial common faunal species: field mouse (*Musboodga*), wild cat (*Felischaus*), frog (*Ranacyanophyctis*), etc. Bird species include crow, pigeon, dove, cuckoo, owl, etc. Therefore, no rare, threatened or endangered species of flora, wildlife habitat, and population exist in the potential site.

### 7.9.13 Cyclones and flooding

342. Tangail district as a whole and Madhupur is not a disaster prone area in general. Rather it is a surplus area in production of food grains in the country. Locally procured food grains and some imported grains from outside needs to be stored and taken off for distribution to the disaster prone/food deficit areas, both to the north-east and southern parts of the country. Hence, storage and handling of these food grains are also a part of supply chain for serving the disaster affected population and to be used as a reserve.

## 7.10 Socioeconomic Baseline of 8 Sites

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

### 7.10.1 Overview

344. The districts where the modern silos facilities are proposed to be constructed have been considered as the project area or project districts. The project districts have a total population of 38.80 million which is 27% of the national population (144.043 million) according to the 2011 Census. Table 7.36 provides the project area districts.

**Table 7-36: Project Area Districts**

	<b>Proposed Sites</b>	<b>Project District</b>	<b>Beneficiary Population (Million) People</b>
1.	Ashuganj	Brahmanbaria	2.84
2.	Barisal	Barisal	2.324
3.	Chittagong	Chittagong	7.616
4.	Dhaka	Dhaka	12.044
5.	Maheswarpasha	Khulna	2.318
6.	Madhupur	Tangail	3.605
7.	Mymensingh	Mymensingh	5.11
8.	Narayanganj	Narayanganj	2.948
Total			38.805

### 7.10.2 Demographic Profile

#### 7.10.2.1 Population

345. The project area comprising the eight districts has a total population of 38.8 million peoples (27% of national population in 2011). Male population is higher in the project area on an average giving the male female ratio of 1.016 (number of male per female), higher than the national average of 1.003. The female population is higher in Barisal, Brahmanbaria, Mymensingh and Tangail districts and male female ratio is the lowest in Brahmanbaria (0.927 male against one female). Following the national average, male population is higher in all other districts and it is the highest in Dhaka district. Table 7.37 shows that average household size in the project area is 4.5 (persons per household) which is a higher than the national average of 4.4. Other than Barisal, Brahmanbaria Mymensingh and Chittagong districts, average household size in the project districts is less than the national average.

346. The project areas has an average population density of 2384 persons per squatter kilometer, more than double the national average (2.35 times the national average of 1015 persons per sq km). Density of population in Brahmanbaria, Chittagong, Dhaka, Mymensingh, Narayanganj and Tangail is high (more than national average) because those include the densely populated city areas. Even with a metropolitan city, population density in Khulna and Barisal districts is low due to climate vulnerability.

**Table 7-37: Population Characteristics in Project Area**

District	Total	Male/Female Ratio	Household Size	Density
Barisal	2.324	0.958	4.5	835

District	Total	Male/Female Ratio	Household Size	Density
Brahmanbaria	2.840	0.927	5.3	1,510
Chittagong	7.616	1.016	4.9	1,442
Dhaka	12.044	1.195	4.2	8,229
Khulna	2.318	1.029	4.2	528
Mymensingh	5.110	0.987	4.4	1,163
Narayanganj	2.948	1.066	4.3	4,308
Tangail	3.605	0.951	4.1	1,056
<b>Total PA</b>	<b>38.805</b>	<b>1.016</b>	<b>4.5</b>	<b>2,384</b>
<b>Bangladesh</b>	<b>144.043</b>	<b>1.003</b>	<b>4.4</b>	<b>1,015</b>

Source: BBS Population and Housing Census, 2011

### 7.10.2.2 Religions Composition

347. Communities in Bangladesh are largely Muslim by religion and more than 90% of its population is Muslim. Hinduism is the religion for the second largest population in the country and constitutes 8.39% of the total population. The rest are communities under Christianity, Buddhism and other religion/faiths. Compared to the national average, proportion of Muslims in the project area is similar but Hindu population is higher. People in other religions are smaller in the area compared to the national average. Table 7.38 shows distribution of project area population by religion.

**Table 7-38: Population by religion in the Project Area**

District	Population by Religion (%)				
	Muslim	Hindu	Christian	Buddhist	Others
Barisal	87.77	11.69	0.526	0.010	0.003
Brahmanbaria	92.51	7.46	0.014	0.004	0.010
Chittagong	86.90	11.31	0.098	1.591	0.099
Dhaka	94.65	4.70	0.515	0.110	0.018
Khulna	76.63	22.68	0.657	0.004	0.031
Mymensingh	95.79	3.58	0.557	0.002	0.067
Narayanganj	95.06	4.89	0.033	0.013	0.007
Tangail	92.72	6.83	0.392	0.003	0.056
Total	90.25	9.14	0.349	0.217	0.036
National	90.43	8.39	0.56	0.37	0.25

### 7.10.2.3 Tribal Communities

348. About 1.6 million of the national population in Bangladesh (144.04 million) belongs to 45 different small ethnic groups. These peoples are concentrated in the north, and in the Chittagong Hill Tracts (CHT) in the south-east of the country commonly known as tribal peoples. However, tribal peoples are also scattered in small proportion all over Bangladesh. A total of 116,926 tribal peoples are living in the 8 project districts of which only 35.72% are living in the urban areas. Half of the tribal communities in Barisal, 70% in Brahmanbaria, and 76% in Dhaka are living in the urban areas. In rest of the districts, tribal peoples are mainly living in the rural areas. **Table 7.39** provides the concentration of tribal peoples in the project districts. Barman, Chakma, Coach, Garo, Hajong, Lusai, Manda, and Marma are the major tribes living in the project districts. Tribal concentration in the project districts is higher in Chittagong, Dhaka, and Mymensingh compared to the other districts.

**Table 7-39: Tribal Population in the Project Area**

	District	Tribal	Living in	Ethnic Groups
	Barisal	76	50.00	Chakma, Garo, Tripura and others
	Brahmanbaria	118	70.34	Chakma, Marma, Lusai and others
	Chittagong	32,165	33.31	Chakma, Tripura, Marma and others
	Dhaka	20,123	76.12	Chakma, Garo, Marma and others
	Khulna	2,054	11.98	Chakma, Barman, Manda and others'
	Mymensingh	35,907	5.44	Garo, Barman, Hajong and others
	Narayanganj	899	35.82	Chakma, Barman, Marma and others
	Tangail	25,584	2.73	Garo, Barman, Coach and others
	Total	116,926	35.72	Barman, Chakma, Coach, Garo, Hajong,
% of total tribal population in Bangladesh				20.67

Source: BBS Population and Housing Census, 2011

### 7.10.3 Economic Profile

349. Bangladesh is a poor and overpopulated country (1015 persons per sq km) and 31.5% of its population is living in poverty. Despite numerous difficulties, Bangladesh economy has grown 5-6% per year since 1996. Although more than half of GDP is generated through the service sector, 45% of the country's population is employed in the agriculture sector with rice as the single-most-important product. The project area largely represents the country in terms of industry, trade and agriculture production. About 52% of the employed population in the project area is engaged in agriculture and half of them own agriculture land. About 50% of the lands in the project area is under grain cultivation. Only 30% of the population has residential structures made of cement concrete materials representing the richer segment of the project area population.

#### 7.10.3.1 Ownership of Farm Land

350. In Bangladesh an average 53% of the total households own farm land and 18% of the total farm households are living in the project area. The proportion of farm households is 36% with respect total households in the project area. By district, farm households are less in Dhaka and Narayanganj due to its metropolitan characteristics. Majority of the farm households (88%) are small holders having farm lands from 0.05 acres to 2.49 acres. Less than one percent of the farm households (0.94%) are large holders having 7.50 acres or more lands and the rest 11% are medium land holders having land between 2.50 acres to 7.50 acres. See Table 7.40 for details.

**Table 7-40: Ownership of Farm Land in the Project Area**

PA Districts	Total HHs	Farm Households		Small (0.05-	Medium (2.50-	Large (7.50+
	No.	No.	%	No.	No.	No.
Barisal	482,075	322,054	66.81	290,408	29,899	1,747
Brahmanbaria	465,720	257,490	55.29	229,014	26,813	1,663
Chittagong	1,298,834	365,173	28.12	334,285	26,171	4,717
Dhaka	2,266,479	241,452	10.65	218,887	20,404	2,161
Khulna	502,835	207,743	41.31	167,904	35,146	4,693
Mymensingh	1,103,260	652,612	59.15	559,053	87,352	6,207
Narayanganj	532,415	119,479	22.44	113,340	5,675	464
Tangail	801,637	501,032	62.50	442,937	54,569	3,526
Total	7,453,255	2,667,035	35.78	2,355,828	286,029	25,178
% of farm households				88.33	10.73	0.94

Bangladesh	28,695,763	15,183,183	52.91	12,812,372	2136415	234,396
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Source: BBS, Bangladesh Agriculture Census 2008

### 7.10.3.2 Land Area and Use

351. Total land area in the project districts is 4.2 million acres (1.7 million ha). The lands as per their use pattern can be classified under fallow, cultivated, forest, irrigated and river. Except in Chittagong and Khulna, more than 50% of the land in the PA is under cultivation. About 25% land in Chittagong and 56% land in Khulna is under forest area. On an average 29% land is under irrigation and 4% is under rivers. Table 7.41 gives the land use pattern in the project area. The differences in land-use pattern have also other implications such as occupation and livelihood sources of the affected households and business.

**Table 7-41: Ownership of Farm Land in the Project Area**

Project District	Total Area (Acres)	Proportion of land by type (%)				
		Fallow	Cultivated	Forest	Irrigated	Under
Barisal	658,859	5.64	58.15	11.99	18.47	5.75
Brahmanbaria	250,745	2.10	60.13	0.16	33.73	3.88
Chittagong	564,288	1.77	45.12	25.14	22.05	5.92
Dhaka	1,100,369	0.93	57.44	3.30	32.75	5.57
Khulna	464,756	1.32	33.34	56.18	7.64	1.52
Mymensingh	651,965	0.05	56.33	3.99	38.89	0.73
Narayanganj	69,492	2.01	51.52	0.20	38.41	7.87
Tangail	443,621	0.82	52.33	8.42	36.54	1.89
Total PA	4,204,095	1.83	51.80	13.67	28.56	4.14

Source: BBS, Bangladesh Agriculture Census 2008

### 7.10.3.3 Housing Status

352. Housing demonstrates the living standard and social status of peoples in Bangladesh. *Pucca* houses (constructed with bricks and mortar) indicate richness while *jhupri* type structures are used by the poor and vulnerable section of the people. Majority of the population in the project area are using *kutcha* structures made of corrugated iron (CI) sheets, wood and bamboo and the middle class people are using semi-*pucca* houses with CI sheet in roof and bricked walls. Around 80% of the population in Barisal, Brahmanbaria, Mymensingh and Tangail are using *kutcha* houses which are the least in Dhaka (16%). On an average, 16% of the project area peoples use *pucca* structures and another 20% use semi-*pucca* structures. Users of *pucca* and semi-*pucca* houses are higher in Dhaka, Chittagong, Narayanganj and Khulna and proportions of households using *pucca* structures are 45.6%, 25.0%, 20.7% and 18.3% respectively and those of semi-*pucca* structures are 36.6%, 20.6%, 33.6% and 23.0% respectively. Users of *Jhupri* houses are the highest in Chittagong – 6% and the lowest in Brahmanbaria – 1.1%. Table 7.42 shows the details of housing status of the project area population.

**Table 7-42: Housing Pattern in the Project Area**

Project Districts	Proportion of households by Housing type (%)			
	Pucca	Semi-Pucca	Kutcha	Jhupri
Barisal	7.3	10.9	80.0	1.8
Brahmanbaria	8.2	13.7	77.0	1.1
Chittagong	25.0	20.6	48.3	6.1
Dhaka	45.6	36.6	15.9	1.9

Project Districts	Proportion of households by Housing type (%)			
	Pucca	Semi-Pucca	Kutchha	Jhupri
Khulna	18.3	23.0	56.6	2.1
Mymensingh	3.6	12.4	80.3	3.7
Narayanganj	20.7	33.6	44.5	1.2
Tangail	2.8	6.5	89.1	1.6
Total project Area	16.4	19.7	61.5	2.4

Source: BBS, Population and Housing Census 2011

#### 7.10.3.4 Employed Population

353. The project area has a population of 38.805 million and only 10% of the population is employed in various sectors including agriculture (43%), industry (17%) and service (40%). Employed population is the highest in Mymensingh with respect to total district population and the lowest in Barisal. About 14% of the population in Mymensingh is employed followed by Tangail (14%), Narayanganj (11%), and Brahmanbaria (10%). Only 9% of the population in Dhaka, 8% in Khulna and 7% in Barisal are employed. See Table 7.43 for details.

**Table 7-43: Occupation by Male and Female**

District	Employed population against	Agriculture		Industry		Service	
		Male	Female	Male	Female	Male	Female
Barisal	6.61	107383	3737	8840	993	27342	5383
Brahmanbaria	10.33	192082	8330	18132	2822	61806	10080
Chittagong	7.56	188033	10294	69862	36073	221082	50246
Dhaka	9.35	109595	4999	174498	105486	521772	209959
Khulna	7.72	89334	5872	17842	4715	47159	13995
Mymensingh	13.59	493383	13030	36896	8800	122466	19843
Narayanganj	11.03	54278	1987	83773	41164	116044	28027
Tangail	13.55	342522	7526	35499	7431	84536	10904
Total PA	9.88	1576610	55775	445342	207484	1202207	348437
% by sex		96.58	3.42	68.22	31.78	77.53	22.47
% by Sector			42.56		17.02		40.42

Source: BBS, Population and Housing Census 2011

#### 7.10.3.5 Poverty

354. Poverty is the state of poorness. It refers to various forms of economic, social and psychological deprivation among the people who lack adequate resources, control or access to power for achieving a minimum level of living. It can be earmarked by income level of the household. The concept of absolute poverty is the minimum level of income that is needed for physical survival. Thus a poverty line can be defined as the minimum level of household income that can be able to purchase a bundle of goods and services to satisfy the basic needs of the household. The Household Income and expenditure Survey (HIES) 2010 used the Cost of Basic Needs (CBN) method to measure poverty incidence. The HIES 2010 have been measured two types of poverty: moderate poverty and extreme poverty. Extreme poverty line is the minimum income to support basic foods and the moderate poverty line is the income to support basic food and non-food expenses.

355. Poverty in the national level has been reduced over the 5 years since HIES 2005 to 31.5% in 2010 from 40% in 2005. Table 7.44 indicates that incidence of poverty is the highest in Barisal division and the lowest in Chittagong division. Poverty persists in both urban and rural areas in

Barisal and Khulna divisions while urban poverty is much less in Chittagong and Dhaka divisions. Incidence of extreme poverty is also the highest in Barisal division, almost double the other divisions. Extreme poverty in the project area is close to the national average due to the higher incidence in the Barisal division. In other areas, the incidence is lower than the national average. Incidence of moderate poverty in the project area is 32.1% again due to higher rate of poverty in the Barisal division.

**Table 7-44: Incidence of Poverty in Project Area**

PA Division	Extreme poverty			Moderate poverty		
	National	Rural	Urban	National	Rural	Urban
Barisal	26.7	27.3	24.2	39.4	39.2	39.9
Chittagong	13.1	16.2	4.0	26.2	31.0	11.8
Dhaka	15.6	23.5	3.8	30.5	38.8	18.0
Khulna	15.4	15.2	16.4	32.1	31.0	35.8
Total PA	17.7	20.6	12.1	32.1	35.0	26.4
<b>Bangladesh</b>	<b>17.6</b>	<b>21.1</b>	<b>7.7</b>	<b>31.5</b>	<b>35.2</b>	<b>21.3</b>

Source: BBS HIES 2010

#### 7.10.4 Education

356. Education plays an important role in eradication of poverty and enhancing social wellbeing. Poverty is negatively correlated with the level of education. The Poverty Monitoring Survey 2004 showed that poverty incidences of the literate were much lower than the illiterates. This was true for both semi-urban and rural areas, but the difference in poverty incidence between literates and illiterates were well pronounced in case of urban areas. Overall, literacy among the project area population is 55.43% which is higher than the national average (51.8%). Student – institution ratio is also higher, meaning more students are enrolled in the educational institutions in the project area.

#### 7.10.5 Literacy

357. According to the population and housing census 2011 (PHC 2011), the project area population has a literacy level of 55.43% which is higher than national average. Literacy rate is the highest in Dhaka (70.50%) followed by Barisal (61.2%), Khulna (60.1%), Chittagong (58.9% and Narayanganj (57.1%). Literacy rate remained below average in Brahmanbaria, Mymensingh and Tangail districts. Although Bangladesh has advanced in female education through various interventions, there is still discrimination between genders in education. Literacy rate among male is still higher than the female populations. Except in Tangail, literacy rate is higher in the male population in all the project districts. . See Table 7.45 for details.

**Table 7-45: Literacy rate by district and gender**

District	Total	Male	Female
Barisal	61.20	61.90	60.00
Brahmanbaria	45.30	45.70	44.90
Chittagong	58.90	59.80	50.80
Dhaka	70.50	73.60	66.90
Khulna	60.10	64.30	55.95
Mymensingh	43.50	44.90	42.20
Narayanganj	57.10	59.50	54.60
Tangail	46.80	50.00	51.00
Total PA	55.43	57.46	53.29

District	Total	Male	Female
National	51.80	54.10	49.40

### 7.10.6 Educational Institutions

358. Almost all the universities in Bangladesh are located in the project area as it includes the major cities of the country. About 17% of the primary schools, 57% of the secondary schools, 27% of the colleges and 92% of the universities in the country are located in the project area. Number of students in these institutions is also much higher than the national average. Number of students in primary schools is 1.8 times the national average, which is 1.4 times for secondary schools and 1.8 times for colleges. Table 7.46 shows the details of educational facilities in the project area. There is no university in Brahmanbaria and Narayanganj districts.

**Table 7-46: Number of Educational Institutions**

District	Primary Schools		Secondary Schools		Colleges		Universities
	No.	Student/	No.	Student/	No.	Student/	No.
Barisal	3,060	760	743	3,128	111	103,003	1
Brahmanbaria	1,040	2,731	194	14,642	35	15,473	
Chittagong	3,106	2,452	866	8,795	181	184,094	14
Dhaka	1,464	8,227	802	15,017	300	202,066	56
Khulna	1,249	1,856	404	5,739	82	35,244	2
Mymensingh	1,798	2,842	453	11,281	72	46,080	6
Narayanganj	519	5,681	131	22,505	23	30,330	
Tangail'	1,561	2,309	380	9,487	61	34,454	1
Total PA	13,797	3,357	10,546	11,324	865	81,343	80
Bangladesh	80,397	1,792	18,500	7,786	3,150	45,728	87
% in PA	17.16	187.35	57.01	145.44	27.46	177.88	91.9

Source: Bangladesh Bureau of Statistics, Zila Profile, 2007

### 7.10.7 Gender Issues

#### 7.10.7.1 General

359. Gender, according to the World Bank definition, refers to culturally based expectations of the roles and behaviors of males and females. The term distinguishes the socially constructed from the biologically determined aspects of being male and female. Unlike the biology of sex, gender roles and behaviors can change historically, sometimes relatively quickly, even if aspects of these roles originated in the biological differences between the sexes. Because the religious or cultural traditions that define and justify the distinct roles and expected behaviors of males and females are strongly cherished and socially enforced, change in gender systems often is contested.

#### 7.10.7.2 Gender Discrimination

360. Women in Bangladesh are gradually coming forward in national development endeavors getting pace in social sector in terms of equity and empowerment. Despite credible successes in poverty reduction and gender equity, significant gender disparity still exists in income-poverty. First, there is the general incidence of extreme poverty for women headed, women-managed and women-supported households. Second, women workers earn considerably less than men workers. Third, lower average consumption for women is also evident from persistent gender inequality in severe malnutrition, mortality and morbidity. In Bangladesh 20–30 per cent of households are headed by women, and 95 per cent of these are considered to fall below the poverty line.

361. The women folks are continuously fighting against poverty and patriarchy, along with malnutrition, high maternal mortality rate, lack of access to resources, environmental degradation, lack of access to health, lack of paid employment, discriminatory wage rates, strict gender division of labor, and lack of scope to exercise political rights. Poor women suffer more than men (and than better-off women) from poverty, hunger, malnutrition, economic crises, illiteracy, environmental degradation and disaster-related problems and become victims of violence and political instability. They are also exposed to exploitation and gender-based violence, excluded from decision making and education and deprived of their right to adequate health and nutrition.

362. Women do not enjoy land and property rights, have lower levels of education than men, work in the informal sectors and experience restricted mobility. The continuing fragmentation of holdings is leading to a loss of security for women from the family network and their normative entitlements to social support beyond the family are weakening. Thus women are becoming more vulnerable to extreme poverty and destitution. Women's work possibilities outside the household have reduced as household asset base has been declined. Women's involvement in field wage labor is outweighed by technological displacement of paddy husking, rice milling and other work (Bridge, 1994). Despite state interventions for women empowerment and gender equality, women are lagging behind in case of education, employment and other social development sectors.

#### *7.10.7.3 Gender Status in Project Area*

363. Gender roles and relations between male and female in the project areas are typical of the Bangladesh society at large. Women constitute 49.6% of the total population in the project area. Compared to men, women are lagging by 4.17% in literacy achievements and they constitute 15.94% of the total employed population. In the traditional male dominant society in Bangladesh, men have easy access to livelihood earnings. Interactions and simple assessment by consultation brought forth the gender inequality with employed women earning about 15% less than their male counterparts. The gender gap in education at present is drawing to a close at an impressive rate at primary and secondary levels. But the gap still persists at higher secondary and tertiary levels. At all secondary levels of education, the drop-out rates are higher for girls than boys. Women in the impact area villages in general have no access over leadership in village and also in their families. In recent years, some of the women got access to the local leadership and they are now members of Union Parishad and municipalities. Poor women have little control over family resources unless it is women headed or have access to micro-credit. Recent developments indicate that women are being gradually regarded instrumental in family economy and decision-making.

#### *7.10.7.4 Women and Food Security*

364. Women play a major and crucial role in food production in Bangladesh. Women constitute of 45.6% of the total farming population. They maintain the dual responsibility of farm and household production. Despite their routine domestic work, women are actively involved in agricultural production. Women in rural areas are generally responsible for most of the agricultural work in the homestead which ranges from selection of seeds to harvesting and storing of crops. About 60-70% of women from landless and near-landless households work as agricultural wage laborers. The role of women in rice production is already substantial and expanding further. Despite impressive gains in public participation over the last two decades, women in Bangladesh remain particularly vulnerable to poverty and food insecurity. It is women who primarily bear the brunt of household food insecurity.

Over 95% of women headed households, which account for 8% of rural households, fall below the poverty line.<sup>13</sup>

## 7.10.8 Coastal Population and Food Security

### 7.10.8.1 Coastal Population

365. Bangladesh has a coastline of 710 km along the Bay of Bengal. About 1/3<sup>rd</sup> of the land area of the country along the coastline is categorized as coastal zone is at the risk of cyclone, tidal surge and salinity intrusion. The coastal zone covers 19 districts<sup>14</sup>, together account 32% of the area and 28% of the population of the country. The principal means of livelihood of the coastal population is agriculture farming. According to a WFP study in the Sidr hit area in December 2007 (60 sample villages), nearly one third (32.5%) of the households were involved in farming either in their own land (15.6%), in leased in land (5%), share cropping (4.2%) or work as an agricultural wage labourer (7.7%). Nearly one quarter of the households (24.7%) were earning their primary livelihood by casual labour. Fishing was the third most common livelihood, representing approximately 16% of households. Nearly ten percent (9.7%) of families were engaged in providing transport services (Rickshaw/van/boat) as their principal livelihood. All these occupations cumulatively provide livelihoods to 83.2% of households. The remaining 17% included primarily trade or own business, salaried employment, remittances, and others.

366. Food security in Bangladesh is characterized by considerable regional variations. Exposure to natural disasters is one of the major factors of food insecurity. According to poverty map 2005, there is a similarity between levels of poverty and levels of food insecurity. Poverty persists in the coastal belt due to frequent disasters and lack of infrastructures. According to a WFP survey in 2007, the coastal population largely represents the poor as 47% consider them extreme poor, 41% poor, 11% middle and less than one percent well-off. According to the Household Income and Expenditure (HIES) survey 2005, about 52% of the households in Barisal division were poor in 2005. Within the 52%, an estimated 36% were below the lower poverty line, and described as extreme poor. HIES 2010 assessed that poverty incidence in the coastal area has been reduced to 39% in 2010.

### 7.10.8.2 Grain Storage at Household Level

367. The major cereal grains in Bangladesh (rice, wheat and maize) are often kept in storage for a considerable period. Cereal grains are stored by farmers to meet their own consumption and for seeds. The produce thus retained is estimated to vary from 10 to 100% of the production. The average retention is about 70% of the produce. Cereal grains are stored either in containers or in bulk. The containers in Bangladesh include *matka* or large earthen pots, and gunny bags (See Figure 7.16).

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<sup>13</sup> Oxfam International, Food Insecurity of Women in Bangladesh- The Causes, Effects and Solution, posted at Oxfam website: <http://oiyp.oxfam.org.au/blog/food-justice/> accessed on 14 November 2012

<sup>14</sup> Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Gopalganj, Jessore, Jhalokati, Khulna, Lakshmipur, Narail, Noakhali, Potuakhali, Pirojpur, Satkhira and Shariatpur. – WARPRO, 2004, Living in the Coast, Problems, Opportunities and Challenges.



**Figure 7-16: Grain Storage at Household Level**

368. Rural storage of cereal grains accounts for about 80% of the produce and is accomplished in traditional storage systems. The techniques used in traditional storage are embedded in custom and has passed down through generations. The type of foodstuff and size of the crops determine the design and capacity of these facilities. There are about eight different types of storage systems used at the farm level in Bangladesh. Among these, dhangola (medium and large sized cylindrical or rectangular bin), bed (cylindrical medium capacity bin), and dole (small capacity cylindrical bamboo-made structure) are common types of storage systems. Among bamboo structures, the most commonly used ones are dole and bed. The dole has a bottom as an integral part of it, but the bed and dhangola do not. The common size of dole is about 0.6 m in diameter and 1 m in height, and the capacity is 240 to 450 kg. The bed is about 1.5 m in height and 1.5 m in diameter, and its capacity is 700 to 1200 kg. The rectangular dhangola is about 7 m in length, 3.5 m in width and 3 m in height, and its capacity is 4000 to 40,000 kg. The dhangola is stronger in construction and more costly than either bed or dole. Experimental studies show that all these three types of bins are suitable for storage of seeds of paddy from harvesting to sowing and that the dole is the best among the three. The optimum capacity of the bed and dole are 2450 kg and 750 kg, respectively.

#### ***7.10.8.3 Loss of Cereal Grain and Crop Seeds***

369. The level of avoidable post-harvest losses of stored cereal grain in Bangladesh is still unacceptably high and varies from 10 to 25% (Banglapedia 2006). The loss occurs partly due to insect and fungal attack during storage. Reducing post-harvest losses depends on proper threshing, cleaning, drying, and storage. Drying is the removal of excess moisture content from the grains to an appropriate level, usually 13-15% (wet basis). Cereal grains in Bangladesh are dried through traditional method of sun drying. In this method, moist crops are spread on a flat surface, commonly of beaten earth, directly in the sun's rays for a certain time.

370. Various assessments after the Cyclone Sidr 2007 provide the information that many of the affected households in the coastal area lost their food and crop seed stocks in the disaster. The WFP study indicates that about 25% of the households in the coastal zone had crop seed stock before the cyclone. The cyclone made complete damage to the seed stock of 10.5% of these households and another 11.5% experienced partial loss<sup>15</sup>.

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<sup>15</sup> WFP, Food Security Assessment after Sidr Cyclone, December 2007

## **8 IMPACT ASSESSMENT AND MITIGATION**

371. This Chapter presents the assessment of the potential environmental and social impacts and recommends appropriate mitigation measures to address these potential impacts.

### **8.1 Environmental Impact Assessment and Mitigation**

#### **8.1.1 Environmental Impact Screening Snapshot**

372. As part of the environmental impact assessment process, a screening matrix was used tailored specifically to the proposed Project, focusing the potential environmental impacts during the design, construction and operation phases. The matrix examined the interaction of project activities with various components of the environment. The impacts were broadly classified as physical, biological and social, and then each of these broad categories further divided into different aspects. The potential impacts thus predicted were characterized as follows:

- High negative (adverse) impact;
- Low negative impact,
- Insignificant impact,
- High positive (beneficial) impact,
- Low positive impact, and
- No impact.

373. The matrix is provided in Table 8.1(next page).

374. The negative impacts predicted in this manner were the ‘unmitigated’ impacts. Appropriate mitigation measures were recommended as part of this EIA, thus reducing the occurrence possibility and severity of the potentially adverse impacts. The potentially negative impacts identified through this process are discussed in the subsequent sections.

**Table 8-1: Environmental and Social Screening Matrix (Unmitigated)**

Project Phases and Activities	Physical					Biological		Social and Socioeconomic												
	Soil Erosion/Contamination	Air Quality	Surface Water Quality	Groundwater Quality	water Availability and Consumption	Natural Vegetation	Wildlife	Land Acquisition	Blocked Access Routes	Noise and Vibration	Impacts on Agriculture and grazing	Flooding	Vehicular Traffic	Safety Hazard	Damage to Infrastructure	Public Health	Aesthetic Value	Cultural Issues	Gender Issues	
<b>Design Phase</b>																				
Site Selection	N	N	N	N	N	N	N	H	N	N	H	H	N	N	N	N	N	N	N	N
<b>Construction Phase</b>																				
Contractor Mobilization	0	H	0	0	0	0	0	0	L	H	0	0	H	H	L	H	0	L	L	
Equipment / Material	0	H	0	0	0	0	0	0	L	H	0	0	H	H	L	H	0	0	0	
Construction Camp Establishment	L	L	L	0	0	L	0	L	L	H	0	L	L	H	L	H	L	L	L	
Operation of Construction Camp	H	H	H	H	H	0	0	0	0	H	0	0	H	H	H	H	0	H	L	
Site Clearance	H	H	L	0	0	H	0	0	H	H	0	0	H	H	H	H	L	0	L	
Borrow and disposal area	H	L	L	0	0	H	0	0	H	H	H	0	H	H	H	0	H	0	L	
Excavations	H	H	L	L	0	0	0	0	H	H	0	0	H	H	H	H	L	0	L	
Foundations	H	H	L	L	L	0	0	0	H	H	0	0	H	H	H	H	L	0	L	
Fabrication of Silos	H	H	L	L	0	0	0	0	H	H	0	0	H	H	H	H	L	0	L	
Installation of Machinery and	H	H	L	L	0	0	0	0	H	H	0	0	H	H	H	H	L	0	L	
Demobilization	0	H	0	0	0	L	0	0	L	H	0	0	H	H	L	H	0	L	L	
<b>Operation Phase</b>																				
Operation of Machinery and	H	H	H	0	L	0	0	0	0	H	0	0	0	H	0	H	0	0	0	
Fumigation	H	H	0	0	0	0	0	0	0	0	0	0	0	H	0	H	0	0	0	
Repair and Maintenance	H	H	H	0	0	0	0	0	0	H	0	0	L	H	0	H	0	0	0	
Grain Transportation	0	H	0	0	0	0	0	0	H	H	0	0	H	H	H	H	0	0	0	

Key: H: High negative impact; L: Low negative impact; 0: insignificant/negligible impact; +L: low positive impact; +H: High positive impact, N: no impact.

### 8.1.2 Potential Impacts during Design Phase

375. The potentially significant negative impacts associated with the decisions made during the design phase. The possible impacts need to be considered during design phase are as follows:

- Risk of flooding and inundation.
- Loss of agricultural and grazing land;

These potential impacts are discussed below.

### 8.1.3 Risk of Flooding and Inundation

376. Any flooding and inundation will altogether undermine and negate the very purpose of these silos. Flooding normally occurs in Bangladesh during the monsoon season from June to September. The catastrophic floods of 1987 occurred throughout July and August and affected 57,300 km<sup>2</sup> of land, (about 40% of the total area of the country). The flood of 1988 was also of catastrophic consequence, occurred throughout August and September. The waters inundated about 82,000 km<sup>2</sup> of land, (about 60% of the area). In 1998, over 75% of the total area of the country was flooded. The 2004 flood was very similar to the 1988 and 1998 floods with two thirds of the country under water. The peak water depth and maximum discharge data at four different locations of Bangladesh (Aricha, Bahadurabad, Bhairab Bazar, Hardinge Bridge) are collected for the period 1975 to 2009 from the database of Bangladesh Water Development Board and Institute of Water Modeling (IWM) of Bangladesh. From the analyses of flood frequency, it is found that the country's worst flood of 1988 has the recurrence interval of 40 to 100 years and the 2004 flood has the recurrence interval of 20 to 100 years. The following table shows the different historical floods with its estimated recurrence interval in years.

**Table 8-2: Estimated Flood Recurrence Interval**

Flood reference year	Recurrence interval of flood (year)
1975	9.99
1990	2.33
1988	40-100
1998	10-100
2004	20-100

377. Other than Madhupur, all other seven selected sites for the proposed silos are near the rivers. The historical data of flooding for the sites are as follows.

**Table 8-3: Flooding History and Land Elevation Information of the Sites**

Silo Site	Location with respect to the river	Type of land	Average GL of sites above/below of plinth level of existing godowns	Drainage system	Flooding Status
Barisal	Western Bank of the River Kirtonkhola	Low marshy land/ditch land	Below of 3 ft	Natural drainage. There is no sewerage system.	The highest tidal water level is 1ft below the top of the river bank.

Silo Site	Location with respect to the river	Type of land	Average GL of sites above/below of plinth level of existing godowns	Drainage system	Flooding Status
Narayanganj Central Supply Depot (CSD)	Shitalakshya river is in the west	Low undulated land	Below of 3 ft	Water are accumulates in the pond inside the compound and natural flow towards the river. Sewerage system exists.	The site is not affected by flood water. Highest flood water level was 2'-0" above internal road level in 1998.
Dhaka CSD	Buriganga river is in South	Flat low land	Below of 2.5 ft	Natural drainage. Sewerage system exists	The proposed land is 2'-6" below plinth level of exiting go down. The site was flooded by 3'-6" in 1988 flood.
Ashuganj	Site is located on the east side of river Meghna	Low undulated land	Below of 3 ft	Natural drainage. Sewerage system exists	Highest flood water level was 1'-0" above internal road level in 1998.
Mymensingh	Site is Situated on the Southern bank of the river Brahmaputra	Low marshy land/ditch land	Below of 2.5 ft	Natural drainage. Sewerage system exists	The site is not affected by flood water. Water level is 1'-0" below the top of Mymensingh – Tangail high way during monsoon period.
Maheswarpasha (Wheat)	The site is located on The western Bank of the River Bhairab	Low undulated land	Below of 4.5 ft	Natural drainage. Sewerage system exists	The proposed site is located on the western bank of the river Bhairab. Water level is 1'-0" below the top of concrete jetty during the tidal period.
Chittagong (Wheat)	No river	Low undulated land	Below of 1.5 ft	Natural drainage. Sewerage system exists	Not affected by flood
Madhupur	No river	High land	No existing godowns	No sewerage and drainage system	The site is not affected by flood water. The proposed site is located on the Madhupur high land.

378. The historical data shows Dhaka, Narayanganj, Ashuganj, Mymensingh and Maheswarpasha were inundated in last 30 years and Madhupur does not have any natural drainage system. In addition the existing godowns are already higher than the existing ground level. From consultation, it was found, water entered to the Narayanganj Godown during 1988 flood. The significance of this unmitigated impact is assessed as **high and long term**. Huge losses are likely to take place in case of flooding

379. **Mitigation Measures.** The following measures will address the flooding and inundation risks:

- 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 if the available sites are not currently at the appropriate level.
- Appropriate drainage system will be included in the facility design.

380. **Residual Impacts.** With the help of the above measures, the impact due to flooding and inundation will be adequately reduced. Therefore the significance of the residual impacts will be **low to medium**.

#### 8.1.4 Loss to Agriculture and/or Grazing Land

381. The proposed silos will be constructed either within the existing facilities or at the government-owned vacant land. Table 8.3 shows other than Madhupur each of the sites may need to raise to meet the minimum height to avoid flood level. Each of the site will need soil. There is paddy field at the south of Ashuganj site, and to the east of the Madhupur site, Government khas lands under District Commissioner are used to cultivate for production of banana and pineapple. Collecting top soil from the existing agricultural land will cause loss of agricultural production. Storage of construction material on the agricultural land, disposal of debris from the Dhaka CSD, Maheswarpasha CSD and possibly Narayanganj will cause loss of agriculture and grazing land for short time.

#### Mitigation Measures

- The possible sources of material should be identified at the design phase. The contractor needs to comply with the identified sources. If necessary the contractor will identify the sources of material which will not impact the existing agricultural land and grazing land.
- If the adjacent agriculture land is used for collecting earth, the contractor will ensure the topsoil are put aside during collection and put back to the earlier place after collection.
- The location of stockpiling of construction material, construction camp and debris from the demolished structure should be identified. The locations will neither the agricultural/grazing land nor the location which will create problem to the adjacent areas including residential, school, mosque etc and local people.

#### 8.1.5 Damage to the Existing Infrastructure

382. Establishment of construction camp, pile driving and other civil works for construction of silo, stock piling of construction material, increasing traffic during construction and operation will impact the existing social infrastructure in the vicinity, if those are not addressed properly during the design phase. The list of structures within the vicinity of 500m of the sites are as follows:

**Table 8-4 Existence of Important Infrastructure within 500 m from the DG Food Demarcated Area**

Ashuganj	Barisal	Chittagong	Dhaka	Madhupur	Maheswar-pasha	Mymensingh	Narayanganj
2 schools, 1 madrasa, 4 mosques, 1 community graveyard and Eidhah	Four schools and 2 colleges, 4 mosques and 2 churches, 6 private clubs, Martyrs' mausoleum	KEPZ, TSP Complex	Three mosques and mazars, residential area, police station, one school is under construction	Boundary wall of BFIC, Government Khas land used for pineapple and banana cultivation	4 mosques, 3 madrasa, 1 school	1 river crossing for public use	1 mosque and Strip of river bank (for public recreation)

### Mitigation Measures

- The design will ensure location of stockpiling of construction material, construction camp and debris from the demolished structure has been identified. The locations will not create problem to the adjacent areas including residential, school, mosque etc and local people.
- The contractor will come with the work plan which will identify the sources of material, the route of transportation to the site and construction time.
- At the design period, a traffic management plan with the existing traffic and projection of increased traffic volume during the construction and operational phase should be developed to minimizing the noise pollution during construction and operation phase.

#### 8.1.6 Damage due to Waste Disposal

383. Table 8.3 shows Barisal and Madhupur site has no sewerage system. However, other than Madhupur other sites have natural drainage system. Even though Dhaka, Narayanganj, Chittagong, Maheswar-pasha, Mymensingh and Ashuganj have existing sewerage system, temporary establishment of construction camp may supersede the capacity of the existing system. If proper and adequate drainage and sewerage system and proper waste collection method is not provided that will create overflow of existing system, odor issue, public nuisance and pollution of river.

### Mitigation Measures

- Proper waste management and disposal system should be considered during design period and done construction period for all sites.
- Temporary workers camp and sanitary toilets for the workers should be installed before starting the work.
- Mechanism for the safe disposal of solid waste and other construction waste should be developed in project site before the actual commencement of work.
- The waste should not be disposed in near-by river at any mean.

#### Responsibility

- The Design Consultant will ensure the above environmental mitigation measures have been considered in the project design.
- The contractor needs to comply with the identified measures and come up with the work plan addressing the environmental issues and mitigation measures with Environmental Action Plan (EAP) and submit with BoQ
- DG Food will endorse the adequacy of the EAP

## 8.2 Potential Impacts during Construction Phase

384. The potentially negative impacts likely to be caused by the construction activities include the following:

- Loss of natural vegetation
- Noise and vibration
- Air quality deterioration including dust pollution
- Soil and water contamination
- Blocked access routes
- Soil erosion
- Safety hazard and public health
- Loss of livestock grazing area
- Damage to infrastructure
- Aesthetic value
- Social Conflict due to labor from outside
- Water availability and consumption

These potential impacts are discussed below.

### 8.2.1 Loss of Natural Vegetation

385. 450 trees will need to be felled to clear the land for constructing silos at the proposed sites, as shown in the Table 8.5 below.

**Table 8-5: Trees to be Cut**

Sl No	Name of the Sites	Name of the tree	Scientific name	No. of matured trees	Total no. of trees directly affected
1.	Barisal CSD Campus	Mehugony	<i>Swieteniamahogoni</i>	44	69
		Koroi	<i>Albizzia lebbek</i>	09	
		Dates (Khejur)	<i>Phoenix dactylifera</i>	03	
2.	Narayanganj CSD	Mango	<i>M. indica</i>	04	10
		Jackfruit	<i>Artocarpus heterophyllus</i>	06	
3.	Dhaka CSD Campus	Jackfruit	<i>Artocarpus heterophyllus</i>	3	9
		guava		6	
4.	Ashuganj Silo Campus	eucalyptus		23	30
		Koroi	<i>Albizzia lebbek</i>	07	
5.	Mymensingh CSD Campus	Betel nut	<i>Areca catechu</i>	5	159
		Coconut	<i>Cocos nucifera</i>	106	
		Koroi	<i>Albizzia lebbek</i>	4	
		Mahogany	<i>Swieteniamahogoni</i>	24	
		Jackfruit	<i>Artocarpus heterophyllus</i>	6	
		Mango	<i>M. indica</i>	4	
		Guava		1	

		Banyan	<i>F. religiosa</i>	1	
		Plum (Boroi)	<i>Ziziphus mauritiana</i>	4	
		Krishnachura	<i>Caesalpinia pulcherrima</i>	4	
6.	M. Pasha CSD Campus	Mahogany	<i>Swieteniamahogoni</i>	51	97
		Koroi	<i>Albizzia lebbek</i>	17	
		Coconut	<i>Cocos nucifera</i>	28	
7.	Chittagong Silo Campus	Mahogany	<i>Swieteniamahogoni</i>	3	16
		Mango	<i>M. indica</i>	5	
		Jackfruit	<i>Artocarpus heterophyllus</i>	1	
		Neem		1	
		Gamari	<i>Gmelina Arborea</i>	2	
		Rubber	<i>Hevea brasiliensis</i>	2	
		Betel nut	<i>Areca catechu</i>	1	
		Banyan	<i>F. religiosa</i>	1	
8.	Madhupur Highland	Koroi	<i>Albizzia lebbek</i>	01	60
		Akashmoni	<i>Acacia auriculiformis</i>	47	
		mango	<i>M. indica</i>	01	
		Banana	<i>Musa sapientum</i>	04	
		Jackfruit	<i>Artocarpus heterophyllus</i>	07	
	<b>Grand</b>				<b>450</b>

386. The above table shows a number of vital species of trees will be cut. Specially in Mymensingh CSD the impacts due to tree cutting is major. The duration of the impact is long-term, irreversible and certain. The trees to be cut may not be all matured. Compensatory measures are possible but will take time to be effective.

387. **Mitigation Measures.** Compensatory tree plantation will be carried out within the facility and saplings five times the trees felled will be planted. Before starting the construction works, the contractor will prepare an inventory of the trees to be felled. The contractor will then prepare a tree plantation plan and the species to be planted and obtain approval from the Supervision Consultants. The plantation of trees will most likely take place towards the end of the construction phase. Appropriate maintenance and monitoring will need to be carried out to ensure survival and growth of the planted trees.

### 8.2.2 Noise and Vibration

388. The construction activities and increased vehicular traffic will generate noise and vibration which are likely to affect the nearby communities.

**Table 8-6: Number of Piles to be Driven**

Ashuganj	Barisal	Chittagong	Dhaka	Madhupur	Maheswarp asha	Mymensingh	Narayanganj
1980	1040	2520	1140	1440	1590	1200	640

389. The above information shows the maximum noise and vibration for pile driving will be at Chittagong. As mentioned in the Table 8.4 Dhaka, Ashuganj, Maheswarpasha and Barisal have number

of social infrastructures within 500 m of contour. Barisal has a Martyr Monument in the vicinity of the silo site. The construction workers will be affected most due to the noise of pile driving.

390. **Mitigation Measures.** The following measures will address the potentially negative impacts of the Project associated with noise and vibration:

- The contractors will ensure that the noise from the construction sites and camps complies with the national and WB standards.
- Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants.
- 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, to avoid noise pollution.
- Working hours for construction activities within/near the communities will be limited to between 8 am and 6 pm.
- Liaison with the community will be maintained. Grievance redress mechanism will be put in place to address the community complaints.
- Proper scaffolding is needed to protect the Martyr Monument in Barisal. The contractor needs to observe regularly to check if there is any crack in the monument due to pile driving. If so, they immediately need to stop the work and inform the archeological department through the implementing agency.
- The construction workers need to be provide The workers will use safety device for protection of ears (earmuffs and ear-plugs etc.) following IFC guideline
- Silo facility foundation shall be designed to minimize vibration effect.

### 8.2.3 Air Quality

391. Construction machinery and project vehicles will release exhaust emissions, containing carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and particulate matter (PM). These emissions can deteriorate the ambient air quality in the immediate vicinity of the project sites. Furthermore, construction activities such as excavation, leveling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions. These emissions pose health hazards for the nearby communities. This **unmitigated** potential impact is characterized and assessed as follows:

Impact Parameter	Nature of Project Impact	Characterization of Project Impact
Duration of impact	Medium term (during construction phase only)	Moderate
Spatial extent	May extend beyond Project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible in short term	Minor

Impact Parameter	Nature of Project Impact	Characterization of Project Impact
Legal standards	Unmitigated emissions will breach the national standards	Major
Likelihood of impact	Certain	Major
Sensitivity	Moderate impacts on nearby	Medium
Impact Significance		<b>Moderate</b>
Residual Impact if mitigated	Construction related air pollution	<b>Low to Negligible</b>

392. **Mitigation Measures.** The following measures will address the potentially negative impacts of the Project associated with air quality deterioration:

- The vehicular and equipment exhaust will comply with the national standards.
- Contractor to ensure compliance with the standard for ambient air quality.
- Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.
- Liaison will be maintained particularly with the communities near the camps and work sites.

#### 8.2.4 Soil and Water Contamination

393. Wastes particularly effluents from the works sites may contaminate the soil and water. The contractors' camps will generate domestic solid waste and waste water including sewage. The contractors' workshops will generate oily water, waste oils, oily rags, and other similar wastes. The stores and warehouse will generate solid waste such as empty cement bags, cardboards, and wooden crates. Improper disposal of these waste streams can potentially contaminate the soils and water resources of the area. Soil and water contamination can potentially have negative impacts on the local community, natural vegetation, agriculture, and biological resources of the area including aquatic flora and fauna.

394. Table 8.3 shows Barisal and Madhupur site has no sewerage system. Even though Dhaka, Narayanganj, Chittagong, Maheswarpasha, Mymensingh and Ashuganj have existing sewerage system, temporary establishment of construction camp may supersede the capacity of the existing system. If proper and adequate drainage and sewerage system and proper waste collection method is not provided that will create overflow of existing system, odor issue, public nuisance and pollution of river.

395. Deep foundation will be needed for the silo construction. The pile will be driven through the groundwater in all sites. The groundwater quality may be affected.

**Table 8-7: Pile driving into GW= Pile length – GW depth (m)**

Ashuganj	Barisal	Chittagong	Dhaka	Madhupur	Maheswarpasha	Mymensingh	Narayanganj
19.8	30	29.58	29.75	17.84	37.1	27.73	19.75

396. **Mitigation measures.** The following measures will address the potentially negative impacts of the Project associated with soil and water contamination:

- The contractors will prepare separate waste management plans for each site in accordance with international best practice.
- No untreated waste effluents will be released to ground or water.
- Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.
- For the domestic sewage from the construction camps and offices, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity. The contractors will submit to the Supervision Consultants the plans for the camp layout and waste disposal system, and obtain approval. As stated above, the camps will preferably be established inside the existing CSD facilities as far as possible.
- Waste oils will be collected in drums and sold to the recycling contractors.
- The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) 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 construction camps will be disposed in a manner that does not cause soil contamination. The waste disposal plan submitted by the contractor(s) will also address the solid waste.

397. **Residual Impacts.** With the help of the above measures, the potential impacts associated with soil and water contamination are likely to be adequately addressed, and hence the significance of the residual impact will be **low**.

#### 8.2.5 Blocked Access Routes

398. The silo site of Dhaka, Maheswarpasha, Ashuganj and Barisal are in congested area. The construction camps, construction activities and stock-piling of construction material can potentially block the access routes and roads inside and in the vicinity of the silo sites. In Dhaka and Maheswarpasha and possibly in Narayanganj, the debris of the demolished structure may block the access routes.

399. **Mitigation measures.** The following mitigation measures will be implemented to address the potential impacts associated with the blocked routes:

- The contractor will prepare traffic management plan prior to commencing mobilization and obtain approval from the Supervision Consultants.
- The construction facilities (work areas, camp sites, workshops, others) will be established after obtaining approval from the Supervision consultants and ensuring that no roads or routes are blocked.
- In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.

400. **Residual Measures.** With the help of above measures, the potential impacts associated with blocked routes are likely to be adequately addressed. Therefore the significance of the residual impact is expected to be low.

### 8.2.6 Soil Erosion

401. The proposed all sites are located in generally flat areas and existing site is not prone to soil erosion. However, certain construction activities can potentially soil erosion at the proposed sites particularly during the rainy season. Soil erosion can potentially affect the integrity of the existing and proposed buildings at the sites, can cause water ponding particularly during rainy season, and can also affect the trees and natural vegetation of the area. The construction activities which could potentially cause soil erosion include the following:

- Construction camp establishment
- Site clearance
- Excavation
- Obtaining material from borrow sites
- Construction of silo foundations.

402. **Mitigation Measures.** The following mitigation measures will help avoid/mitigate any soil erosion at the proposed silo sites:

- Material borrowing and disposal plan will be prepared and approval obtained from the Supervision Consultants. .
- Cultivation fields will be avoided for borrowing material to the extent possible.
- Written consent of the land owner will be obtained for material (soil) borrowing. A standard form should be prepared and used for this purpose.
- The borrow and disposal areas will be re-contoured to avoid deep ditches or high mounds.
- Photographic record (before, during and after) will be kept for the borrow and disposal areas.
- Leveling and re-contouring borrow sites will be carried out.
- Cut and fill at the proposed sites will be carefully designed, and ideally should balance each other. The surplus soil, if any, will be disposed at places approved by the Supervision Consultants (“Engineer”). Such sites will be selected after surveying the area and ensuring that soil deposition will not have any significant impacts, such as loss of productive land, blocked access, natural vegetation and disturbance to drainage.
- If necessary, fill material for silo sites will be obtained from appropriate locations approved by Supervision Consultants. Such locations will be selected after surveying the area and ensuring that soil extraction will not have any significant impacts, such as soil erosion, loss of natural vegetation and disturbance to drainage.
- Where the use of cultivated land is unavoidable for obtaining the fill material, the top 30 cm soil layer will be removed and stockpiled for redressing the land after removal of the borrow material. The excavation in such areas will be limited to 50 cm depth.
- The fill material will not be obtained from any cultivation fields or orchards, unless the consent of the owner is obtained.
- Areas from where the fill material is obtained or surplus soil deposited, will be landscaped to minimize erosion and hazard for people and livestock.

- Construction camps will be located in a stable and flat area, requiring minimal devegetation and leveling. The contractor(s) will obtain approval from the Supervision Consultants for this purpose. The camps will preferably be located inside the existing CSD facilities.
- Embankments and excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (eg, stone pitching).
- Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water bodies will be minimized.
- After the completion of the construction works, the construction sites, campsites and other work areas will be completely restored. No debris, surplus construction material or any garbage will be left behind.
- Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites.

### 8.2.7 Vehicular Traffic

403. The construction activities will cause an increase in the vehicular traffic on the local roads. Similarly, transportation of silo equipment and materials will also cause additional traffic on the access routes (roads and water ways). This increased traffic can potentially cause traffic congestions on roads and in waterways and also pose safety hazards for the nearby population particularly children.

404. Sensitivity study will reveal the anticipated traffic volume to assess the impact of traffic congestion. An example of sensitivity analyses are presented (used TRIP model is presented in the Annex 3) considering 10 tons/truck loading to identify the maximum allowable traffic loads for all the 08 sub project sites of phase-I using traffic survey data outside the sub project sites. The results of the sensitivity analyses are presented in the following Table.

**Table 8-8: Allowable Additional Simulated Vehicles**

SI No	Sub project Site	Present peak rate of traffic	Allowable additional simulated vehicles
1.	Barisal CSD Campus	196	50
2.	Narayanganj CSD Campus	224	25
3.	Dhaka CSD Campus	Not surveyed	---
4.	Ashuganj Silo Campus	256	30
5.	Mymensingh CSD Campus	244	50
6.	Maheswarpasha CSD Campus	244	35
7.	Chittagong Silo Campus	264	25
8.	Madhupur Highland	Not surveyed	---

405. And it is quiet anticipated that, the number of trucks carrying construction materials including cement, reinforcing bars, sand and stone chips should not exceed this rate of truck flow limit during construction.

406. Moreover, 40 ocean containers with silo equipments will be transported from Chittagong/Mongla port to all other sub project areas of the BMFSFP. According to the sensitivity example (Annex 5), there should not be any regular traffic congestion due to movement of these container vehicles.

407. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- The contractors will prepare a traffic management plan for each site and obtain approval from the Supervision Consultants. In particular, transportation and equipment and material will be astutely planned to avoid traffic congestion and other associated problems.
- Project drivers will be trained on defensive driving practices.
- Speed limits will be enforced for the Project vehicles.
- Reduced speed near/through communities.
- Liaison should be maintained particularly with the communities near the camps and work sites.
- Safety signage should be placed at the work sites.

### 8.2.8 Safety Hazards and Public Health

408. The steel silo will be constructed on the base of the silo mentioned above. The factory fabricated galvanized steel sections of the silos and other steel structural members will be bolted with the vertical members of the silo bins to form the round outer skin of the silo as per the diameter of the bin. The upper cone of the silo will then be placed and constructed on top of this. Once the top cone has been placed on the first section the entire structure will be raised by a battery of special jacks placed at the base of the silo and another circular section added beneath it. The entire construction, till it reaches the required height, will thus be completed. The conveyor belts and other equipment of the silos will be connected with the system as the construction works progress.

409. The construction activities will involve operation of **heavy construction machinery, vehicular traffic, excavation, filling operations and demolition of structures**. These activities may pose some safety hazards to the local population. The **fuel storage** at the camp sites may also pose safety hazards for the construction staff as well as for surrounding population. **Stockpiling** of construction material in all sites and debris from the demolished structure may cause serious accident to the construction worker and people in the vicinity.

410. **Slips and falls** on the same elevation associated with poor housekeeping, such as excessive waste debris, fall of bolts during assembling of steel frames, loose construction materials/bolts, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction sites.

411. Construction of steel silos may pose significant hazards related to the potential **fall of materials or tools**, as well as ejection of solid particles from abrasive or other types of power tools during assembling of the steel frames from height which can result in injury to the head, eyes, and extremities.

412. Vehicle traffic and **use of lifting equipment** in the movement of machinery and materials on a silo construction site may pose temporary hazards, such as physical contact, dust, emissions, and noise. Equipment operators have limited fields of view close to their equipment and may not see pedestrians

close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

413. Inappropriate waste disposal at the camps and construction sites, and air quality deterioration caused by the Project’s vehicular traffic and construction activities potentially pose health hazards for the construction staff and nearby population.

414. Unhygienic condition and unavailability of safe drinking water for the construction staff will expose them to health risks. In addition, influx of construction staff can potentially expose the nearby population to communicable diseases. The **unmitigated** potential impact is characterized and assessed below.

Impact Parameter	Nature of Project Impact	Characterization of Project Impact
Duration of impact	Short term (during construction phase only)	Minor
Spatial extent	May extend beyond Project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible	Minor
Legal standards	-	Minor
Likelihood of impact	Likely	Moderate
Sensitivity	Severe impacts on nearby communities and along road/waterway traffic	Major
Impact Significance		<b>Major</b>

415. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- The contractors will prepare site specific Health, Safety and Environment (HSE) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS.
- The contractor will provide personal protective equipment (PPE) to the construction staff and will ensure its appropriate usage.
- The construction staff will be screened for communicable diseases.
- Availability of safe drinking water will be ensured for the construction staff.
- 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 site. Each site will have an ambulance available.
- The WBG’s EHS Guidelines will be included in the contract documents.
- The construction sites will have protective fencing to avoid any unauthorized entry.
- The project drivers will be trained for defensive driving skills.
- Vehicular speeds near/within communities will be kept low to minimize safety hazards.

- Camp sites will be selected with approval of the Supervision Consultants, as mentioned earlier. The camps will have periphery fencing to avoid any unauthorized entry.
- Firefighting equipment will be made available at the camps and worksites.
- The camp staff will be provided safety including fire fighting training.
- 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.
- The contractor will prepare Demolition Work Plan for each site when necessary and obtain approval from the Supervision Consultants. The Demolition Work Plan should be prepared following BNBC.
- Liaison with the community will be maintained.
- An Engineer should be consulted before modifying a silo because a simple can drastically alter its structural ability. Equipment attached to a silo can impose dangerous loads.

416. **Residual Impacts.** Despite the implementation of the above measures, some safety hazards and risks are still likely to exist. Therefore the significance of residual impacts has been assessed as **medium**.

### 8.2.9 Livestock Grazing

417. Seven of the eight proposed sites for the silos are already inside the Food Department's facilities. However, some livestock grazing was observed even inside some of these facilities. The construction activities are likely to negatively affect this grazing particularly at and in the immediate vicinity of the construction sites, construction camps and other Project facilities.

418. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- Consultations will be carried out with the communities to be affected to identify alternate grazing areas.
- The affected communities will be offered employment at the construction sites to compensate for any loss of grazing areas.

### 8.2.10 Damage to Infrastructure and Monuments

419. The construction activities may require removal of some existing infrastructure in Dhaka, Maheswarpasha and Narayanganj within the CSDs. In addition, there could be some inadvertent damage to the roads, electricity lines, water channels, jetties, and other structures during the construction activities, transportation of equipment and material, and associated vehicular traffic. The Barisal site has a Martyr Monument. Dhaka, Maheswarpasha, Barisal and Ashuganj in an area with number of infrastructure around. A number of 5-6 storied buildings are in close vicinity of the boundary wall of Dhaka site. These area will be affected by the deep pile driving.

**Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- The condition of the infrastructure in the vicinity will be regularly monitored.

- It will be ensured that no damage is caused to the monument at Barisal site.
- Appropriately sized vehicles will be used to transport the material construction , minimizing the wear and tear of the transportation routes.
- Proper scaffolding is needed to protect the Martyr Monument in Barisal. The contractor needs to observe regularly to check if there is any crack in the monument due to pile driving. If so, they immediately need to stop the work and inform the archeological department through the implementing agency.
- All damaged infrastructure will be restored to original or better condition.

#### 8.2.11 Aesthetic Value

420. Site clearance, tree felling, presence of construction material/machinery, and construction activities may potentially affect the aesthetic value of the area.

421. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- Screens will be used at the site periphery
- Landscaping and tree plantation will be carried out at the site and camps where possible.
- Proper housekeeping will be regularly carried out at the site and camps.

#### 8.2.12 Water Availability and Consumption

422. Water consumption during the construction phase (camp operation and construction activities) can potentially cause conflict with the existing water users particularly nearby communities.

423. **Mitigation measures.** The following mitigation measures will address the negative impacts of the Project associated with the water consumption:

- Astute planning will be employed to conserve water at the construction sites and camps. Water will be procured in a manner that least affects the existing water users and local communities.
- The contractors will submit the plan to procure and consume water for their construction as well as camp needs, and obtain approval from the Supervision consultants.
- Extreme care will be taken when working close to wells and other water sources. Any damage caused by the project activities will be repaired.

#### 8.2.13 Social Conflict

424. 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.

425. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- Liaison with the communities will be maintained throughout the construction phase.
- Grievance redress mechanism will be established at each site (details are provided later in the document).

### **Responsibility**

- The contractor will execute the mitigation measures as mentioned in the Environmental Action Plan (EAP)
- The Supervision Consultant will regular monitor the activity
- DG Food with the Sr. Environmental Specialist in PMU will ensure that all environmental mitigation measures are adequately addressed.

## **8.3 Potential Impacts during Operational Phase**

426. The potentially negative impacts likely to be caused by the operation and maintenance (O&M) activities include the following:

- Safety hazards and public health
- Impact from Ancillary Facilities
- Air quality
- Soil and water contamination
- Water consumption
- Noise and vibration.
- Vehicular traffic
- Damage to the infrastructure
- Aesthetic value.

These potential impacts are discussed below.

### **8.3.1 Safety Hazards and Public Health**

427. The O&M activities may pose some safety hazards particularly to the O&M staff. These may include electrocution, fall, burns, cuts and other body injuries, asphyxiation, and exposure to phosphine gas. The fuel storage at the silo facilities may also pose safety hazards for the O&M staff as well as for surrounding population.

428. Inappropriate waste disposal and air quality deterioration caused by the O&M activities potentially pose health hazards for the O&M staff and nearby population. Unhygienic condition and unavailability of safe drinking water for the O&M staff will also expose them to health risks.

429. O&M staffs are particularly exposed to the fumigants which may cause severe respiratory irritation.

430. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

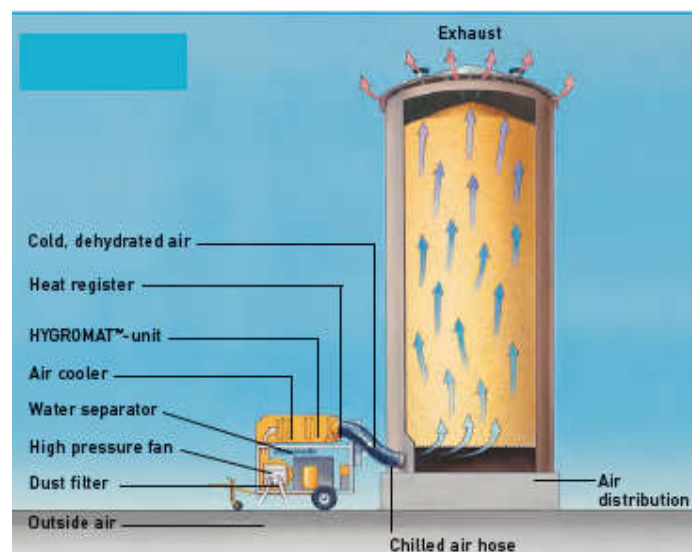
- Each facility will prepare a site specific Health, Safety and Environment (HSE) Plan. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS. The HSE Plan will be made an integral part of

the Operational Manual of each facility. The Plan will particularly address procedures to handle aluminum phosphide and to prevent exposure to phosphine gas.

- Material safety data sheet (MSDS) will be followed to handle aluminum sulphide and other hazardous chemicals.
- PPE will be provided to the O&M staff.
- 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.
- The O&M staff will be provided safety including fire fighting training.
- 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.

### 8.3.2 Impact from Ancilliary Facilities

431. The silos will be equipped with several ancillary facilities like commercial scale grain chiller and dryer; commercial scale fumigation system; fuel storage; mechanical handling system; generator as power back up system. Air pollution and electricity consumption are the main problem due to commercialized refrigeration. Figure 8.1 shows an example of typical grain chilling procedure. Carbon di Oxide (CO<sub>2</sub>), Nitrogen Oxide (NO<sub>x</sub>) and Sulfur di Oxide (SO<sub>x</sub>), Suspended Particulate Matter (SPM) are the typical pollutants which are expected from the exhaust emission from silo and refrigerators.



**Figure 8-1: Process Grain Chilling**

Source: Frigortech Technical Manual

432. The drying facility, mechanical handling system will cause dust pollution and electricity consumption. Fuel storage for machines, Generator for electricity back up will cause air pollution or accidental hazard. If fumigation is necessary special attention and guideline needs to be followed for fumigant application.

433. **Mitigation Measures.** The following measures will address the potentially negative impacts of the Project associated ancillary facilities:

#### **Fumigation Application Guideline**

434. In storage of food grains during operation of silos, aluminum phosphide (AP), will be used as a fumigant to prevent infestation so that the silo complex will not be cross contaminated. Phosphine gas from aluminum phosphine granules and the gas is bio degradable. It does not have any kind of residual effect on the food grains. AP is safe and well accepted all over the world as only a certified agency involved in the Pest Management would carry out this duty. The DGF has its own dose limit of using AP (12 gm/mt) in food grains and this dose will be followed also as guideline of fumigation in BMFSFP. DGF is authorized to use the indicative dose of fumigant agent in food grains.

**PHOSPHINE**(hydrogen phosphide) (Phostoxin, Detia, Fumitoxin, Phostek, Gastoxin, etc.)

- Widely used on stored grain.
- Good sealing is critical.
- Time is critical.
- Probing greatly improves results.
- Recirculation or modified technique for grain depths greater than 30 feet.
- EPA exposure limit of 0.3 ppm.
- Gas reading(s) required on each fumigation except in some situations.
- SCBA above 0.3 ppm (gas mask okay to 15 ppm or escape).

#### **Fumigation Guidelines**

- Effective fumigations result from following several recommended guidelines including the following:
- Level the grain below the vertical wall of the bins.
- Remove or break up any crust on the grain surface.
- Seal all cracks, making the bin as airtight as possible.
- Fumigate when the grain temperature is between 70 and 90° F.
- Keep the bin closed and post warning signs until the gas concentration is below 0.3 ppm.
- **DO NOT ENTER** the bin during or after fumigation until gases have been reduced to safe concentrations. (0.3 ppm).

435. Regular air quality for CO<sub>2</sub>, SPM, Sox and NO<sub>x</sub> should be measured. If any new facility is built associated with the silo operation, the implementing agency has to inform Bank for no objection.

436. Fire safety needs to be addressed at each site during construction and operation. The contractor should come up with a fire safety plan. DG food will ensure fire safety measure is appropriately addressed during operation phase. The fire safety should be according to the IFC Environmental Health and Safety Guideline for community.

### 8.3.3 Air Quality

437. Emergency diesel generator and vehicles transporting grains will release exhaust emissions, containing carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), and particulate matter (PM). Emissions and leakage from the bag filters may also release PM. These emissions can deteriorate the ambient air quality in the immediate vicinity of the project sites. These emissions pose health hazards for the O&M staff and nearby communities.

438. In addition, phosphine gas may be released from the aluminum phosphide, which would be used as a fumigant in the facility. Phosphine gas is toxic and is denser than air and hence may collect in low-lying areas. It can form explosive mixtures with air and also self-ignite. When phosphine burns it produces a dense white cloud of phosphorus pentoxide – a severe respiratory irritant. Primarily the O&M staff may be exposed to phosphine.

439. **Mitigation Measures.** The following measures will address the potentially negative impacts of the Project associated with air quality deterioration:

- The vehicular and equipment exhaust should comply with the national standards.
- The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM. The emissions from these filters will comply with the national standards for air quality.
- Compliance with the standard for ambient air quality will be ensured.
- The steel silos to be constructed under BMFS project 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.
- Standard operating procedures will be followed to handle and use aluminum phosphide, and to prevent exposure to phosphine gas. For this purpose, international sources such as National Institute for Occupational Safety and Health (NIOSH) will be utilized. Guideline to be followed during fumigation is presented in Article 8.3.2. Annex 6 includes the waiver certificate for DGF to use AP as fumigants.
- The O&M staff will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.

### 8.3.3 Soil and Water Contamination

440. 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.

441. **Mitigation measures.** The following measures will address the potentially negative 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 card 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.

### 8.3.4 Noise and Vibration

442. 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.

443. **Mitigation Measures.** The following measures will address the potentially negative 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 Supervision Consultants.
- 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, to
- Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.

### 8.3.5 Vehicular Traffic

444. Transportation of food grain to and from silos will cause additional traffic on the access routes (roads and water ways). This increased traffic can potentially cause traffic congestions on roads and in waterways and also pose safety hazards for the nearby population particularly children.

445. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- The Department will prepare a traffic management plan for each 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, BIWTA) regarding the wheat transportation particularly during emergencies.

### 8.3.6 Electricity Consumption

446. 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.

447. **Mitigation measures.** The following mitigation measures will address the negative impacts of the Project associated with the electricity consumption:

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

### 8.3.7 Damage to Infrastructure and Monuments

448. During the food grain transportation, there could be some inadvertent damage to the roads, jetties, and other structures. This **unmitigated** potential impact is characterized and assessed below.

Impact Parameter	Nature of Project Impact	Characterization of Project Impact
Duration of impact	Long term (during entire O&M phase)	Major
Spatial extent	May extend beyond Project boundary (silo sites and access routes)	Moderate
Reversibility	Reversible (after mitigation)	Moderate
Legal standards	-	Minor
Likelihood of impact	Likely	Moderate
Sensitivity	Moderate impacts on infrastructure	Moderate
Impact Significance		<b>Medium</b>

449. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

- Appropriately sized vehicles will be used to transport the food grain, minimizing the wear and tear of the transportation routes.
- The Food Department will maintain close liaison with the relevant authorities such as Highway Department and BIWTA for any damages caused by the food grain transportation.

### 8.3.8 Aesthetic Value

450. Presence of silos may potentially affect the aesthetic value of the area.

451. **Mitigation measures.** The following mitigation measures will be implemented to address the above potential impacts:

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

#### **Responsibility**

- DG Food with the help of Environment, Health and Safety Specialist will ensure the safety of the workers and environmental mitigation.

## 8.4 Assessment of Social Impacts and Mitigation

### 8.4.1 Social Screening

452. This Chapter assesses the potential impacts of the proposed project on environment and people in and around the silos facilities and the target areas where household silos will be distributed. Social screening of all the 8 sites 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. Screening results are given at Table below.

**Table 8-9: Social Screening of 8 Sites**

Site Name	Availability of Land	Current Use	Land acquisition and population displacement	Impact on tribal population
Barisal	DG-Food's land	Vacant	None	None
Narayanganj	DG-Food's land	Existing damaged sheds will be knocked down for new construction	None	None
Dhaka	DG-Food's land	Existing damaged sheds will be knocked down for new construction	None	None
Ashuganj	DG-Food's land	Vacant	None	None
Madhupur	Government khas land	Current users are tenant as per agreement with the informal occupants of the land. The agreement will expire on harvest of the crops by May 2013. The local administration has taken possession of the land under due procedure and started the process to transfer it to the DG-Food.	Land will be transferred through inter-ministerial transfer method.	None
Mymensingh	DG-Food's land	Vacant	None	None
Maheswarpasha	DG-Food's land	Vacant	None	None
Chittagong	DG-Food's land	Vacant	None	None

### 8.4.2 Land Acquisition and related Issues

453. The construction of storage silos is not likely to involve significant land acquisition issues, as most of the proposed public silos will be constructed on DG-Food's existing land or on vacant public lands. At least the proposed sites in the first phase will largely be limited on existing Government sites for grain storage. The sites for subsequent phases and in case of any of the first year sites cannot accommodate the silo facilities within designated lands, additional land or displacement of people may be required during design and construction. Since many of these existing sites are in cities and towns, and some of them are in congested areas, movement of stocks in and out of the silos may add disruptions to existing traffic for sites which are linked by road, and which would use trucks as means of stocking and distribution. However, the project in the subsequent phases and at critical situations in the first phase construction, may not avoid acquisition of private lands or public lands from private uses. The project will cover the entire country and tribal peoples (indigenous peoples) and communities are dispersed in small proportions in most of the plain districts. It is very likely that there are tribal peoples in the project districts. The World Bank is expected to finance the project, and certain procedural requirements based on

World Bank operational policies (OP) apply. These OPs include social safeguard policies related to Indigenous Peoples (OP 4.10) and Involuntary Resettlement (OP 4.12). In addition, the communities may experience temporary inconveniences during construction due to influx of non-local population and increased traffic and demolition of existing structures.

### **8.4.3 Impacts on Indigenous Peoples**

454. Although the project will cover the entire country, it is agreed that DG-Food will select to drop any site for construction of silo facilities, if tribal peoples (indigenous peoples) are likely to be affected due to the construction. The modern public storage facilities and family silos will, however equally benefit the tribal peoples like the mainstream population. The silos sites for the first year construction, as agreed, 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. The OP 4.10 ensures that (i) no adverse impacts on indigenous groups will take place as a result of the project; (ii) project benefits are culturally compatible with local customs and traditions; and (iii) indigenous groups, if affected by the project, participate in project preparations and implementation through a process of informed consultation. Measures to benefit indigenous groups and avoid adverse impacts are integrated into the overall project design and implementation process.

### **8.4.4 Involuntary Resettlement**

455. Public storage silos facilities are proposed on sites having a land area from 7 to 20 acres (1 acre = 0.405 ha) each to accommodate 6 to 33 silo bins of 60 to 90 ft diameter each. These lands are mostly owned by the DG-Food itself and where unavailable, public lands will be used as much as feasible. In only critical cases, private lands can be acquired. The World Bank's Operational Policy 4.12 makes it a requirement that people who are forced to lose land or land based assets, or who lose access to livelihoods as a result of land acquisition are entitled to compensation and assistance, in order to improve or at least regain their previous standard of living. In this project infrastructure investments could potentially affect some people negatively through physical or economic displacement. DG-Food will, however, avoid acquiring private lands and public lands from private uses, unless it is absolutely required. Based on this approach, the World Bank's Operational Policy on Involuntary Resettlement applies in the project. Resettlement Policy Framework for the project and Resettlement Action Plan for subsequent annual works phases will be required.

### **8.4.5 Social Exclusion**

456. 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 a risk that gender, ethnicity and other social stratification of beneficiaries may lead to disproportionate distribution of project benefits. The disadvantaged groups like the small ethnic and other minorities, women, disabled and very poor populations are at the risk of exclusion for distribution of family silos. All the poor and vulnerable families will be in the need of food grain stock and those having farm lands under their cultivation will need safe stock of seeds during disaster. Social management plans will be required for inclusive implementation of the project especially the components for distribution of family silos and community incentives around the public silo sites.

#### 8.4.6 Impacts During Construction

457. The project, for clearing sites for construction of new public silo facilities will demolish a huge number of existing traditional out of work storage buildings. Where the sites are located within a congested area with residential setup, high rise building, schools, and mosques, stacking of debris and demolition activity may affect the residents temporarily.

#### 8.4.7 Impacts Due to Non-local Work force

458. 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 will be required for public participation and to mitigate non-safeguard social impacts including community grievances during construction.

#### 8.4.8 Impacts on Local Infrastructure

459. Construction of public silo infrastructures at some locations has community and public infrastructures like roads, mosques, and sites of importance of national integrity like war mausoleums and sites of commemoration. The project will avoid these sites with alternative layout plan and if feasible consider improvement of these infrastructures along with other community benefits. The project also identified a number of social institutions and community infrastructure within 500-m periphery of the proposed public silo sites to consider improvement of some of them as per community interest and needs. The social institutions and community infrastructures at the sites are as follows:

Ashuganj	4	Alal Shah High School at Chor Char Tola.	
	5	Chor Char Tola Islamia Aliya Madrasha.	
	6	Community graveyard and Eidgah.	
	7	Chor Char Tola Uttar Para Jamee Mosque.	
	8	Mohoram Para Jamee Mosque.	
	9	Rowshonara Girls High School.	
	10	Rail Station Waktia Mosque.	
	11	Hazi Abdul Jalil Jamee Mosque.	
	Barisal	12	Five schools and 2 colleges.
		13	Four mosques and 2 churches
		14	Six private clubs.
15		Martyrs' mausoleum	
Chittagong	16	Water supply network	
	17	Drainage system	
	18	Approach road to the site	
Dhaka	19	Approach road to the highway	
	20	Access road around the site	
	21	Three mosques and mazars	
Madhupur	22	<i>One kilometer road connecting Ramkrisna Bari village with Mymensingh-Tangail highway by the side of boundary wall of BFIC</i>	
Moheswarpash, Khulna	23	Masjidul Aksha Jame Mosque (Senpara)	
	24	Mohammadia Forkania Madrasha (Senpara)	
	25	Shaebpara Girls high school	
	26	Shaebpara Baitul Elahi Mosque	

	27	Mosjudul Meraj Maniktola
	28	Maniktola Darul ulum Hafizea Madrasha
	29	Shaebpara Baitul Jame Mosque
	30	Darul Quaran Islamia Madrasha
Mymensingh	31	Gudara ghat (river crossing)
	32	Connecting road between the Gudara Ghat and the <i>Mymensingh Station Road</i>
Narayanganj	33	CSD Jame Mosque
	34	Strip of river bank (for public recreation)

#### 8.4.9 Project Benefits

460. Modernizing the current food storage system in the country will result in improved storage capacity at national and at community levels to make available food stock in case of emergency and disasters. The project will help ensure food and nutritional security to the communities, particularly in the disaster prone areas. 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. Family silos will safeguard the household food stock for the coastal population at the events of disasters. The women and children will be more benefited as any shock on food stock directly affects the women and the children suffers from delayed and skewed food supply during disasters and the aftermath.

### 8.5 Climate Change Impact on Food Security & Contribution of BMFSFP

461. Climate change is a long-term change in the statistics of weather expressed as a probable change in mean or extreme weather conditions. The United Nations definition specifically refers to climate change as the influence of human activity that alters the composition of the global atmosphere, which is in addition to natural climate variability. Climate variability refers to variations in the climate on all temporal and spatial scales beyond that of individual weather events.

462. Climate change in Bangladesh is an extremely crucial issue as the country is one of the most vulnerable nation to the impacts of climate change in the coming decades. Located at the bottom of the mighty Ganges-Brahmaputra-Meghna river system, there are a total of 57 trans-boundary rivers coming down to it; 54 from neighbouring India and 3 from Myanmar.

#### 8.5.1 Present Status & Effect of Climate Change of Food Security in Bangladesh

463. The country which has merely control of the water flow and volume drains to the Bay of Bengal over 90% of the total run-off generated annually. Coupled with the high level of widespread poverty and increasing population density and limited adaptive capacity and poorly funded has made the region one of the most adversely affected in the planet.

464. In Bangladesh, yields from rain fed agriculture could be reduced to 50% by 2020. And for a country with increasing population and hunger, this will have an extremely adverse effect on food security. Although effects of climate change are highly variable, by 2030, South Asia could lose 10% of rice and maize yields. As a result of all this, Bangladesh would need to prepare for long term adaptation, which could be as drastic as changed sowing dates due to seasonal variations, introducing different varieties and species, to practicing novel water supply and irrigation systems and long term storages.

465. Although the country has managed to increase the production of rice since the nation's birth, from 10 metric tons (mt) to over 30 mt, around 30% of the population is still malnourished. Now more than 5 million hectares of land are irrigated, almost fourfold than that in 1990. Even though modern rice varieties have been introduced in three-fourths of the total rice irrigation area, the sudden shift in population increase is putting strains on the production. Climate change threatens the agricultural economy which although counts for just 20% of GDP, contributes to over half the population's labor force. As pointed out before in the book, in 2007 after a series of floods and cyclone Sidr, food security was severely threatened. Given the country's infrastructure and disaster response mechanisms, the food yield situation got worse. The loss of rice production was estimated at around 2 million mt which could potentially feed 10 million people. This was the single most important catalyst in the 2008 price increase which led to around 15 million people going without much food. This was further worsened by cyclone Aila. However, the rice production during the last one and a half decade from 1996-97 has steadily increased from 18.882 million tons to 33.500 million tons in 2010-11 respectively. Though rice production continues to increase, but wheat production shows a declining trend from 1.454 million ton in 1996-97 to 0.990 million ton in 2011-12.

### **8.5.2 Impact of BMFSFP to Combat Climate Change Impact**

466. At present GoB's Public Food Distribution System (PFDS), has an effective storage capacity of about 1.6 million mt. With the increase in population and some GoB priority intervention for strengthening of public food procurement and expansion of safety net programs for ensuring food security of the poor section of population, the effective capacity of food grain storage has to be increased to a significant extent. The sixth Five Year Plan of the country has a projection of increasing the storage capacity by about 784,000 mt by the year 2011-2015<sup>16</sup>. The GoB/FAO/USAID-sponsored Country Investment Plan (CIP)<sup>17</sup> also has put emphasis on increase and modernization of public storage and handling facilities particularly in disaster prone areas. Priority interventions suggested include building of more modern storage facilities that are better equipped to adapt to the climate change impacts, minimize disaster shocks and ensure quality and safety of the commodities in the storage. The suggestions also include repair/upgrade and modernization of the existing facilities and the process of monitoring and quality assurance.

467. Parboiled rice is the staple food for Bangladesh which cannot be stored more than 2 to 3 months in the existing storage facilities. Steel Silo can store parboiled rice for more than 2.5 years. The long time storage capacity of parboiled rice will provide DG Food the increased storage capacity of surplus rice every year and will increase the disaster preparedness of GoB in terms of enough food security to combat the aftermath of shortage of food during any natural calamity.

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<sup>16</sup> Sixth Five Year Plan, Ministry of Planning, Government of the People's Republic of Bangladesh

<sup>17</sup> Bangladesh Country Investment Plan (CIP), GoB/FAO/USAID, June 2011

## **SECTION D: ENVIRONMENTAL MANAGEMENT PLAN (EMP)& CONSULTATION - DISCLOSURE**

## 9 ENVIRONMENTAL MANAGEMENT PLAN

468. This Chapter presents the Environmental Management Plan (EMP) of the Project. The EMP essentially provides the implementation mechanism for the environmental and social mitigation measures discussed in Chapter 9.

### 9.1 Objectives of EMP

469. The basic objective of the EMP is to manage, prevent, and mitigate potentially adverse impacts of project interventions in a way that minimizes the adverse impact on the environment and people of the Project area of the each silo facility. The specific objectives of the EMP are to:

- Facilitate the implementation of the environmental and social mitigation measures identified during the present EIA and discussed in Chapter 8.
- Assign responsibilities for project proponent, contractors, consultants, and other members of the Project team for the environmental and social management of the Project;
- Define a monitoring mechanism and identify monitoring parameters to ensure effective implementation of the mitigation measures.
- Assess environmental training requirements for different stakeholders at various levels.
- Describe communication and documentation requirements.

### 9.2 EMP Components

470. The EMP components are listed below.

- Institutional Arrangement
- Mitigation Plan
- Monitoring Plan
- Capacity Building
- Documentation and reporting
- Grievance redress mechanism
- Contractual arrangements for EMO implementation
- EMP implementation cost

471. These components are discussed in Sections 8.3 to 8.10 below.

### 9.3 Institutional Arrangements

472. The institutional arrangements required for implementation of the EMP are discussed below. A flow chart for implementation arrangement is added in Figure 9.1

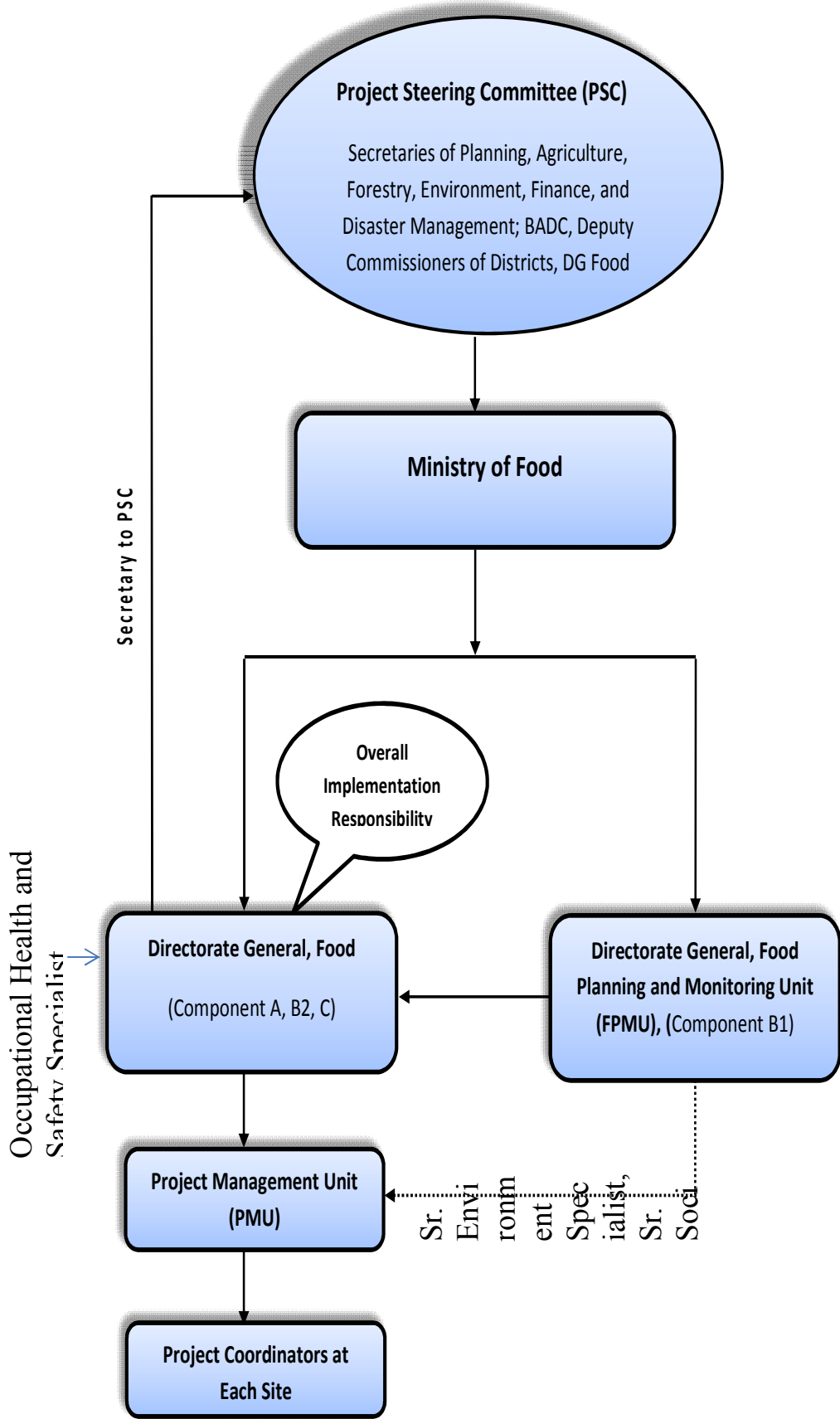


Figure 9-1 Implementation Step Up of the Project

### 9.3.1 Implementation Responsibility

473. 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.

474. A **Project Management Unit (PMU)** would be established in the DG Food's office for day-to-day implementation and monitoring of the project activities. The PMU would be headed by a Project Director and consist of: (i) Deputy-Project Director; (ii) two technical specialists; (ii) once Senior Procurement Specialist, and one Procurement Analyst; (iii) One Senior Financial Management specialist, one Financial Management Specialist and one accountant and a book keeper; (iv) **Senior Environmental Specialist**, Senior Social Specialist, and Senior Communication Specialist; (v) at each site in the field PMU would have one Project Coordinator for coordination with the contractors, consultants and local administration as well as with communities, one Technical Specialist and **one Social and Environment Specialist** and support staff. *The Senior Environment Specialist has to be on Board as soon the PMU is set up. S/He will be responsible for ensuring the adequacy of environmental component in the Bidding Document (BOO) and ensure the quality of Environmental Action Plan (EAP) submitted by the contractor. The field level environmental specialist should be on board before commencement of the field work.*

### 9.3.2 Construction Phase

475. **Environment Specialist in PMU.** The PMU will have a dedicated Senior Environmental Specialist (SES) to ensure implementation of EMP and other environmental management responsibilities. The SES will maintain 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 (discussed below).

476. **Supervision Consultant's Environment Monitor.** The Supervision Consultants will have dedicated, properly qualified and experienced, site-based Environment Monitor (EM) at each construction site. The EMs will monitor and supervise the EMP implementation at the field level. The EMs will maintain coordination with SES at the PMU level and supervise and monitor the construction contractor. The EM needs to be a graduate preferably in environmental science/engineering with at least 5 years' experience in the related field.

477. **Contractor's Environment Supervisor.** 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.

### 9.3.3 Operation Phase

478. 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.**

### 9.4 Mitigation Plan

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

- A listing of the potential impact associated with that project activity,
- A comprehensive listing of mitigation measures (actions),
- The person(s) responsible for ensuring the full implementation of the action,
- The person(s) responsible for monitoring the action,
- The timing of the implementation of the action to ensure that the objectives of mitigation are fully met.

Separate mitigation plans for the construction and O&M phases of the proposed Project are presented in **Tables 9.1** and **9.2**, respectively.

**Table 9-1: Mitigation Plan for Design and Construction Phase**

	Project Activities		Potential Impacts	Mitigation Actions	Responsibility		Timing
					Execution	Monitoring	
	<b><u>Design Phase</u></b>						
1	Site selection	1.1	Involuntary resettlement	<ul style="list-style-type: none"> <li>Government-owned land to be selected to avoid involuntary resettlement.</li> <li>Resettlement Policy Framework prepared to address any acquisition of private land during subsequent Project phases</li> </ul>	DG Food	-	Before construction (BC): during detailed designing of the project
2	Design considerations	2.1	Risk of flooding and inundation	<ul style="list-style-type: none"> <li>The design will ensure that facilities remain safe from flooding and inundation.</li> <li>The site selected for the facilities will be sufficiently higher than the maximum water level during high tides and storm surges.</li> <li>Appropriate raising of the foundations will be carried out if the available sites are not currently at the appropriate level.</li> <li>Appropriate drainage system will be included in the facility design.</li> </ul>	Design consultants	DG Food	BC
		2.2	Soil and water contamination	<ul style="list-style-type: none"> <li>Appropriate waste collection and disposal systems will be included in the design of the silo facilities and ancillaries.</li> <li>Appropriate waste including sewage disposal facilities such as septic tanks and soaking pits of adequate size and capacity will be included in the design of the office and housing facilities</li> </ul>	Design consultants	DG Food	BC

	Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
				Execution	Monitoring		
3	<b>Construction Phase</b> Contractor Mobilization and Demobilization	3.1	Air Quality Deterioration	<ul style="list-style-type: none"> <li>The vehicular and equipment exhaust should comply with the national standards.</li> <li>Contractor to ensure compliance with the standard for ambient air quality.</li> <li>Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.</li> </ul>	Contractors	CSC	BC; AC
		3.2	Noise	<ul style="list-style-type: none"> <li>The contractors will ensure that the noise from the construction sites complies with the national and WB standards.</li> <li>Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants.</li> <li>Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.</li> <li>Vehicles will have exhaust silencers to minimize noise generation.</li> <li>Nighttime traffic will be avoided near the communities.</li> <li>Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise disturbance.</li> <li>Working hours for construction activities within the communities will be limited to between 8 am and 6 pm.</li> <li>Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.</li> </ul>	Contractors	CSC	BC; AC
		3.3	Vehicular Traffic	<ul style="list-style-type: none"> <li>Project drivers will be trained on defensive</li> </ul>	Contractors	CSC	BC;

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<p>driving practices.</p> <ul style="list-style-type: none"> <li>• Speed limits will be enforced for the Project vehicles.</li> <li>• Reduced speed near/through communities.</li> <li>• Liaison should be maintained particularly with the communities near the camps and work sites.</li> <li>• Safety signage should be placed at the work sites.</li> </ul>			AC
	3.4 Safety Hazards and Public Health	<ul style="list-style-type: none"> <li>• The contractors will prepare site specific Health, Safety and Environment (HSE) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS.</li> <li>• The construction staff will be screened for communicable diseases.</li> <li>• The WBG's EHS Guidelines will be included in the contract documents.</li> <li>• The project drivers will be trained for defensive driving skills.</li> <li>• Vehicular speeds near/within communities will be kept low to minimize safety hazards.</li> <li>• All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>• Liaison with the community will be maintained.</li> </ul>	Contractors	CSC	BC; AC
	3.5 Blocked access routes	<ul style="list-style-type: none"> <li>• The contractor will prepare traffic management plan prior to commencing mobilization and obtain approval from the</li> </ul>	Contractors	CSC	BC; AC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
		<p>Supervision Consultants.</p> <ul style="list-style-type: none"> <li>In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.</li> </ul>				
	3.6	Damage to Infrastructure	<ul style="list-style-type: none"> <li>All damaged infrastructure will be restored to original or better condition.</li> </ul>	Contractors	CSC	BC; AC
	3.7	Cultural and gender issues	<ul style="list-style-type: none"> <li>Liaison with the communities will be maintained throughout the construction phase.</li> <li>Grievance redress mechanism will be established at each site.</li> </ul>	Contractors	CSC	BC; AC
4	4.1	Involuntary resettlement	<ul style="list-style-type: none"> <li>Location of construction camp will be finalized after consultation with nearby communities and after obtaining approval from Supervision Consultants.</li> <li>Camps will be established within the CSD facilities as far as possible.</li> <li>If private land is needed, appropriate rent to be paid to the land owner after completing all documentation requirements.</li> </ul>	Contractors	CSC	BC
	4.2	Air Quality Deterioration	<ul style="list-style-type: none"> <li>The equipment exhaust will comply with the national standards.</li> <li>Contractor to ensure compliance with the standard for ambient air quality.</li> <li>Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.</li> <li>Liaison will be maintained particularly with the communities near the camps.</li> </ul>	Contractors	CSC	BC
	4.3	Noise	<ul style="list-style-type: none"> <li>Generators will have exhaust mufflers (silencers) to minimize noise generation.</li> </ul>	Contractors	CSC	BC; DC
	4.4	Soil Erosion	<ul style="list-style-type: none"> <li>Construction camps will be located in a</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<p>stable and flat area, requiring minimal devegetation and leveling.</p> <ul style="list-style-type: none"> <li>• After the completion of the construction works, campsites will be completely restored. No debris, surplus construction material or any garbage will be left behind.</li> <li>• Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites.</li> </ul>			
	4.5 Risk of flooding	<ul style="list-style-type: none"> <li>• The site selected for the camps will be sufficiently higher than the maximum water level during high tides and storm surges.</li> <li>• Appropriate raising of the camp foundations will be carried out if the available sites are not currently at the appropriate level.</li> <li>• Appropriate drainage system will be included in the camp design.</li> </ul>	Contractors	CSC	BC
	4.6 Surface Water Contamination	<ul style="list-style-type: none"> <li>• Contractor will prepare camp management plan and waste management plan and obtain approval from CSC</li> <li>• For the domestic sewage from the construction camps, appropriate treatment and disposal system, such as septic tanks and soaking pits, will be constructed having adequate capacity.</li> </ul>	Contractors	CSC	BC; DC
	4.7 Loss of Vegetation	<ul style="list-style-type: none"> <li>• Clearing natural vegetation will be avoided as far as possible.</li> <li>• The camp will be established in a natural clearing as far as possible</li> <li>• Complete record will be maintained for any tree cutting. Compensatory tree plantation will be carried out.</li> </ul>	Contractors	CSC	BC; DC
	4.8 Increased	<ul style="list-style-type: none"> <li>• The contractors will prepare a traffic</li> </ul>	Contractors	CSC	BC;

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
	vehicular traffic	<p>management plan for each site and obtain approval from the Supervision Consultants. Project drivers will be trained on defensive driving practices.</p> <ul style="list-style-type: none"> <li>• Speed limits will be enforced for the Project vehicles.</li> <li>• Liaison should be maintained particularly with the communities near the camps.</li> <li>• Safety signage should be placed where appropriate.</li> </ul>			DC
	4.9 Safety Hazards and public health	<ul style="list-style-type: none"> <li>• The contractors will prepare site specific Health, Safety and Environment (HSE) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS.</li> <li>• Availability of safe drinking water will be ensured for the construction staff.</li> <li>• 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 site. Each site will have an ambulance available.</li> <li>• The WBG's EHS Guidelines will be included in the contract documents.</li> <li>• The camps will have protective fencing to avoid any unauthorized entry.</li> <li>• Firefighting equipment will be made available at the camps.</li> <li>• The camp staff will be provided safety including fire fighting training.</li> </ul>	Contractors	CSC	BC; DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
		<ul style="list-style-type: none"> <li>All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>Liaison with the community will be maintained.</li> </ul>				
	4.10 Social and Gender Issues	<ul style="list-style-type: none"> <li>Liaison with the communities will be maintained throughout the construction phase.</li> <li>Grievance redress mechanism will be established at each site (details are provided later in the document).</li> </ul>	Contractors	CSC	BC DC	
	4.11 Blocked access routes	<ul style="list-style-type: none"> <li>Camps will be located ensuring that no routes are blocked.</li> <li>In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.</li> </ul>	Contractors	CSC	BC;	
	4.12 Damage to infrastructure	<ul style="list-style-type: none"> <li>All damaged infrastructure will be restored to original or better condition.</li> </ul>	Contractors	CSC	DC	
	4.13 Aesthetic aspects	<ul style="list-style-type: none"> <li>Proper landscaping and plantation will be carried out at the camps.</li> </ul>	Contractors	CSC	BC;	
5	Camp operation	5.1 Air quality deterioration	<ul style="list-style-type: none"> <li>The equipment exhaust will comply with the national standards.</li> <li>Contractor to ensure compliance with the standard for ambient air quality.</li> <li>Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.</li> <li>Liaison will be maintained particularly with the communities near the camps.</li> </ul>	Contractors	CSC	DC
		5.2 Noise	<ul style="list-style-type: none"> <li>The contractors will ensure that the noise from the camps complies with the national and WB standards.</li> <li>Liaison with the community will be</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		maintained. Grievance redressal mechanism will be put in place to address the community complaints.			
	5.3 Soil and water contamination	<ul style="list-style-type: none"> <li>Adequate implementation of waste management plan will be ensured.</li> <li>Waste oils will be collected in drums and sold to the recycling contractors.</li> <li>The inert recyclable waste from the camp (such as card board, drums, 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.</li> <li>Domestic solid waste from the construction camps will be disposed in a manner that does not cause soil contamination.</li> </ul>	Contractors	CSC	DC
	5.4 Water consumption	<ul style="list-style-type: none"> <li>Astute planning will be employed to conserve water at the camps. Water will be procured in a manner that least affects the existing water users and local communities.</li> <li>The contractors will submit the plan to procure and consume water for their camp needs, and obtain approval from the Supervision consultants.</li> </ul>	Contractors	CSC	DC
	5.5 Vehicular traffic	<ul style="list-style-type: none"> <li>Speed limits will be enforced for the Project vehicles.</li> <li>Liaison should be maintained particularly with the communities near the camps.</li> <li>Safety signage should be placed where appropriate.</li> </ul>	Contractors	CSC	DC
	5.6 Safety hazards and public health	<ul style="list-style-type: none"> <li>The contractor will provide personal protective equipment (PPE) to the construction staff and will ensure its appropriate usage.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
		<ul style="list-style-type: none"> <li>○ Availability of safe drinking water will be ensured at the camps.</li> <li>○ First aid boxes will be made available at each camp. Emergency phone numbers (including hospitals, Fire Department, and Police) will be displayed at key locations within the site.</li> <li>○ The WBG's EHS Guidelines will be included in the contract documents.</li> <li>○ The camp sites will have protective fencing to avoid any unauthorized entry.</li> <li>○ The project drivers will be trained for defensive driving skills.</li> <li>○ Firefighting equipment will be made available at the camps and worksites.</li> <li>○ The camp staff will be provided safety including fire fighting training.</li> <li>○ All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>● Liaison with the community will be maintained.</li> </ul>				
	5.7	Damage to infrastructure	<ul style="list-style-type: none"> <li>● All damaged infrastructure will be restored to original or better condition.</li> </ul>	Contractors	CSC	DC
	5.8	Social and Gender Issues	<ul style="list-style-type: none"> <li>● Liaison with the communities will be maintained throughout the construction phase.</li> <li>● Grievance redress mechanism will be established at each site (details are provided later in the document).</li> </ul>	Contractors	CSC	DC
6	6.1	Air Quality Deterioration	<ul style="list-style-type: none"> <li>● The vehicular and equipment exhaust should comply with the national standards.</li> <li>● Contractor to ensure compliance with the standard for ambient air quality.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<ul style="list-style-type: none"> <li>Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.</li> </ul>			
	6.2 Noise	<ul style="list-style-type: none"> <li>The contractors will ensure that the noise from the construction sites complies with the national and WB standards.</li> <li>Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants.</li> <li>Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.</li> <li>Vehicles will have exhaust silencers to minimize noise generation.</li> <li>Nighttime traffic will be avoided near the communities.</li> <li>Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise disturbance.</li> <li>Working hours for construction activities within the communities will be limited to between 8 am and 6 pm.</li> <li>Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.</li> </ul>	Contractors	CSC	DC
	6.3 Vehicular Traffic	<ul style="list-style-type: none"> <li>Project drivers will be trained on defensive driving practices.</li> <li>Speed limits will be enforced for the Project vehicles.</li> <li>Reduced speed near/through communities.</li> <li>Liaison should be maintained particularly with the communities near the camps and</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<ul style="list-style-type: none"> <li>work sites.</li> <li>Safety signage should be placed at the work sites.</li> </ul>			
	6.4 Safety Hazards and Public Health	<ul style="list-style-type: none"> <li>The contractors will prepare site specific Health, Safety and Environment (HSE) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS.</li> <li>The construction staff will be screened for communicable diseases.</li> <li>The WBG's EHS Guidelines will be included in the contract documents.</li> <li>The project drivers will be trained for defensive driving skills.</li> <li>Vehicular speeds near/within communities will be kept low to minimize safety hazards.</li> <li>All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>Liaison with the community will be maintained.</li> </ul>	Contractors	CSC	DC
	6.5 Blocked access routes	<ul style="list-style-type: none"> <li>The contractor will prepare traffic management plan prior to commencing mobilization and obtain approval from the Supervision Consultants.</li> <li>In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.</li> </ul>	Contractors	CSC	DC
	6.6 Damage to Infrastructure	<ul style="list-style-type: none"> <li>All damaged infrastructure will be restored to original or better condition.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing		
			Execution	Monitoring			
	6.7	Cultural and gender issues	<ul style="list-style-type: none"> <li>Liaison with the communities will be maintained throughout the construction phase.</li> <li>Grievance redress mechanism will be established at each site.</li> </ul>	Contractors	CSC	DC	
7	Site Clearance	7.1	Air quality deterioration	<ul style="list-style-type: none"> <li>The vehicular and equipment exhaust will comply with the national standards.</li> <li>Contractor to ensure compliance with the standard for ambient air quality.</li> <li>Water will be sprinkled where needed and appropriate, particularly at work sites near the communities.</li> <li>Liaison will be maintained particularly with the communities near the camps and work sites.</li> </ul>	Contractors	CSC	DC
		7.2	Noise and vibration	<ul style="list-style-type: none"> <li>The contractors will ensure that the noise from the construction sites complies with the national and WB standards.</li> <li>Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise pollution.</li> <li>Working hours for construction activities within/near the communities will be limited to between 8 am and 6 pm.</li> <li>Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.</li> </ul>	Contractors	CSC	DC
		7.3	Soil erosion	<ul style="list-style-type: none"> <li>Cut and fill at the proposed sites will be carefully designed, and ideally should balance each other.</li> <li>Embankments and excavated slopes will not be left untreated/unattended for long</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<p>durations. Appropriate slope stabilization measures will be taken per the design (eg, stone pitching).</p> <ul style="list-style-type: none"> <li>• Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water bodies will be minimized.</li> <li>• After the completion of the construction works, the construction sites and other work areas will be completely restored. No debris, surplus construction material or any garbage will be left behind.</li> <li>• Photographic record will be maintained for pre-project, during-construction and post-construction condition of the sites.</li> </ul>			
	7.4 Surface water contamination	<ul style="list-style-type: none"> <li>• No untreated waste effluents will be released to ground or water.</li> <li>• Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.</li> </ul>	Contractors	CSC	DC
	7.5 Loss of natural vegetation	<ul style="list-style-type: none"> <li>• Clearing natural vegetation will be avoided as far as possible.</li> <li>• Tree plantation plan will be prepared and implemented.</li> <li>• Complete record will be maintained for any tree cutting. Compensatory tree plantation will be carried out and five saplings will be planted for each tree felled.</li> </ul>	Contractors	CSC	DC
	7.6 Blocked access routes	<ul style="list-style-type: none"> <li>• In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.</li> </ul>	Contractors	CSC	DC
	7.7 Vehicular traffic	<ul style="list-style-type: none"> <li>• The contractors will prepare a traffic management plan for each site and obtain</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<p>approval from the Supervision Consultants.</p> <ul style="list-style-type: none"> <li>• Project drivers will be trained on defensive driving practices.</li> <li>• Speed limits will be enforced for the Project vehicles.</li> <li>• Reduced speed near/through communities.</li> <li>• Liaison should be maintained particularly with the communities near the camps and work sites.</li> <li>• Safety signage should be placed at the work sites.</li> </ul>			
	7.8 Safety hazards and public health	<ul style="list-style-type: none"> <li>○ The contractors will prepare site specific Health, Safety and Environment (HSE) Plan and obtain approval from the Supervision Consultants. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS.</li> <li>○ The contractor will provide personal protective equipment (PPE) to the construction staff and will ensure its appropriate usage.</li> <li>○ The construction staff will be screened for communicable diseases.</li> <li>○ Availability of safe drinking water will be ensured for the construction staff.</li> <li>○ 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 site. Each site will have an ambulance available.</li> <li>○ The WBG's EHS Guidelines will be included in the contract documents.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing		
			Execution	Monitoring			
		<ul style="list-style-type: none"> <li>○ The construction sites will have protective fencing to avoid any unauthorized entry.</li> <li>○ The project drivers will be trained for defensive driving skills.</li> <li>○ Vehicular speeds near/within communities will be kept low to minimize safety hazards.</li> <li>○ Firefighting equipment will be made available at the worksites.</li> <li>○ The site staff will be provided safety including fire fighting training.</li> <li>○ All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>● Liaison with the community will be maintained.</li> </ul>					
	7.9	Damage to infrastructure	<ul style="list-style-type: none"> <li>● All damaged infrastructure will be restored to original or better condition.</li> </ul>	Contractors	CSC	DC	
	7.10	Aesthetic value	<ul style="list-style-type: none"> <li>● Screens will be used at the site periphery</li> <li>● Landscaping and tree plantation will be carried out at the site after completion of the works.</li> <li>● Proper housekeeping will be regularly carried out at the site and camps.</li> </ul>	Contractors	CSC	DC	
	7.11	Gender and social issues	<ul style="list-style-type: none"> <li>● Liaison with the communities will be maintained throughout the construction phase.</li> <li>● Grievance redress mechanism will be established at each site (details are provided later in the document).</li> </ul>	Contractors	CSC	DC	
8	Borrow and Disposal Area Management	8.1	Air quality deterioration	<ul style="list-style-type: none"> <li>● Same as 7.1</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
	8.2	Noise and vibration	<ul style="list-style-type: none"> <li>• Same as 7.2.</li> </ul>	Contractors	CSC	DC
	8.3	Soil erosion	<ul style="list-style-type: none"> <li>• Material borrowing and disposal plan will be prepared and approval obtained from the Supervision Consultants. .</li> <li>• Cultivation fields will be avoided for borrowing material to the extent possible.</li> <li>• Written consent of the land owner should be obtained for material (soil) borrowing. A standard form should be prepared and used for this purpose.</li> <li>• Borrow and disposal areas will be re-contoured to avoid deep ditches or high mounds.</li> <li>• Photographic record (before, during and after) will be kept for the borrow and disposal areas.</li> <li>• Leveling and re-contouring borrow sites should be carried out.</li> <li>• The surplus soil, if any, will be disposed at places approved by the Supervision Consultants (“Engineer”). Such sites will be selected after surveying the area and ensuring that soil deposition will not have any significant impacts, such as loss of productive land, blocked access, natural vegetation and disturbance to drainage.</li> <li>• If necessary, fill material for silo sites will be obtained from appropriate locations approved by Supervision Consultants. Such locations will be selected after surveying the area and ensuring that soil extraction will not have any significant impacts, such as soil erosion, loss of natural</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
		<p>vegetation and disturbance to drainage.</p> <ul style="list-style-type: none"> <li>Where the use of cultivated land is unavoidable for obtaining the fill material, the top 30 cm soil layer will be removed and stockpiled for redressing the land after removal of the borrow material. The excavation in such areas will be limited to 50 cm depth.</li> <li>The fill material will not be obtained from any cultivation fields or orchards, unless the consent of the owner is obtained.</li> <li>Areas from where the fill material is obtained or surplus soil deposited, will be landscaped to minimize erosion and hazard for people and livestock.</li> </ul>				
	8.4	Soil and water contamination	<ul style="list-style-type: none"> <li>Same as 7.4.</li> </ul>	Contractors	CSC	DC
	8.5	Blocked access routes	<ul style="list-style-type: none"> <li>Borrow/disposal areas will be selected avoiding existing routes.</li> <li>In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.</li> </ul>	Contractors	CSC	DC
	8.6	Loss of natural vegetation	<ul style="list-style-type: none"> <li>Loss of vegetation will be minimized at borrow/disposal areas</li> <li>Compensatory tree plantation will be carried out for any tree felling.</li> </ul>	Contractors	CSC	DC
	8.7	Loss of agriculture	<ul style="list-style-type: none"> <li>Borrow/disposal areas will be selected avoiding agricultural/cultivation areas.</li> <li>Compensation will be paid to the owner/grower in case of any loss to agriculture.</li> </ul>	Contractors	CSC	DC
	8.8	Vehicular traffic	<ul style="list-style-type: none"> <li>Same as 7.7.</li> </ul>	Contractors	CSC	DC
	8.9	Safety hazards and	<ul style="list-style-type: none"> <li>Same as 7.8.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
	public health				
	8.10 Damage to infrastructure	<ul style="list-style-type: none"> <li>All damaged infrastructure will be repaired/restored to original or better condition.</li> </ul>	Contractors	CSC	DC
	8.11 Aesthetic value	<ul style="list-style-type: none"> <li>Screens will be used around the borrow/disposal areas if needed.</li> <li>The borrow and disposal areas will be re-contoured.</li> </ul>	Contractors	CSC	DC
9	Excavation				
	9.1 Air pollution	<ul style="list-style-type: none"> <li>Same as 7.1</li> </ul>	Contractors	CSC	DC
	9.2 Noise and vibration	<ul style="list-style-type: none"> <li>Same as 7.2</li> </ul>	Contractors	CSC	DC
	9.3 Soil erosion	<ul style="list-style-type: none"> <li>Same as 7.3.</li> </ul>	Contractors	CSC	DC
	9.4 Soil/water contamination	<ul style="list-style-type: none"> <li>Same as 7.4.</li> </ul>	Contractors	CSC	DC
	9.5 Blocked access	<ul style="list-style-type: none"> <li>Same as 7.6.</li> </ul>	Contractors	CSC	DC
	9.6 Vehicular traffic	<ul style="list-style-type: none"> <li>Same as 7.7.</li> </ul>	Contractors	CSC	DC
	9.7 Safety hazards and public health	<ul style="list-style-type: none"> <li>Same as 7.8.</li> </ul>	Contractors	CSC	DC
	9.8 Damage to infrastructure	<ul style="list-style-type: none"> <li>Same as 7.9.</li> </ul>	Contractors	CSC	DC
	9.9 Aesthetic value	<ul style="list-style-type: none"> <li>Same as 7.10.</li> </ul>	Contractors	CSC	DC
10	Construction of foundations				
	10.1 Air quality deterioration	<ul style="list-style-type: none"> <li>Same as 7.1</li> </ul>	Contractors	CSC	DC
	10.2 Noise and vibration	<ul style="list-style-type: none"> <li>Same as 7.2</li> </ul>	Contractors	CSC	DC
	10.3 Soil erosion	<ul style="list-style-type: none"> <li>Same as 7.3.</li> </ul>	Contractors	CSC	DC
	10.4 Soil/water contamination	<ul style="list-style-type: none"> <li>Same as 7.4.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing		
			Execution	Monitoring			
	10.5	Water availability and consumption	<ul style="list-style-type: none"> <li>Astute planning will be employed to conserve water at the construction sites. Water will be procured in a manner that least affects the existing water users and local communities.</li> <li>The contractors will submit the plan to procure and consume water for their construction needs, and obtain approval from the Supervision consultants.</li> <li>Extreme care will be taken when working close to wells and other water sources. Any damage caused by the project activities will be repaired.</li> </ul>	Contractors	CSC	DC	
	10.6	Blocked access	<ul style="list-style-type: none"> <li>Same as 7.6.</li> </ul>	Contractors	CSC	DC	
	10.7	Vehicular traffic	<ul style="list-style-type: none"> <li>Same as 7.7.</li> </ul>	Contractors	CSC	DC	
	10.8	Safety hazards and public health	<ul style="list-style-type: none"> <li>Same as 7.8.</li> </ul>	Contractors	CSC	DC	
	10.9	Damage to infrastructure	<ul style="list-style-type: none"> <li>Same as 7.9.</li> </ul>	Contractors	CSC	DC	
	10.10	Aesthetic value	<ul style="list-style-type: none"> <li>Same as 7.10.</li> </ul>	Contractors	CSC	DC	
11	Fabrication of Silos	11.1	Air quality deterioration	<ul style="list-style-type: none"> <li>Same as 7.1</li> </ul>	Contractors	CSC	DC
		11.2	Noise and vibration	<ul style="list-style-type: none"> <li>Same as 7.2</li> </ul>	Contractors	CSC	DC
		11.3	Soil erosion	<ul style="list-style-type: none"> <li>Same as 7.3.</li> </ul>	Contractors	CSC	DC
		11.4	Soil/water contamination	<ul style="list-style-type: none"> <li>Same as 7.4.</li> </ul>	Contractors	CSC	DC
		11.5	Blocked access	<ul style="list-style-type: none"> <li>Same as 7.6.</li> </ul>	Contractors	CSC	DC

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing		
			Execution	Monitoring			
	11.6	Vehicular traffic	• Same as 7.7.	Contractors	CSC	DC	
	11.7	Safety hazards and public health	• Same as 7.8.	Contractors	CSC	DC	
	11.8	Damage to infrastructure	• Same as 7.9.	Contractors	CSC	DC	
	11.9	Aesthetic value	• Same as 7.10.	Contractors	CSC	DC	
12	Installation of machinery and equipment	12.1	Air quality deterioration	• Same as 7.1	Contractors	CSC	DC
		12.2	Noise and vibration	• Same as 7.2	Contractors	CSC	DC
		12.3	Soil erosion	• Same as 7.3.	Contractors	CSC	DC
		12.4	Soil/water contamination	• Same as 7.4.	Contractors	CSC	DC
		12.5	Blocked access	• Same as 7.6.	Contractors	CSC	DC
		12.6	Vehicular traffic	• Same as 7.7.	Contractors	CSC	DC
		12.7	Safety hazards and public health	• Same as 7.8.	Contractors	CSC	DC
		12.8	Damage to infrastructure	• Same as 7.9.	Contractors	CSC	DC
		12.9	Aesthetic value	• Same as 7.10.	Contractors	CSC	DC

**Table 9-2: Mitigation Plan for Operation and Maintenance Phase**

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing		
			Execution	Monitoring			
1	Operation of Machinery and Equipment	1.1	Air quality deterioration	• The vehicular and equipment exhaust should comply with the national	O&M staff	HSE Staff	During O&M

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing	
			Execution	Monitoring		
		<p>standards.</p> <ul style="list-style-type: none"> <li>The bag filters will be maintained regularly, ensuring that there is no excessive leakage and release of PM. The emissions from these filters will comply with the national standards for air quality.</li> <li>Compliance with the standard for ambient air quality will be ensured.</li> <li>Standard operating procedures will be followed to handle and use aluminum phosphide, and to prevent exposure to phosphine gas. For this purpose, international sources such as National Institute for Occupational Safety and Health (NIOSH) will be utilized.</li> <li>The O&amp;M staff will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.</li> </ul>				
	1.2	Noise and vibration	<ul style="list-style-type: none"> <li>It will ensure that the noise from the facility complies with the national and WB standards.</li> <li>PPE (ear muffs or air plugs) will be provided to the O&amp;M staff</li> <li>Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by the Supervision Consultants.</li> <li>Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.</li> <li>Vehicles will have exhaust silencers to minimize noise generation.</li> </ul>	O&M staff	HSE Staff	During O&M

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<ul style="list-style-type: none"> <li>Nighttime traffic will be avoided near the communities.</li> <li>Movement of all project vehicles and personnel will be restricted to within work areas, to</li> <li>Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.</li> </ul>			
	1.3 Soil/water contamination	<ul style="list-style-type: none"> <li>Each facility will have waste management plan as part of its Operations Manual. No untreated waste effluents will be released to the environment.</li> <li>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.</li> <li>Waste oils will be collected in drums and sold to the recycling contractors.</li> <li>The inert recyclable waste from the site (such as card 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.</li> <li>Domestic solid waste from the offices and residential areas will be disposed in a manner that does not cause soil contamination.</li> </ul>	O&M staff	HSE Staff	During O&M
	1.4 Water consumption	<ul style="list-style-type: none"> <li>Astute planning will be employed to conserve water at the plant, offices and</li> </ul>	O&M staff	HSE Staff	During O&M

Project Activities	Potential Impacts	Mitigation Actions	Responsibility		Timing
			Execution	Monitoring	
		<p>residential area.</p> <ul style="list-style-type: none"> <li>Water will be procured in a manner that least affects the existing water users and local communities. Preferably, the facility will have its own dedicated water source such as a deep tube-well.</li> </ul>			
	1.5 Safety hazards and public health	<ul style="list-style-type: none"> <li>Each facility will prepare a site specific Health, Safety and Environment (HSE) Plan. The Plan should also include awareness raising and prevention measures for particularly for communicable diseases such as hepatitis B and C, and HIV/AIDS. The HSE Plan will be made an integral part of the Operational Manual of each facility. The Plan will particularly address procedures to handle aluminum phosphide and to prevent exposure to phosphine gas.</li> <li>Material safety data sheet (MSDS) will be followed to handle aluminum sulphide and other hazardous chemicals.</li> <li>Complete inventory and chain of custody record will be maintained for aluminum phosphide.</li> <li>PPE will be provided to the O&amp;M staff.</li> <li>HSE trainings will be provided to the O&amp;M staff on a regular basis.</li> <li>Availability of safe drinking water will be ensured at each facility.</li> <li>First aid boxes will be made available at each construction site. Emergency phone numbers (including hospitals,</li> </ul>			During O&M

	Project Activities		Potential Impacts	Mitigation Actions	Responsibility		Timing
					Execution	Monitoring	
				<p>Fire Department, and Police) will be displayed at key locations within the facility.</p> <ul style="list-style-type: none"> <li>• Firefighting equipment will be made available at the facilities.</li> <li>• The O&amp;M staff will be provided safety including fire fighting training.</li> <li>• All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.</li> <li>• Waste management plan to be prepared and implemented in accordance with international best practice.</li> <li>• Liaison with the community will be maintained.</li> </ul>			
2	Fumigation	2.1	Air quality deterioration	<ul style="list-style-type: none"> <li>• Compliance with the standard for ambient air quality will be ensured.</li> <li>• Standard operating procedures will be followed to handle and use aluminum phosphide, and to prevent exposure to phosphine gas. For this purpose, international sources such as National Institute for Occupational Safety and Health (NIOSH) will be utilized.</li> <li>• The O&amp;M staff will be provided HSE trainings on regular basis; these trainings will address the issues related to phosphine gas.</li> </ul>	O&M staff	HSE Staff	During O&M
		2.2	Soil/water contamination	<ul style="list-style-type: none"> <li>• Handling, storage, and disposal of aluminum phosphide will be carried out in accordance with the approved procedures. No uncontrolled release to environment (soil, water) will be carried out.</li> </ul>	O&M staff	HSE Staff	During O&M

	Project Activities		Potential Impacts	Mitigation Actions	Responsibility		Timing
					Execution	Monitoring	
				<ul style="list-style-type: none"> <li>MSDS will be followed to handle aluminum sulphide and other hazardous chemicals.</li> </ul>			
		2.3	Safety hazards and public health	<ul style="list-style-type: none"> <li>Same as 1.5</li> </ul>	O&M staff	HSE Staff	During O&M
3	Repair and Maintenance	3.1	Air quality deterioration	<ul style="list-style-type: none"> <li>Same as 1.1.</li> </ul>	O&M staff	HSE Staff	During O&M
		3.2	Noise and vibration	<ul style="list-style-type: none"> <li>It will ensure that the noise from the facility complies with the national and WB standards.</li> <li>PPE (ear muffs or air plugs) will be provided to the O&amp;M staff</li> <li>Vehicles will have exhaust silencers to minimize noise generation.</li> <li>Liaison with the community will be maintained. Grievance redressal mechanism will be put in place to address the community complaints.</li> </ul>	O&M staff	HSE Staff	During O&M
		3.3	Soil/water contamination	<ul style="list-style-type: none"> <li>Each facility will have waste management plan as part of its Operations Manual. No untreated waste effluents will be released to the environment.</li> <li>Waste oils will be collected in drums and sold to the recycling contractors.</li> <li>The inert recyclable waste from the site (such as card board, drums, and broken/used parts) will be sold to recycling contractors. Hazardous waste will be kept separate and handled according to its nature.</li> </ul>	O&M staff	HSE Staff	During O&M
		3.4	Water consumption	<ul style="list-style-type: none"> <li>Same as 1.4.</li> </ul>	O&M staff	HSE Staff	During O&M

	Project Activities		Potential Impacts	Mitigation Actions	Responsibility		Timing
					Execution	Monitoring	
		3.5	Safety hazards and public health	<ul style="list-style-type: none"> <li>• Same as 1.5.</li> </ul>	O&M staff	HSE Staff	During O&M
4	Grain Transportation	4.1	Air quality deterioration	<ul style="list-style-type: none"> <li>• The vehicular should comply with the national standards.</li> </ul>	O&M staff	HSE Staff	During O&M
		4.2	Noise and vibration	<ul style="list-style-type: none"> <li>• The vehicular should comply with the national standards.</li> </ul>	O&M staff	HSE Staff	During O&M
		4.3	Vehicular traffic	<ul style="list-style-type: none"> <li>• The Department will prepare a traffic management plan for each silo facility. This plan will be a part of the Operational Manual of each facility.</li> <li>• Liaison will be maintained with the relevant authorities (such as traffic police, BIWTA) regarding the wheat transportation particularly during emergencies.</li> </ul>	O&M staff	HSE Staff	During O&M
		4.4	Safety hazards and public health	<ul style="list-style-type: none"> <li>○ The project drivers will be trained for defensive driving skills.</li> <li>○ Vehicular speeds near/within communities will be kept low to minimize safety hazards.</li> </ul>	O&M staff	HSE Staff	During O&M
		4.5	Damage to infrastructure	<ul style="list-style-type: none"> <li>• Appropriately sized vehicles will be used to transport the food grain, minimizing the wear and tear of the transportation routes.</li> <li>• The Food Department will maintain close liaison with the relevant authorities such as Highway Department and BIWTA for any damages caused by the food grain transportation.</li> </ul>	O&M staff	HSE Staff	During O&M

## 9.5 Environmental Monitoring

480. Two distinct types of environmental monitoring will be carried out during the Project construction and O&M phases. These are discussed below.

### 9.5.1 Compliance Monitoring

481. The compliance monitoring of the project activities is principally a tool to ensure that the environmental and social control measures identified during the EIA are strictly adhered to during the Project execution.

482. Various aspects of the EIA compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractors or any other persons associated with the Project.
- Verify that the activities are undertaken in compliance with the EIA and EMP.
- Document and communicate the observations to the concerned person(s) of the contractors, PMU and Supervision Consultants, so that any corrective measures, if required, can be taken in a timely fashion.
- Maintain a record of all incidents of environmental and social significance and related actions and corrective measures.
- Maintain contact with the communities, solicit their views and concerns, and discuss them during the fortnightly meetings.
- Prepare periodic reports of the environmental and social performance of Project.

483. The mitigation plan discussed in Section 9.4 above will be used as a management and monitoring tool for compliance monitoring. Inspections will be carried out using checklists prepared by the contractors, on the basis of the Table 9.1, during the construction phase, and by the O&M staff on the basis of Table 9.2 during the O&M phase of each facility.

### 9.5.2 Effects Monitoring

484. The EIA predicts the impacts of the proposed Project on the basis of information available at the time of conducting the assessment and the natural processes that link various environmental and social parameters. Based on this prediction, mitigation measures are introduced such that the predicted residual effects do not exceed acceptable levels. However, there can be an element of uncertainty in such predictions, for example, due to an insufficient grasp of the processes, limitations in prediction techniques, or inadequate data on the environment. This is true for the physical, biological, as well as socioeconomic environment. Consequently, it is possible that even if the mitigation measures are implemented fully, the negative impacts of the Project could exceed predicted levels or acceptable limits.

485. In order to address the above concerns, effects monitoring will be undertaken during the Project activities, with the overall objective of proper management of environmental and social risks and uncertainties. Broadly, effects monitoring has the following objectives:

- To verify that the impacts of the proposed project are within acceptable limits, thus establishing credibility (public assurance);

- To immediately warn the Project proponents (and the regulatory agencies, if required) of unanticipated adverse impact or sudden changes in impact trends so that corrective actions can be undertaken, which may include modifications in the proposed activities, or the inclusion of modified or additional mitigation measures;
- To provide information to plan and control the timing, location, and level of certain project activities so that the effects are minimized; and
- To facilitate research and development by documenting the effects of the proposed project that can be used to validate impact-prediction techniques and provide a basis for more accurate predictions of future projects.

486. The effects monitoring plan is provided in Table 9.3. The detailed methodologies will be developed by the contractor before commencing the construction activities. The effects monitoring will comprise the following:

- Soil erosion;
- Water quality;
- Oil spills;
- Waste management;
- Air quality;
- Noise;
- Socioeconomic aspects; and
- Grievance monitoring.

487. PMU may revise the effects monitoring plan during the project implementation as required.

**Table 9-3: Effects Monitoring**

	<b>Monitoring Parameter</b>	<b>Monitoring Locations</b>	<b>Frequency</b> <sup>18</sup>	<b>Responsibility</b>	<b>Methodology/ Resource Requirement</b>	<b>Documentation</b>
1	Soil erosion	Construction sites, labor campsites, borrow areas, disposal sites	During routine monitoring	CSC	Visual observation, digital camera	Record of visual observation and photographs
3	Water quality	At wells and surface water bodies near work sites and labor campsites	Before mobilization	Contractor	Laboratory analysis/sampling bottles	Record of sampling and analysis
		Selected local wells	Quarterly	Contractor	Laboratory analysis/Sampling bottles	Record of sampling and analysis
		Selected locations at nearby surface water bodies	Quarterly	Contractor	Laboratory analysis/Sampling bottles	Record of sampling and analysis
4	Damage to groundwater wells	Construction site	During routine monitoring	Contractor	Visual observations, digital camera	Record of visual observation/photographs
5	Oil spill	Construction sites workshops and oil storage areas	During routine monitoring	CSC	Visual observations, digital camera	Record of visual observations/ photographs
6	Solid waste	Construction sites, labor campsites	During routine monitoring	CSC	Visual observations, digital camera	Record of visual observations/ photographs
7	Wastewater	Work sites; labor campsites	During routine monitoring	CSC	Sampling bottles	Record of sampling and analysis

<sup>18</sup> The frequency of effects monitoring can be adjusted per the site conditions/requirements.

	<b>Monitoring Parameter</b>	<b>Monitoring Locations</b>	<b>Frequency</b> <sup>18</sup>	<b>Responsibility</b>	<b>Methodology/ Resource Requirement</b>	<b>Documentation</b>
8	Ambient air quality	Construction sites, labor campsites	Before mobilization	Contractor	Ambient air quality monitoring equipment	Record of sampling and analysis
		Construction site, labor campsite	Quarterly	Contractor	Ambient air quality monitoring equipment	Record of sampling and analysis
9	Exhaust emissions	Construction sites, camp site	During routine monitoring	CSC	Visual observations, digital camera	Record of visual observations/ photographs
10	Dust emissions	Construction sites, labor camp site, project roads	During routine monitoring	CSC	Visual observations, digital camera	Record of visual observations/ photographs
11	Noise	Construction sites, labor camp site, project roads; nearby communities	Fortnightly or during construction activities causing noise	Contractor	Noise meter	Complete record of noise measurement and location
12	Public grievance	Nearby communities	Throughout construction work	CSC and PMU	Complaints register	Complete record of any complaints

## 9.6 Capacity Building

488. Environmental and social trainings will help ensure that the requirements of the EIA and EMP are clearly understood and followed by all project personnel throughout the project period. The EMS of the CSC will ensure, in collaboration with the SES of PMU, that these trainings are provided to all Project personnel. The environmental and social training program will be finalized before the commencement of the project. The trainings will be provided to the DG-Food staff, the CSC staff, the construction contractors, and other staff engaged for the Project. Training will cover all staff levels, ranging from the management and supervisory to the skilled and unskilled categories. The scope of the training will cover general environmental awareness and the requirements of the EIA and the EMP, with special emphasis on sensitizing the project staff to the environmental and social aspects of the area. Table 9.4 provides a summary of various aspects of the environmental and social trainings to be conducted at each silo construction site separately. PMU may revise the plan during the Project implementation as required.

489. During the O&M phase of the Project, these trainings will continue to be conducted by HSE staff for all relevant O&M personnel at each facility.

**Table 9-4: Environmental and Social Trainings**

<b>Contents</b>	<b>Participants</b>	<b>Responsibility</b>	<b>Schedule</b>
General environmental and socioeconomic awareness; Environmental and social sensitivity of the project area; Key findings of the EIA; Mitigation measures; EMP; Social and cultural values of the area.	Selected DG-Food staff; PMU; CSC staff	CSC	Prior to the start of the Project activities. (To be repeated as needed.)
General environmental and socioeconomic awareness; Environmental and social sensitivity of the project area; Mitigation measures; Community issues; Awareness of transmissible diseases Social and cultural values.	PMU; CSC; selected contractors' crew	CSC	Prior to the start of the field activities. (To be repeated as needed.)
EMP; Waste disposal; HSE	Construction crew	Contractors	Prior to the start of the construction activities. (To be repeated as needed.)
Road safety; Defensive driving; Waste disposal; Cultural values and social sensitivity.	Drivers	Contractors	Before and during the field operations. (To be repeated as needed.)
Camp operation;	Camp staff	Contractors	Before and during the

<b>Contents</b>	<b>Participants</b>	<b>Responsibility</b>	<b>Schedule</b>
Waste disposal; HSE Natural resource conservation; Housekeeping.			field operations. (To be repeated as needed.)
Restoration requirements; Waste disposal.	Restoration teams	Contractors	Before the start of the restoration activities.
HSE during Operation Phase	Selected DG-Food staff;	DG Food	Prior to the Start of the Project Operation and when required during the operation phase

## 9.7 Record Keeping & Database Management

490. Database will be created and synchronized with the main project database for recording, disseminating and responding to information which emerges from the various environmental monitoring and management programs. They are also necessary for rendering the environmental management system “auditable”. SES will be in charge of the database.

### 9.7.1 Monitoring Records

#### 9.7.1.1 Quantitative Physical Monitoring

491. The objective of quantitative physical monitoring is to ensure that the mitigation measures designed to prevent, reduce and where possible offset any significant adverse impacts on the environment are being implemented throughout the Project lifecycle.

492. A database would be developed by CSC with the assistance of PMU for storing the results of the quantitative monitoring. The facility would be capable of producing tabulated weekly and monthly reports that provide the following information:

- Sampling points;
- Dates and times of sample collection;
- Test results;
- Control limits;
- “Action limits” (circa 80 percent of the control limits) at which steps must be taken to prevent the impending breach of the control limit; and
- Any breaches of the control limits, including explanations if available.

493. The monitoring data would be continually processed as it is received, so as to avoid a buildup of unprocessed data.

#### 9.7.1.2 General Site Inspections and Monitoring

494. A Site Inspection Checklist for recording the findings of the general site condition surveys would be developed by the respective contractors, on the basis of the Environmental Mitigation Plan described

in Section 9.4, during the construction phase. The Site Inspection Checklist would be supported by sketches, as necessary.

### **9.7.2. Complaints Records**

495. A tabulated standard form would be prepared for recording any environmental complaints that are received from the public or government organizations by whatever medium i.e. visits to the Plant, telephone calls or correspondence.

The form would concisely list the following information:

- Date of the complaint;
- Name and contact address of the complainant;
- Brief description of the complaint, with a file reference to any correspondence from the complainant;
- Brief description of the action taken by the Plant Management to investigate the cause of the complaint and bring about corrective action, if justified; and
- Date of reply to the complainant, with a file reference to any correspondence.

496. All complaints received by the PMU would be handled in this way

### **9.7.3. Information Sources**

497. A complete and up-to-date file of all relevant sources of information should be maintained by the PMU. This file would be readily accessible and include, as a minimum, copies of the following documents:

- Current environmental permits and consents;
- All relevant national regulations, international guidelines and codes of practice;
- Manufacturers' MSDSs for all hazardous substances used on the plant;
- Manufacturers' operating manuals for all the environmental monitoring equipment;
- Current calibration certificates for all the equipment that requires calibration by an external organization; and
- The latest version of this Environmental Management and Monitoring Manual.

### **9.7.4. Non-Compliance Report**

498. Any breaches of the acceptable standards specified, would be reported to the PMU using a standard form, i.e. a Non-Compliance Report (NCR).

499. A copy of each completed NCR would be held on file by CSC, to be replaced by the reply copy when it is received. A record of corrective actions would also be made and tracked to their completion.

### **9.7.5. Monthly Internal Reports**

500. The CSC will prepare a monthly report for issue to the PMU. These reports will summarize the following:

- Progress in implementing this EMP;

- Findings of the monitoring programs, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- Any emerging issues where information or data collected is substantially different from the baseline data reported in the Environmental Assessment;
- Outstanding NCRs;
- Summary of any complaints by external bodies and actions taken / to be taken; and
- Relevant changes or possible changes in legislation, regulations and international practices.

#### 9.7.6 External Audits (Third Party Validation)

501. Arrangements will be made for an independent audit of the existing practices against the requirements of the EMP, on an annual basis. The following aspects will be covered under the external audit:

- the EMP is being adequately implemented,
- mitigation measures are being implemented and their effectiveness,
- the compliance and effects monitoring are being conducted,
- environmental and social trainings are being conducted, and
- complete documentation is being maintained.

502. These audits would be used to re-examine the continued appropriateness of the EMP and to provide advice on any up-dates required. Attention would be given to lessons learnt in the light of experience. In particular, consideration would be given to the monitoring programs in place to determine whether their purpose has been served and they can therefore be terminated or reduced in frequency. A ToR is added in Annex 10.

#### 9.7.7 Supervision by World Bank

503. DG Food with the help of SES will prepare the **half yearly progress report** on environmental management and will submit to the World Bank for review. The World Bank will review the screening report, environmental management plan, monitoring reports on random basis and will carry out field visit to cross-check. The contributing development partners may also join in the field visit to understand the environmental compliance of the project.

504. The **Annual Environmental Audit Report** prepared by the third party monitoring firm will be shared with the safeguards secretariat.

### 9.8 Grievance Redress Mechanism

505. A grievance can be defined as an actual or perceived problem that might give grounds for complaint. As a general policy, DG-Food and PMU will work proactively towards 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 related to the land acquisition, resettlement process and environmental management. This will be the responsibility of the PMU, CSC, and contractors and persons designated to be responsible for stakeholder liaison.

506. Potential impacts and effects that are most likely to give rise to grievances for this Project are related to:

- Compensation and resettlement of affected persons (if any)
- Distribution of employment opportunities;
- Construction noise; and,
- Presence of a construction labor force and the effects on neighboring villages, local services and infrastructure.

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

- Negative impacts on a person or a community (e.g. financial loss, physical harm, nuisance);
- Dangers to health and safety or the environment;
- Failure of DG-Food, 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.

### 9.8.1 Grievance Logging

508. The CSC will be required to log grievances as received directly and have a formal logging system. The CSC will prepare a standard form to record complaints that are received from individuals or organizations by any means including site visits, telephone calls or written correspondence. In addition to the contact information and complaint details, the logging system needs to track the action taken by the contractor and Project staff to investigate the cause of the complaint and bring about corrective action if justified, as well as the date of reply to the complainant, with a file reference to any correspondence.

509. Grievances during construction phase will be investigated to review validity and responsibility. In the first instance, grievances will be directed to the CSC to classify according to Table 9.5 below.

**Table .9-5: Grievance Classification Criteria**

<b>Grievance Classification</b>	<b>Risk Level</b>	<b>Validity</b>	<b>Response</b>
Low	None or low	Unsubstantiated	CSC will conduct investigation, document findings and provide a response
Medium	Possible risk and likely a one off event	Possible substantiation	CSC and an appropriate investigation team will conduct investigation. The CSC PMU may decide to stop work during the investigation to allow the corrective preventive actions to be

Grievance Classification	Risk Level	Validity	Response
			determined. The CSC will provide a response.
High	Probable risk and could reoccur	Probable substantiation	CSC will get the contractor to organize a Major Investigation Team for prompt investigation and resolution. Work will be stopped in the affected area. The CSC will provide a response.

510. The CSC will log the receipt of a comment, formally acknowledge it, track progress on its investigation and resolution, and respond in writing with feedback to the aggrieved party. A response time of 10 working days, unless there are exceptional circumstances, would be the aim.

511. The CSC will identify an appropriate investigation team with the correct skills to review the issue raised and to decide whether it is Project related or whether it is more appropriately addressed by a relevant authority outside the Project. PMU will play a role in investigating the validity and responsibility for some grievances. Project staff, and outside authorities as appropriate, will also contribute to investigations as required. The investigation will aim to identify whether the incident leading to the grievance is a singular occurrence or likely to reoccur. Identifying and implementing activities, procedures, equipment and training to address and prevent reoccurrence will be part of the investigation activities. In some cases it will be appropriate for the CSC to follow up at a later date to see if the person or organization is satisfied with the resolution or remedial actions.

512. The SC will explain in writing (or where literacy is an issue, orally) the manner in which the review was carried out, the results of the review, any changes to activities that will be undertaken to address the grievance or how the issue is being managed to meet appropriate environmental and social management systems and requirements.

513. The CSC will summarize grievances in project performance reports, at least bi-annually during construction and annually during operation.

514. The Project will aim to protect a person’s confidentiality when requested and will guarantee anonymity in annual reporting. Individuals will be asked permission to disclose their identity. Investigations will be undertaken in a manner that is respectful of the aggrieved party and the principle of confidentiality. The aggrieved party will need to recognize that there may be situations when disclosure of identity is required and the Project will identify these situations to see whether the aggrieved party wishes to continue with the investigation and resolution activities.

## 9.9 Inclusion of EMP in Contract Documents

515. In order to make contractors fully aware and responsible of the implications of the EMP and to ensure its compliance, it will be ensured that environmental measures are treated appropriately and separately in the tender documentation and that payment milestones are linked to environmental performance, measured by execution of the prescribed environmental mitigation measures. Such a procedure would help ensure adequate assessments of project impacts are carried out during Project construction and operation phases, where a consistent approach will be expected on behalf of contractors

that warrant data and information collected from monitoring programs are compared to baseline conditions.

516. The contractors would be made accountable through contract documents and/or other agreements of the obligations and importance of the environmental and social components of the Project. They would be prepared to co-operate with the executing agency, project management unit, supervising consultants and local population for the mitigation of adverse impacts. After the EMP's addition in the contract documents, the contractors will become bound to implement the EMP and to hire trained environmental management staff for implementation and effectiveness of the mitigation measures.

517. The contractor is to bid for executing the EMP, including the recommended mitigation measures and monitoring programs, as part of their Bill of Quantities. Since many contractors do not have clear understanding the need of environmental management, some quoted very low price for implementation of EMP and eventually cannot implement EMP as per design. To avoid this problem, Fixed Budget will be assigned for EMP implementation. The contractors may need orientation on the requirement of the EMP in the pre-bidding meeting. The contractor needs to submit an Environmental Action Plan (EAP) based on the EIA and EMF in line with the construction schedule and guideline. The EAP needs to be reviewed by the supervision consultant and cleared by MFSP and World Bank.

## 9.10 EMP Implementation Cost

518. The estimated costs for the environmental management and monitoring activities are set out in Table 9.6 below.

**Table 9-6: Cost Estimates for Environmental Management and Monitoring Activities (Per site)**

	Description	Tentative Cost BDT	Cost US\$	Basis
<b>Environmental Management Plan (EMP)</b>				
1	Environment Specialist in PMU/month	50000	610	Market Value
2	Environmental Supervisor/ environment Specialist in Field	25000	305	Market Value
3	Tree Plantation/sapling	2000	24.5	Forest Department
	Pollution Prevention Plan (Water, Air	300000*)	610	BUET
4	Provision of noise checking facility of	200000*)	610	BUET
5	Waste Disposal	100000*)	1220	Market Value
6	Drinking Water Management	100000*)	1220	Market
7	Borrow Area Restoration	50000*)	1220	Market Value
8	Traffic Management Plan	100000*)	2440	Market Value
9	Provision of safety measures to	500000*)	2440	Market Value
10	Demolition Work Plan	50000	2440	Market Value
11	Establishment of Construction Camp	200000	3660	Market Value
12	Monitoring & Evaluation,	200000*)	6100	Market Value
13	Training and Capacity building (10	500,000*)	6100	
	<b>Total EMP (Item 3 to 7, 12 and 13)</b>	<b>1,80,000</b>	<b>22000</b>	

\*) included in contractors' costs and Environmental Action Plan developed in line with construction schedule

## 10. CONSULTATION AND DISCLOSURE

519. This Chapter provides the objectives, process and outcome of the community consultations conducted as part of the ESA study.

### 10.1.1 Objectives

520. Community consultation has been conducted as an integral part of the social assessment (SA) of the project. The SA aims to provide a two-way communication between the communities and the project proponents. The consultation process was adopted to identify key stakeholders, and help assess the current practice of grain storage at family level, community interests and needs in the vicinity of the proposed silo sites, and identify impacts of the project interventions to the communities. In line with this aim, the objectives of the community consultation and participation were to:

- develop and maintain communication links between the project proponents and other communities including the beneficiaries and affected persons,
- provide key project information to the stakeholders and communities, and to solicit their views on the project and its potential or perceived impacts, and
- ensure that views and concerns of the communities and other stakeholders are incorporated into the project design and implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed project.

### 10.1.2 Consultation and Participation Framework

521. The stakeholder consultation is a continuous process, and should be carried out throughout the life of project. The consultations carried out during the social assessment and reported in this Chapter are essentially among the initial steps in this process. Participation of the project stakeholders need to be ensured during the subsequent project phases as well. Table 5.1 provides the consultation and participation framework for stakeholder consultation and participation in the subsequent project phases from detail design to civil works construction.

**Table 10-1 Consultation and Participation Framework**

<b>Project Stage</b>	<b>Proposed Tool</b>	<b>Stakeholders</b>	<b>Responsibility</b>
Project Design Phase	Meetings with institutional stakeholders (carried out during the present ESA); Meetings with grass root stakeholders (carried out during the present ESA)	Institutional stakeholders; Local stakeholders, including the communities to be affected/benefitted during the project implementation.	ESA consultant.
Project Construction	Sharing of the project	Institutional	Site level executives of

<b>Project Stage</b>	<b>Proposed Tool</b>	<b>Stakeholders</b>	<b>Responsibility</b>
/ implementation Phase	objectives, project components, major benefits, potential impacts, and mitigation measures with the affected communities (and other stakeholders).	stakeholders; Local stakeholders, including the communities to be affected/benefitted during the project implementation.	the DG-Food under the PMU
	Grievance Redressal Mechanism (discussed in SMF).	The communities to be affected/benefitted	GRCs at local and central levels for the project
	Consultations with the communities during Environmental and Social Monitoring (discussed in EMF/SMF).	The communities to be affected/benefitted	SA consultant.
	Consultations with the project affectees / beneficiaries and communities during the external monitoring (EMF/SMF).	The communities to be affected/benefitted	External monitoring consultant.
	Consultations with the project affectees / beneficiaries, and communities during the site visits by the WB monitoring mission.	The communities to be affected/benefitted; District government officers	WB monitoring mission.
Project Operation Phase	Liaison with the communities	The communities to be affected/benefitted	Silo Manager/Regional Controller of Food under the DG-Food

## 10.2 Stakeholder Identification

522. DG-Food under the Ministry of Food has been preparing the project and will be responsible to implement it with financing from the International Development Association (IDA) of the World Bank Group. According to the objectives of the project, the population in the disaster prone areas of Bangladesh are the prime beneficiary of the project and they are spread all over the country, in the coastal zone, in the flood prone areas, and in the drought prone areas. Concentrated to the proposed silo sites, the residents attached to the sites will be impacted during construction and operation of the silos. Local leaders, traders, transporters and wage labourers have expressed their interest to the project. Key stakeholders of the project at various levels include:

- DG-Food and its officials at HQ and in the field offices.
- local administration – district and upazila level government officials.
- local government institutions – municipalities, union and upazila parishads.

- beneficiaries of the project (i.e., farmers, traders, wage labourers, and other villagers) and the likely affected persons.
- millers, transporters and transport workers.
- the broader interested community.

### 10.3 Consultation Process

523. The consultations with the project stakeholders were carried out at two steps; once during identification of the sites for construction of silo facilities and again after finalization of the eight selected sites. Community meetings and consultation with local peoples at the sites were conducted. The consultants and the DG-Food staff at the local level organized and conducted the community meetings and the consultant discussed various pertinent issues with the local community representatives during site selection. Outside the silo sites, communities in two villages in Barisal were also consulted on current practice of grain storage at the family level and need for interventions for improved and safe storage facilities. The process of consultation was conceived to interact with the communities and other stakeholders on the project concept, objectives, design and likely impacts. Communities were consulted during site survey for selection of potential sites in Barisal, Narayanganj, Dhaka, Ashuganj, Madhupur, Mymensingh, Maheshwar Pasha, Chittagong, Mongla, Dinajpur, Naogaon, Bhaghabari, Khulna, and Govindaganj. However, the consultation during January was concentrated in Barisal, Narayanganj, Dhaka, Ashuganj, Madhupur, Mymensingh, Maheshwar Pasha, and Chittagong. The consultations helped understand local knowledge with respect to project objectives, current practices, problems and various other issues and concerns, and integrate these into the project design and social impact management. The participants of the consultation meetings at the eight selected sites and in the two villages in Patuakhali have been given in Annex-10.

### 10.4 Consultation during Site Identification

524. Consultation with local communities and institutional stakeholders were carried out at all potential sites in Barisal, Narayanganj, Dhaka, Ashuganj, Madhupur, Mymensingh, Maheshwar Pasha, Chittagong, Mongla, Dinajpur, Naogaon, Bhaghabari, Khulna, and Govindaganj. Key issues discussed in the community level during site identification were as presented in the Table 10.2.

**Table 10-2 Key Issues Discussed during Community Consultations**

Sl. No.	Stakeholders consulted	Major issues and Concerns
1.	Local communities attached to the proposed silo sites (farmers, traders, transporters, laborers, women, and others)	<ul style="list-style-type: none"> <li>● Project objectives and benefits</li> <li>● Project components related to silo facilities</li> <li>● Need for participation of the communities in site selection and project design</li> <li>● Criteria for site selection</li> </ul>
2.	Likely affected households (likely to losing land, structures, income sources and livelihoods and those experiencing inconveniences during construction)	<ul style="list-style-type: none"> <li>● Likely impacts on assets and income</li> <li>● Community attitude to the project – compensation measures and recommendations</li> <li>● Community severance issues resulting from</li> </ul>

3.	Women and vulnerable groups	displacement <ul style="list-style-type: none"> <li>• Relocation options and site locations</li> <li>• Livelihood restoration and enhancement.</li> </ul>
4.	District and upazila level government officials (land acquisition officers, physicians, forest officer, agriculture officer) and local chairmen and union Parishad members	<ul style="list-style-type: none"> <li>• Issues related to project impacts</li> <li>• Process of resettlement planning</li> <li>• Health safety and other social issues during construction</li> </ul>

### 10.5 Community attitude towards the project

525. As an infrastructure project, the Silo projects will have several impacts of varied significance. These impacts were shared with the communities and their views and inputs were sought to mitigate them. The consultations brought forth that despite some adverse impacts of the project, the communities and likely affected households (few sites) were very positive towards the project. They feel proud of having a project of national importance in their area.

### 10.6 Perceived benefits of the project

526. Each community recognized the benefits of the silos in terms of improved food security, price control, enhancement of transport business and increase in procurement encouraging more production and more employment. The community peoples believe that the project will create new employment and mobility of women enhancing family income.

### 10.7 Anticipated negative impacts

527. Consultation at the 14 sites indicate that the communities also perceive some adverse impacts of the project along with the intended benefits. The community perceived adverse social impacts of the Project interventions specific to proposed sites includes the following:

- (i) The Project will cause decrease of farm land and thereby farm products due to acquisition of agricultural land in Govindaganj and taking over khas lands in Manda and Modhupur .
- (ii) The acquisition and Project interventions will involve additional work and money for shifting the structures of the affected persons, though very small, in Govindaganj and in Baghabari .
- (iii) Safety of women and children may be endangered in the construction sites. Various types of crime can take place during the construction.
- (iv) The construction will eventually impact on the price and availability of land in the area for replacement land purchase by the affected persons.
- (v) The persons to be displaced from their residence and business or employment may suffer from diminishing income and loss of employment.
- (vi) Compensation for loss of assets can be inadequate and people will suffer alarmingly in collecting compensation from the government.
- (vii) Risks of infectious diseases may increase due to influx of non-local workers during construction.

## 10.8 Suggestions to mitigate adverse impacts


528. These likely adverse impacts can largely be mitigated with appropriate social and resettlement management. Well-planned and well managed social actions will check impoverishment of affected community and induce higher social facilities and livelihood opportunities. The Project should have awareness program to avoid the risk of infectious diseases during construction. The community people were involved through consultation on project design and anticipated consequences. The recommendations of the consultation process were:

- All possible alternatives should be examined to minimize land acquisition for the silo facilities. Compensation for all losses – land, structure, trees – should be at replacement cost, where acquisition and displacement of people cannot be avoided.
- During construction the local labors including women should be employed and adequate measures should be taken for safe work environment.

## 10.9 Consultation at Eight Selected Sites


529. Site level consultation was carried out after final selection of sites for eight silo facilities during [January 2013](#) in Dhaka, Narayanganj, Comilla, Chittagong, Tangail, Mymensingh, Khulna and Barisal sites. The communities at all the eight sites were found enthusiast about the public silo facilities of modern technology. They have expressed all out supports from their part for construction of the silo facilities. They perceive that the modern silo facilities will ensure food security of the country during emergencies and natural disasters like flood and cyclones. They expect that new employment will be generated for local communities during and after construction. They also identified community institutions within 500-m periphery of the proposed silo sites. The community problems and needs for development and rehabilitation of the community institutions identified by the communities in the meetings at each site have been presented in Table 10.3.

**Table 10-3 Community Problems and Needs**

Consultation Site and Participants	Community Problems and Needs
<p>1. Consultation at Dhaka CSD Site</p>  <p>A total of 38 local peoples participated in the meeting including traders, transport workers, transport businessmen, and wage labourers. A section is seen in the picture.</p>	<p>The site is connected the highways with a road along the bank of the river Buriganga. There are a number of mazaars and mosques run by the communities around the site. The local people demanded development of the road running around the boundary of the CSD. The DG-Food suggests improvement of the road alongside the Buriganga River to facilitate movement of food stock.</p>
<p>2. Consultation at Narayanganj CSD Site</p>	<p>There is a mosque run by the DG-Food within the CSD complex. However, the</p>

Consultation Site and Participants		Community Problems and Needs
	<p>42 local people participated in the meeting including labourers, traders, men and women ( a section is seen in the picture)</p>	<p>local people requested an school and a health centre with special services to the female population of the area.</p>
<p>3. Consultation at Ashuganj Site</p> 	<p>According to the consultation records, 106 persons including farmers, traders wage labourers, unemployed youths, men and women participated in the meeting. A section is seen in the picture.</p>	<p>There are a number of sociocultural institutions within the periphery of the silo site including the Alal Shah High School, the Islamia Aliya Madrasa, Uttara Para Jame Mosque, Moharam Para Jame Mosque, Rowshonary Girls High School, the Rail Station Mosque, Hazi Abdul Jalil Jame Mosque, the Graveyard and the Eidgah those needs immediate rehabilitation.</p> <p>The local communities further demanded that a mosque, a madrasa, a primary school, and a children's park can be established within the silo compound in available vacant lands.</p>
<p>4. Consultation at Madhupur Site</p> 	<p>47 persons including transport operators, transport workers, farmers millers, teachers, religious leaders, and traders participated in the meeting.</p>	<p>The communities around the silo site feel that an School, a Health Centre, a recreation centre are necessary in the area. They demanded reconstruction of existing 1-km road by the side of boundary wall of BFIC which connected Ramkrishna Bari Village with the Mymensingh -Tangail road.</p>
<p>5. Consultation at Mymensingh Site</p>		<p>The communities demanded construcion of a River Jetty at the Gudara Ghat (ferry crossing site) for local boatsat the river in</p>

Consultation Site and Participants	Community Problems and Needs
 <p>Participants (39) include farmers, labour leaders, labourers, elected representatives, millers, dealers, religious leader, and the like.</p>	<p>front of CSD gate and to develop the road (approx. 150 yards) connecting the gate and the ‘Gudara Ghat’.</p> <p>They also feels that a school, a health centre, and a recreation centre can be established around the site. The communities also demanded development of the 1-km road connecting Mymensingh-Tangail Road with the small railway station named ‘Mymensingh Road Station’.</p>
<p>6. Consultation at Chittagang Site</p>  <p>A total of 37 persons including service holders, students, traders, mechanics, rickshaw pullers and autorickshaw drivers, housewives, men and women participated in the meeting.</p>	<p>The local communities are interested in development of water supply, environmental improvement, development of drainage system, development of the approach road to minimize traffic jam, establishment of a new school and a hospital in the area.</p>
<p>7. Consultation at Barisal CSD Site</p>  <p>A total of 28 persons including DG-food staff, local farmers, traders wage labourers, unemployed youths, men and women participated in the meeting.</p>	<p>There are 5 schools, 2 colleges, 7 private hospitals, one government hospital, 4 mosques, 2 girzas, 6 private clubs and 4 NGOs operating within 500m periphery of the silo site.</p> <p>The local people demanded development of the Boddho Bhumi (site of mass killing by the occupation force during the liberation war) and construction of a mini Park.</p>
<p>8. Consultation at Maheswarpasha Site, Khulna</p>	<p>There are a number of religious and</p>

Consultation Site and Participants	Community Problems and Needs
 <p>Thirty (30) local persons including labourers, local residents, trade union leaders, port traders participated.</p>	<p>general educational institutions including Shaebpara Girls high school, Maniktola Darul ulum Hafizea Madrasha and islamic mosques including Mohammadia Forkania Madrasha (Senpara), Shaebpara Baitul Elahi Mosque, Masjidul Meraj Maniktola those needs extension and rehabilitation.</p>

530. The communities at the eight selected sites understand that construction for civil works may involve sudden increase of migrant labourers at the construction sites. The influx of the non-local workers may pose a threat to the local public health environment if safe work environment cannot be maintained. Employment of local labourers will be more safe on health concerns.

### 10.10 Consultation at Village Level in Patuakhali

531. The coastal zone including Khulna, Barisal and Patuakhali districts are prone to natural disasters like cyclones and tidal inundations. Communities in two different villages in two unions in Patuakhali were consulted during [January 2013](#) to understand the current practice and problems with family level grain storage. The villages were visited by the local DG-Food officials and consultants on 3 January 2013 and had a meeting with the communities there. A total 143 persons (61 in Tinghuria and 83 in Balakathi) including local elected representatives, farmers and women participated in the consultation meetings.



Consultation at vilage Tinghuria, Amkora Union

Consultation at vilage Balaikathi, Awliapur Union

532. The two villages (Balaikathi in Awliapur Union and Tinghuria in Amkora Union in Sadar Upazila) constitute 1850 households and 80% of these households are agriculture land holders. The communities in the meetings provided the information that about 78% of the households in these two villages store milled rice, 23% store paddy and other grains, and only 14% keeps crop seeds for their use. About 19% of the households keep grain storage up to 30 kg, 22% keeps 31-50 kg, 29% keeps 51-70 kg,

26% keeps 71-100 kg and only 19% stores above 100 kg. Table 10.4 provides details of the storage practice by communities in the coastal districts.

**Table 10-4 Storage Practice by Communities in Patuakhali district**

Type of Grains	No. of households by size of storage (multiple response)						Total	%
	Upto 30 kg	31-50 kg	51-70 kg	71-100 kg	100 kg +			
Milled Rice	350	300	400	300	100	1450	78	
Paddy		50	60	100	100	310	17	
Other grain		12	22	31	45	110	6	
Crop seeds		45	60	55	100	260	14	
Total	350	407	542	486	345	1850	100	
%	19	22	29	26	19	100		

Source: Consultation at Balakathi and Tinghoria villages in Patuakhali, January 2013

533. The communities generally use plastic and metal containers for milled rice storage available in the market out of emptied chemical or fuel/oil containers. Prices of these empty plastic containers range from BDT 200 to BDT 800. For paddy and other grain storage, the farmers use gunny bags, dole (bamboo mat container) and Matka (pottery). Crop seeds are always stored in Matka. Dole is for storage of paddy and other grains of larger volume.



Gunny Bags

Metal/tin Container

Pottery (*matka*)

534. In these conventional storage bins, 10-12% of grains are damaged due to decay, insects and rodents. Besides, these storage facilities are not safe during disaster. The communities understand that they should gradually shift to more modern methods of storing of food grains and seeds for a longer period at household level. Large plastic containers capable of storing 60-80 kg food grains should be made available all over the country at an affordable price. Plastic bin silos will be helpful if the size is between 70 to 80 kg and there should be provision for anchorage so that silos are secured during disaster.

535. The farmers are generally in the need for grain storage especially crop seeds. There may be others who have cultivable land and those who procure rice, paddy, wheat etc. for local sale. The communities opine that the price of the proposed plastic silos will be affordable to the poor

farmers if the price is kept within BDT 200 to BDT 500. However, the non-poor farmers may be able to pay a bit higher prices.

536. The communities have identified common amenities including service roads, educational and religious institutions and common cultural properties and facilities in the peripheries of the eight sites. These facilities will not be affected by the project interventions. However, they expect that these facilities can be improved for socioeconomic development of the areas. Due attention will be given to the community expectations for detailed engineering design during implementation of the project. The project will support the enhancement of the environment, such as improved landscaping, plantation of trees to improve the aesthetics of tall steel silos, etc.

### **10.11 Disclosure**

537. DG Food will follow the disclosure requirement of the World Bank on environmental documentation. After the clearance from the World Bank, the draft final version of the ESAMF will be posted in the website of DG Food along with a Bangla version and will be kept in the offices for further comments and inputs from non-governmental organization, civil society and general public. Newspaper advertisement will be published in two national dailies (English and Bangla) about the disclosure and request for comments the documents. It will be disclosed in English by World Bank and it will also be made available at the World Bank's Info Shop. The ESAMF will be finalized taking into consideration of the comments received on draft version and will be available in DG Food websites. The final version of the ESAMF along with the Bangla will be available at Silo Site office.