Environmental Assessment and Review Framework

Project Number: 45084
July 2012

BAN: Coastal Climate Resilient Infrastructure Project

Prepared by the Local Government Engineering Department, Government of Bangladesh for the Asian Development Bank.

ABBREVIATIONS

ADB	-	Asian Development Bank
CIF	-	Climate Investment Fund
CCRIP	-	Climate Change Resilient Infrastructure Project
DOE	-	Department of Environment
DRR	-	Disaster Risk Reduction
EARF	-	Environmental Assessment and Review Framework
ECA	-	Environment Conservation Act
ECR	-	Environment Conservation Rules
EDDR	-	Environmental Due Diligence Report
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EU	-	Environmental Unit of LGED
GCM	-	growth center market
GIS	-	geographic information system
GOB	-	Government of Bangladesh
GRS	-	Grievance Redress Committee
IEE	-	Initial Environmental Examination
LGED	-	Local Government Engineering Department
MIS	-	management information system
MOLGRD&C	-	Ministry of Local Government, Rural Development and Cooperatives
NCS	-	National Conservation Strategy
NEMAP	-	National Environment Management Action Plan
NEP	-	National Environment Policy
NGO	-	Non-Government Organization
PIO	-	Project Implementation Office
PMO	-	Project Management Office
PMO	-	Project Management Unit
PPCR	-	Pilot Program for Climate Resilience
REA	-	Rapid Environmental Assessment
SLR	-	sea level rise
SPCR	-	Strategic Program for Climate Resilience
UNDP	-	United Nations Development Program

CONTENTS

I. BACKGROUND

1. The Coastal Climate Resilient Infrastructure Project (CCRIP) is a result of the Government of Bangladesh's participation in the Strategic Program for Climate Resilience (SPCR) prepared under the Pilot Program for Climate Resilience (PPCR). The PPCR is a program under the Strategic Climate Fund (SCF)[1] within the Climate Investment Funds (CIF),[2] to pilot and demonstrate ways to mainstream climate resilience in development planning and management. As one of the projects approved for enhanced climate resilience under the SPCR, the CCRIP will improve livelihoods in the rural coastal districts vulnerable to climate variability and change.

2. Led by the Asian Development Bank (ADB), the World Bank and International Finance Corporation(IFC), proposed investments in the Bangladesh SPCR will focus on improving coastal embankments, rural connectivity, water supply and sanitation, promoting public-private financing for climate change adaptation and disaster risk reduction, and capacity building for mainstreaming climate resilience and knowledge management.

3. The project, while enhancing longevity, climate proofing and sustainability of infrastructure, will improve livelihoods in 12 rural coastal districts vulnerable to climate variability and change and have deficient mobility and accessibility.[3] The project aims to provide climate resilience measures that deliver a degree of climate proofing commensurate with both the task that structures have to perform and the level of acceptable risk as well as being sensibly within available budgets. Each of the project components, roads; growth centers, markets; and cyclone shelters have their specific tasks and levels of acceptable risk to the impacts of sea level rise (SLR), high wind, increasing temperature and increasing likelihood of severe cyclone, storm surge and other extreme weather events. Accordingly, a special focus of this project is to increase the climate resilience of existing and new infrastructure, where technically and economically feasible, to ensure that the intended economic benefits are achieved over the long-term. "Climate-proofing" measures include enhanced resilience to present climate effects plus forecast future climate change impacts.

4. The Environmental Assessment and Review Framework (EARF) have been developed on the basis of the findings and recommendations of the Project Feasibility Study - conducted by the Local Government Engineering Department (LGED) of the Ministry of Local Government, Rural Development and Cooperatives (MoLGRD&C) in the preparation of the CCRIP. The purpose of the EARF is to guide the LGED and the consultants on environmental issues in the task of implementing the various components of the Project.

5. The project has no major adverse environmental impacts and it will make a significant contribution to the environmental enhancement. There are predicted to be significant social and economic benefits including poverty alleviation, income generation, climate change adaptation (CCA), disaster risk reduction (DRR), etc. However, some potential adverse environmental impacts are likely to be soil, air, noise and water pollution, disturbance of aquatic and wildlife habitats, removal of vegetation and socioeconomic impacts from slight realignment of the road that may cause relocation of households, etc. These adverse environmental impacts can be

[1] The SCF is to finance targeted programs with dedicated funding to pilot new approaches with potential for scaling up. It includes PPCR, Forest Investment Program, and Scaling up Renewable Energy Program in Low Income Countries.

[2] The CIF are a unique pair of financing instruments designed to support low-carbon and climate-resilient development through scaled-up financing channeled through ADB, the African Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, and World Bank Group.

[3] These districts are: Satkhira, Khulna, Bagerhat, Perojpur, Barisal, Jhalokati, Bhola, Patuakhali, Barguna, Madaripur, Gopalganj, and Shariatpur.

mitigated through proper engineering designs, by including the specific environmental provisions in contract documents, by requiring appropriate construction methods and other appropriate mitigation measures during implementation, as well as institutional strengthening of environmental management as recommended in this report.

6. The overall project outputs include (i) improved road connectivity; (ii) improved market services; and (iii) enhanced climate change adaptation capacity. The project will upgrade 130 km of upazila roads, 174 km of union roads, and 233 km of village roads, providing year-round connectivity between agricultural production areas and markets and to the other parts of the country. 3,050 meters of bridges/culverts will be constructed or upgraded. The road upgrading works will involve widening and rising of embankments, with suitable slope protection against erosion and wave action; and reconstruction or improvement of existing earthen, Herring Bone Brick, and bituminous and concrete surfaced road sections to appropriate "climate-resilient" standards. Specific adaptation measures to increase climate resilience have been considered for: earthworks; pavement; and drainage. A climate resilient rehabilitation approach has been adopted. This includes constructing the road crest level to 600mm above the maximum normal flood level; embankment protection primarily by means of a combination of turf and shrubs, with additional geotechnical measures where there is high risk of active erosion and special measures adjacent to structures together with increased cross drainage. The project will improve the environment by planting and maintaining suitable vegetation in appropriate locations along road.

7. About 88 growth center markets (GCMs) will be improved under the project with 15% of space allocated to women. Each GCM will be connected either to an existing paved road or to one of those to be improved under the project. The market improvements will include paved trading areas, sheds, water supply system, drainage facilities, sanitation facilities, and market offices. Three suitable markets will be identified where at present no electricity supply is available and Rural Electrification Board has no plans in near future of providing the electricity. In these 3 markets, women market section shops, toilets and street lighting will be electrified using solar photovoltaic cells. Some key elements within growth centers or large markets will be made climate resilient. These are: new market sheds; these will be raised on concrete plinths to a level above the existing maximum normal monsoon high tide level plus the effective maximum SLR for the year 2050, with an additional 250mm freeboard. The project will also improve 186 community markets and 11 women's markets sections will be established in existing community markets. This subcomponent will build/improve physical markets (common shed, fish shed, open paved/raised area, women section, toilet block, internal drainage etc), build commodity collection points, and build 37 boat landing platforms (ghats).

8. The project will construct or extend around 15 multipurpose cyclone shelters; improve about 10 existing cyclone shelters and upgrade around 15 km of cyclone shelter access tracks. Designs will take into account of future sea level rise and other adjusted design requirements due to climate change effects. Strict compliance with relevant Bangladesh building codes with respect to wind loading and floor bearing capacities will be needed. The emphasis will be on ensuring adequate water storage, sustainable power supply and appropriate toilet facilities which can be used during the extreme climatic event.

9. The project will strengthen the capability of LGED staff and local government units through training and initiation of a knowledge management system, with particular emphasis on incorporating climate resilience and adaptation measures during the design, implementation and maintenance of rural infrastructure assets. The project will also enhance knowledge management for climate change. The focus is on development of a framework for enhancing institutional learning and knowledge sharing. This will entail more effective knowledge capture, compilation, storage and sharing on climate resilience principles in the design, construction and

maintenance of rural infrastructure assets. The project will develop tools to enhance knowledge management including strengthening the LGED management information system (MIS)/ geographic information system (GIS), and providing a special web-portal; a portal interface designed for technical planning and design inputs and supporting learning and networking with other external agencies.

10. The Project will integrate CCA and DRR into policy formulation and infrastructure development. A key feature is climate proofing and disaster resilient designs for rural infrastructure to ensure that upgraded roads are less vulnerable to floods, storm surge, landslides and impacts of other extreme weather events.

11. Related to proposed infrastructure and associated civil works for improvement and/or upgrading of existing infrastructure, the project is classified as 'Category B' for environment and an environmental assessment and review framework (EARF) and initial environmental examination (IEE) report have been prepared. The basic infrastructural facilities for the project are mainly improvement/ upgrading and/ or rehabilitation works comprising a large number of schemes, and does not involve major road construction and the project actions do not have any potential for adverse environmental impacts to sites and structures of cultural value. Since the project has very limited potential for adverse environmental impact (soil erosion, local drainage congestion and flooding conditions), full-blown Environmental Impact Assessment (EIA) is not required. The few potential adverse impacts of low magnitude, which have been identified, relate to road upgrading, 'climate-proofing' and rehabilitation tasks that will be mitigated during the implementation of project. All relevant documents need to be endorsed and posted on ADB web site. In the task of compliance monitoring and supervision the environmental assessment requirements and safeguard policies of ADB will also be fully conformed to.

12. Both ADB and the Government of Bangladesh require that development projects do not result in unacceptable damage to any physical cultural resources. The CCRIP is involved in the improvement/ upgrading and/ or rehabilitation project comprising a large number of schemes, and does not involve new and major road construction and the project actions do not have any potential for adverse environmental impacts to sites and structures of cultural value (viz., mosques, temples, churches, graves, archaeological remains, aesthetic locations, etc.).

13. Successful implementation of the project requires coordinated efforts of various stakeholders at different levels. Hence, consultation at different levels was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. Public consultation was useful for gathering environmental data, understanding likely impacts and community's needs and preferences.

14. The executing agency will be the LGED. The LGED will provide relevant environmental information, including information from the documents as above in a timely manner, in an accessible place and in a form and language(s) understandable (in Bengali) to affected people and other stakeholders. For illiterate people other suitable communication methods will be used. It will also organize meetings and seminars in the locality to inform people effectively.

15. The EU of LGED will establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance. It should address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism should not impede access to the country's judicial or administrative remedies. The affected people will be appropriately informed about the mechanism.

16. A suitably staffed project management office (PMO), to be established by LGED at its headquarters in Dhaka, will implement the project. The Chief Engineer of LGED, assisted by the project monitoring and evaluation unit, will be responsible for project implementation and coordination. The PMO will have one office in each of the three regions. A project director in the Dhaka headquarters will be assisted by two deputy project directors; regional office will be responsible for the day-to-day implementation and supervision of project activities. The Project Director will be responsible to the Chief Engineer of the LGED for the overall implementation, monitoring and supervision. The PMO will initiate and supervise all project actions, implement the mitigation and monitoring tasks of the IEE, and the Gender Action Plan, undertake overall monitoring/ evaluation activities, maintain financial accounts, prepare periodic progress reports and the project completion report. The LGED district offices, headed by executive engineers, will be responsible for implementing subprojects under the guidance of the PMO. The project will also coordinate with Bangladesh Water Development Board (BWDB) for development interventions.

17. The EU of LGED will monitor and measure the progress of implementation of the EMP. The extent of monitoring activities will be commensurate with the project's risks and impacts. In addition to recording information to track performance, the LGED will undertake inspections to verify compliance with the EMP and progress toward the expected outcomes.

18. Environmental and climate risks assessment and related monitoring/ supervision tasks will be carried out by one environmental consultant with climate change expertise. It is expected that the environmental consultant of the project will work in close collaboration with the Department of Environment (DOE) in order to remain updated on all environmental assessment requirements and comply with all rules and regulations.

II. ENVIRONMENTAL ASSESSMENT AND REVIEW FRAMEWORK

A. Introduction

1. Project Description with Map

19. As one of the projects approved for enhanced climate resilience under the SPCR, the CCRIP will improve livelihoods in the rural coastal districts vulnerable to climate variability and change. The project, while climate proofing and sustainability of infrastructure, will improve livelihoods in 12 rural coastal districts vulnerable to climate variability and change and have deficient mobility and accessibility. The project aims to provide climate resilience measures that deliver a degree of climate proofing commensurate with both the task that structures have to perform and the level of acceptable risk as well as being sensibly within available budgets. Each of the project components, roads; growth centers, markets; and cyclone shelters have their specific tasks and levels of acceptable risk to the impacts of SLR, high wind, increasing temperature and increasing likelihood of severe cyclone events. The underpinning thrust is on ensuring that all structures are constructed within a strong framework of enforced appropriate specifications and an as-built quality audit. The project draws on experience and lessons identified from previous projects, and recent extreme weather events in the area. "Climate-proofing" measures include enhanced resilience to present climate effects plus forecast future climate change impacts.

20. Bangladesh is one of the most vulnerable countries to climate variability and change because of its geographic location, low deltaic floodplain, and hydro-meteorological influence of erratic monsoon rainfall and other extreme climate events. The low-lying coastal zone of Bangladesh is highly vulnerable both to the normal tidally enhanced monsoon floods and to regular impact from tropical cyclones. 58 tropical cyclones have impacted Bangladesh during the period (1960-2010). Of these, 28% hit the coast of Sundarban (Satkhira, Khulna and

Bagerhat), 22.% west central coast (Borguna, Potuakhali, Barisal, Bhola and Meghna estuary), 26% east central coast (Noakhali and Chittagong) and 24% south-eastern coast (Chittagong, Cox's Bazaar and Teknaf)[4]. The vulnerability of the physical infrastructure to the impacts of the current climatic environment is a consequence of the impacts of monsoonal rainfall and flood; and the additional severe rainfall, flood and wind effects of tropical cyclones.

21. In addition to the current infrastructure vulnerability, the predicted climate changes will increase this vulnerability as a result of sea level rise (SLR); increased wet season rainfall; increased annual temperatures and increased frequency of severe cyclones. Recent predictions derived from IPCC[5] modeling based on minimum and maximum emission scenarios show temperature rising by between 1.9°C and 2.4°C and wet season rainfall increasing by between 9% and 10%[6]. The increase in temperature has the potential to cause material expansion resulting in damage in concrete structures such as buildings, bridges, and culverts. Bitumen seals to roads may be susceptible to softening unless higher temperature resistant bitumens are used. Floods resulting from increased rainfall, cyclones and storm surges have the potential to damage road embankments, markets and housing. Increasingly severe storm events will also increase the potential flood related damage as well as causing additional erosion damage from the over-topping of road embankments.

22. The road network in the coastal districts covered by the project, under present climate conditions, is seriously damaged during extreme climatic events. The maintenance and damage repair requirements of such road sections will increase with climate change and vehicle operating costs will also rise, unless appropriate improvements are undertaken. For many road sections the cross-drainage systems are inadequate under present climate conditions, with poorly maintained canals and drains not having enough hydraulic capacities to efficiently discharge flows to sluice gated outlets through polder embankments. This causes substantial "water-logging" of adjacent land, adversely affecting land-use, and this situation will worsen under climate change. Similarly, for rural markets, maintenance and damage repair requirements, together with spoilage/wastage of perishable goods will also increase with climate change. As demonstrated by recent cyclone events, the present number and capacities of existing cyclone shelters and livestock refuge facilities are inadequate for the communities at risk from such extreme climatic events, even under present climate conditions. The risks associated with extreme events will increase with climate change. Many existing cyclone shelters also have vulnerable access roads and power supplies, together with inadequate water supply and sanitation facilities, which often are not usable during the emergency conditions.

23. The impact of the project will be reduced poverty in the rural coastal districts vulnerable to climate change. The outcome will be enhanced climate resilience of coastal infrastructure in 12 rural coastal districts benefiting the poor and women. The overall project outcome will be achieved through the following project outputs: (i) improved road connectivity; (ii) improved market services; and (iii) enhanced climate change adaptation capacity.

---

[4] Quadir D A and Iqbal A, (2008) Investigation on the Variability of the Tropical Cyclones Impacting the Livelihood of the Coastal Inhabitants of Bangladesh. International Union for Conservation of Nature (IUCN) – Bangladesh.

[5] IPCC-WG-I, 2007: Climate Change 2007, AR-4, Scientific Basis, Intergovernmental Panel on Climate Change, WMO, Geneva, Switzerland

[6] Tanner TM, Hassan A, Islam KMN, Conway, D, Mechler R, Ahmed AU, and Alam, M (2007) ORCHID: Piloting Climate Risk Screening in DFID Bangladesh. University of Sussex, UK.

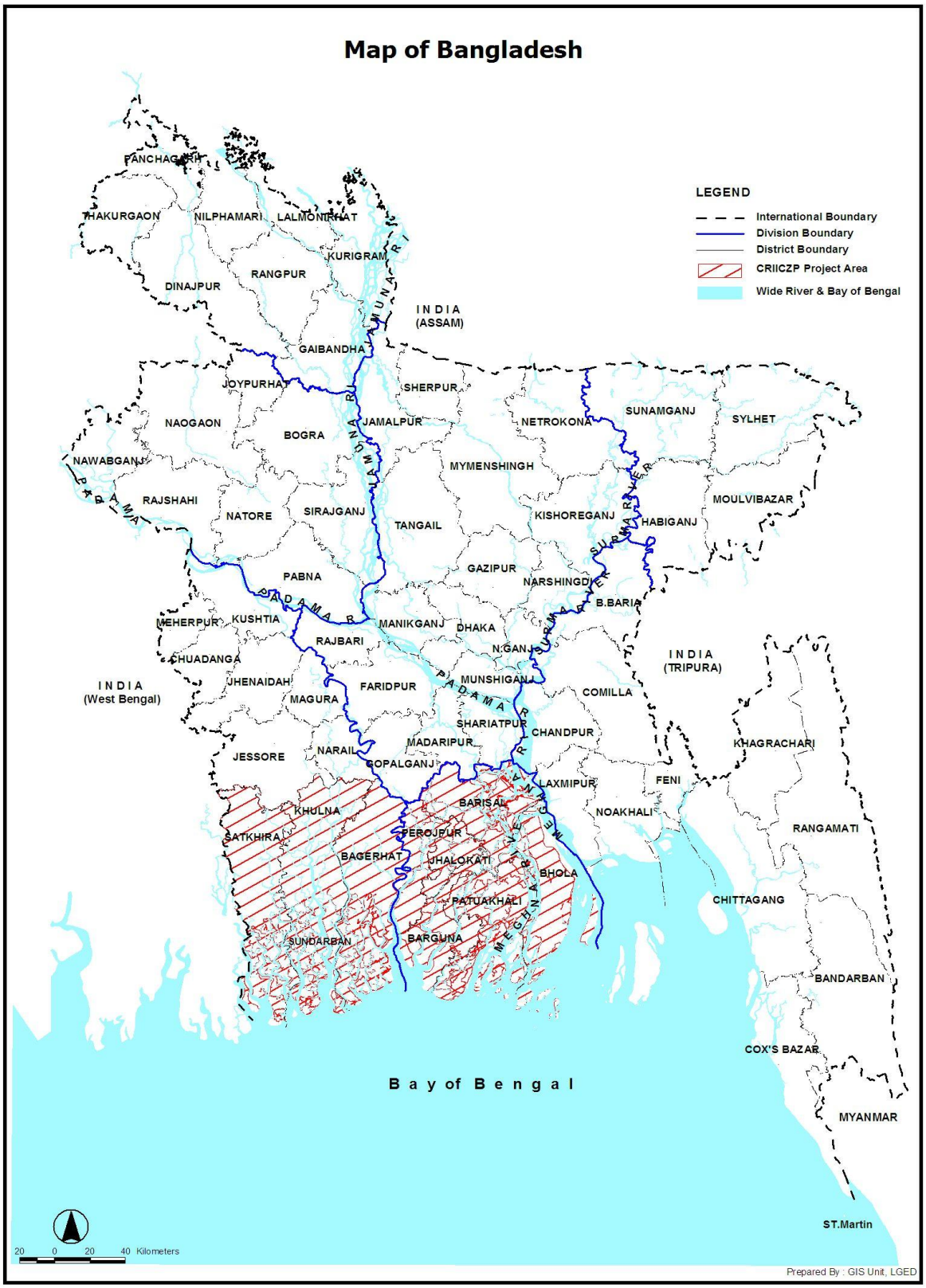

Figure 1: Map of Bangladesh

2. Purpose of the EARF

24. The Environmental Assessment and Review Framework (EARF) has been developed on the basis of the findings and recommendations of the Project Feasibility Study - conducted by the LGED of the Ministry of Local Government, Rural Development and Cooperatives in the preparation of the Coastal Climate Resilient Infrastructure Project (CCRIP). The purpose of the EARF is to guide the LGED and the consultants on environmental issues in the task of implementing the subprojects or various components of the Project. The specific objectives of EARF is to specify appropriate roles and responsibilities to carryout environmental screening, mitigation measure, monitoring and reporting related to implementation of project components and to avoid potential adverse environmental impacts and enhance environmental outcomes of the activities implemented under project components. During the implementation period, all activities related to potential environmental impacts will be carried out in accordance with ADB's Safeguard Policy Statement (2009) in tandem with the Government of Bangladesh's environmental assessment requirements. The IEE prepared as part of the Project Preparation Study has outlined mitigation measures for some minor potential negative environmental impacts, and monitoring plans for the pre-construction, construction and post-project maintenance phases, and it is expected that the EARF will support the integration of these measures and practices in the project design.

25. This EARF provides general policies, guidelines, and procedures to be integrated into the implementation of all infrastructures related components under the project. In preparing this document, relevant environmental safeguard practices, compliance, and past experience in the sector were reviewed. The review also included consultations with the associated stakeholders; qualitative and quantitative assessments of environmental safeguard compliance processes in the Department of Environment (DOE); capacity assessment of the implementing agency; and information on the capacity of their field level staffs. This EARF is intended to be used as a practical tool during infrastructure planning, design, implementation, and monitoring. The Framework describes the steps involved in identifying and mitigating the potential adverse environmental impacts from infrastructure implementation activities, and extreme climatic conditions. The EARF also addresses climate change adaptation and disaster risk reduction approach as a part of safeguard measure. The EARF outlines environmental screening procedures, assessment methodologies, environmental management (mitigation, monitoring and documentation), climate change adaptation and reporting for the components of the Project; and to specify institutional structure and mechanism to carryout compliance to environmental management plan.

B. Assessment of Legal Framework and Institutional Capacity

1. Assessment of Legal Framework

26. The Government of Bangladesh (GOB) is committed to undertake environmental assessment for each new development project and prepare mitigation, monitoring and management plans with a view to minimizing or preventing potential negative environmental impacts. The GOB recognizes the importance of environmental sustainability as the basis for long term development in the country. In 1989, the Ministry of Environment and Forests (MOEF) was created, and within the ministry, DOE was formed as the principal implementing line agency for all environmental actions. Bangladesh is a signatory to Agenda 21 of the 1992 Earth Summit, and it is committed to implement the international legal instrument in its national policies and programs. A National Conservation Strategy (NCS) was prepared by the

Government in 1991, which formed the basis for the formulation of the National Environment Policy (NEP) in 1992. The principal objectives of the NEP are:

(i) Maintenance of the ecological balance;

(ii) Protection against natural disasters;

(iii) Prevention of all types of activities related to pollution and environmental degradation;

(iv) Ensuring environmentally sound development in all sectors; and

(v) Ensuring sustainable, long term, environmentally congenial utilization of all natural resources.

27. At the policy level, environmental awareness is demonstrated by the fact that the Government has so far signed, ratified and acceded to over 25 environment-related international conventions, protocols and treaties including Agenda 21, United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, Convention on Biological Diversity(CBD), and Convention to Combat Desertification (CCD). The linkage between environment and national development planning is embodied in the National Environment Management Action Plan (NEMAP), completed in 1995. As a follow-up of the NEMAP and to concretize its vision, the Government executed a UNDP supported Sustainable Environment Management Program (SEMP) between 1998 and 2004, which emphasized several capacity building components of environmental management. The Government has prepared National Adaptation Program of Action (NAPA) in 2005 and further revised in 2009, which outlines prioritized climate change adaptation options for the country. A more comprehensive document on climate change, titled 'Bangladesh Climate Change Strategy and Action Plan' (BCCSAP) has also been approved by the Government in August 2009. This BCCSAP originally released in 2008 and further revised in 2009 with 44 programs under six thematic areas is expected to serve as the framework to combat climate change over the next 10 years.

28. Bangladesh has a wide range of laws and regulations related to environmental issues. An early legislation impinging directly upon environmental conservation was the Environment Pollution Control Ordinance of 1977. However, a comprehensive environmental law was passed by the national Parliament in 1995, known as the Environment Conservation Act (ECA), which replaced the 1977 ordinance. The ECA was followed by one other legislation in 1997 – the Environment Conservation Rules (ECR). The ECR spells out specific rules and regulations for the enforcement of the ECA. Under the ECR of 1997, 186 types of projects and industries are grouped into four categories according to the extent of their potential adverse environmental impacts. The four categories are: Green (least harmful with no potential negative impacts); Orange `A' and `B' (some potential for negative impacts requiring IEE); and Red (high potential for negative impacts requiring full-blown EIA). It is mandatory for all proposed projects to obtain Environmental Clearance Certificate from DOE. According to the ECR of 1997, the activities of the CCRIP fall under the category of Orange `B', and therefore, an Initial Environmental Examination (IEE) is sufficient to assess environmental assessment of the project interventions.

29. An NCS was also prepared in 1992 with assistance from the International Union for Conservation of Nature (IUCN). The policy and strategy are reflected in the National Environmental Management Action Plan (NEMAP), completed in November 1995. The NEMAP is a document aimed at serving as the basis of programs and interventions related to natural resource and environmental management.

30. LGED took the pioneering task of publishing 'Guidelines to Environmental Issues Related to Physical Planning' in 1994 as a planning tool to engineers and the other technical staff to better appreciate the environmental issues related to selected infrastructural development and enable them to carry out Environmental Impact Assessment (EIA) and incorporate to the environmental protection parameters in the Project preparation process. A new guideline named 'Environmental Guidelines for LGED Projects' has been prepared in 2007-2008 under the guidance of the Environmental Unit, updating the previous one, which has already been printed and published. The new environmental guidelines prepared by LGED provide simple procedures and formats for IEE and EIA of infrastructure development, water and urban sector Projects.

2. Assessment of the Institutional Capacity

31. An Environmental Unit (EU) headed by a Superintending Engineer has been established in LGED and there are positions for Executive Engineer and Assistant Engineer in this unit. These staffs are experienced and knowledgeable in general environmental issue but it is necessary to have specific expertise in climate change and resilience issues, which can be attained by arranging for special training courses for them within the country as well as abroad. The EU covers environmental safeguard issues including mainstreaming of environmental best practices, coordinate environmental management activities as per recently circulated 'Environmental Assessment Guidelines for LGED Projects', facilitate capacity building activities of external and local level stakeholders. The National Environmental Specialist of CCRIP will liaison and coordinate with the EU of LGED for his/ her project specific environmental activities.

3. ADB Environmental Classification

32. The environmental assessment of subprojects must fulfill requirements of ADB, as described in ADB's Safeguard Policy Statement (2009), and Government. At an early stage of subproject preparation, potential direct, indirect, cumulative and induced environmental impacts on and risks to physical, biological, socioeconomic, and physical cultural resources will be identified and their significance and scope determined, in consultation with stakeholders, including affected people and concerned NGOs. Climate and disaster induced risks of the subprojects will also be identified for taking proper adaptation and disaster risk reduction measures. Subprojects will be screened to determine their classification. Depending on the significance of project impacts and risks, the assessment may comprise a full-scale EIA for category 'A category' projects, or an IEE or equivalent process for 'category B' projects. No environmental assessment is required for 'C category' project, although environmental implications need to be reviewed.

C. Anticipated Environmental Impacts

1. Potential Impacts

33. The project has no major significant adverse environmental impacts and it will make a significant contribution to the environmental enhancement. Significant social and economic benefits including poverty alleviation and income generation are expected. However, some potential adverse impacts are likely to be soil, air, noise and water pollution, disturbance of aquatic and wildlife habitats, removal of trees and socioeconomic impacts from slight realignment of the road that may cause relocation of households, etc. These potential adverse environmental impacts (Table 1) can be mitigated through proper engineering designs, by including the specific environmental provisions in contract documents, by requiring appropriate design and construction methods during implementation, as well as institutional strengthening of environmental management as recommended in this report.

Table 1: Potential Environmental Impact and Mitigation Measures

Activities Affecting Environmental Resources	Potential Environmental Impacts/ Issues	Recommended Mitigating Measures
1.0 Planning, Design and Land Acquisition	If standards are too high, excessive earthworks in road development projects can cause other effects.	Set standards appropriate for class of road, traffic and terrain
1.1 Setting Design Standards	Potential of road accident	Set design standards consider road safety
1.2 Design - General	Existing structure, constructed illegally at roadside on Khas land could be affected.	Attempt to negotiate a fair design or compensation solution which does not cause undue hardship but also does not encourage others to encroach.
	Roads and embankments can cause separation and social disruption of nearby habitation.	Provide appropriate number of bridges and culverts in the design to minimize inconvenience to local people.
	Road widening and elevating can affect existing trees and vegetation.	Widen one side only to retain trees on at least one side. If not possible to save trees or vegetation compensate by new plantation of trees.
	Roads can have impacts on wildlife, virgin forest areas, cultural relics, etc.	Avoid such areas as much as possible in the design.
	Roads can cause noise and air pollution.	Integrate into the design, where appropriate, sound barriers, green belt, etc. If possible align roads away from dense settlement.
	Roads can cause an increase in traffic speeds and accidents affecting road users, local people and animals.	Ensure a safe design including speed restriction and warning signs, footpaths, separate lane for Rickshaws and Rickshaw Vans, safe crossings and fences to control livestock as necessary and where possible. Discuss possible designs with local people.
	Traffic on roads can pollute the adjacent surface water bodies.	Plant or preserve a vegetative buffer zone between the road and a surface water body.
1.3 Design-Drainage (continued)	Can alter hydrological regimes and affect flooding and existing irrigation system.	Ensure culverts, and road drainage are adequately designed to minimize effects.
	Can cause negative impacts of concentrating water and increasing scour and soil erosion.	Ensure design improves the drainage system by rectifying any existing problems, such as scour of adjacent lands, which should be checked for during the monsoons. Include tree/ turf planting in design where possible.

Activities Affecting Environmental Resources	Potential Environmental Impacts/ Issues	Recommended Mitigating Measures
	Can affect washing/ drinking water supplied. Local people sometimes interfere with the drainage system because of this, which can result in damage to the road.	Incorporate washing/ drinking water needs into the design. Discuss with local people.
	Drainage from working areas can cause water pollution.	Install adequate waste water treatment facilities at working areas.
1.4 Design- Consideration to Landscape	Landscape disfiguration by irregular borrow pits, deep cuts, fills, etc.	Use a design to blend with landscape.
1.6 Design - Loss of Agricultural land	a. Deprives a group of farmers of their means of living. b. Increases landlessness in the area. c. Reduces employment in agriculture. d. Affects agricultural production.	Plan the project to avoid fertile agricultural land.
1.4 Land Acquisition and Resettlement	Land acquisitions affect local people.	Minimize land acquisition and resettlement in selecting alignment.
	Can cause dissatisfaction and opposition from landowners and users.	Discuss with those affected at all stages. Arrange the payment of reasonable compensation for impact on properties and/ or disruption of incomes.
	Can cause dissatisfaction and opposition from people resettled to new areas (relocation with the existing plot or village is often an acceptable trade-off for the benefit of improved road access).	Discuss with those affected at all stages and provide suitable locations or areas for new settlement with adequate infrastructure. In consultation with affected people set appropriate compensation and resettlement policies aimed at minimal disruption.
2.0 Mobilization		
2.1 Mobilizing Equipment	Air and noise pollution for any nearby settlements	Control contractors' vehicle speed and noise.
2.2 Mobilizing Workforce	The introduction of outside workforce can have a negative impact on the health and social well-being of local people.	Contractor to employ local people where possible. Promote health, sanitation and road safety awareness campaigns (including HIV/ AIDS).
2.3 Establishment and Operation of Labor Camp.	Possible pollution caused by domestic sewage and solid wastes.	Contractor to install and maintain a septic tank system, and a system for disposing of solid wastes.
	Possible excessive or uncontrolled use of fuel wood in labor camp.	Contractor to supply alternative fuel for cooking and heating.
	Possible development of labor camp into a permanent settlement.	Contractor to remove the labor camp at the completion of the contract, unless required by the authorities.
	Possible poaching of local game by outsiders.	Prohibit poaching and make contractor responsible for his workers.

Activities Affecting Environmental Resources	Potential Environmental Impacts/ Issues	Recommended Mitigating Measures
2.4 Establishment and Operation of Depot and Workshop.	Air and noise pollution for any nearby settlements.	Locate depot and workshop away from any residential settlements.
	Possible ground and water contamination by oil, grease, and fuel in yards.	Collect and recycle lubricants. Avoid spills and have a ditch around the area with a settling pond/ oil trap at the outlet.
2.5 Setting Up and Operation of an Asphalt plant or Bitumen Preparation area.	Air and noise pollution for any nearby settlements.	Locate plant away from any residential settlements.
	Possible ground and water contamination by bitumen and solvents.	Avoid spills but surround the area with a ditch with a settling pond/ oil trap at the outlet.
	Cutting down trees to use as fuel wood for heating bitumen.	Contractor not to be allowed to use fuel wood for heating during the processing of any materials.
2.6 Training	Improper construction and environmental management.	Organize and convene a 2-3 days 'Road Construction and Environmental Management' training.
3.0 Construction		
3.1 Earthworks Involved in Widening in Flat Terrain**.**	Erosion from earthworks can increase sedimentation in drains, waterways and irrigation ditches.	Limit earthworks to the dry season as much as possible. Protect exposed earthworks with mulch, fabric, and plant cover.
	Historical remains or cultural items could be uncovered.	Contractor to ensure all such finds are reported and discussed with authorities and representatives of local people.
3.2 Drainage Improvement Works	Spoil disposal from drain excavation by simple side tipping is unsightly and can concentrate runoff and cause erosion.	Contractor to dispose of spoil to designated tipping areas.
	Works can have temporary affects on irrigation or washing/ drinking water supplies.	Contractor to take into account local water uses.
3.3 Pavement Base Construction or Gravel Surfacing	Dust, noise and vibrations	Specifications to include watering in the contract and control of contractor's equipment noise and vibrations specially close to settlements.
	Effect on traffic and pedestrian safety	Contractor to arrange safe traffic control measures and limit possible disruption to non-construction traffic.
3.4 Bituminous Surfacing	Possible pollution of waterways or groundwater by bituminous products or solvents.	Strict control to avoid spills and contractor to have adequate clean up procedures.
3.5 Transport of Project Materials	Air and noise pollution for any nearby settlements and damage to existing roads.	Control contractor's vehicle speeds, noise and weight of loads and control dust and flying debris by covering loads or wetting material if

Activities Affecting Environmental Resources	Potential Environmental Impacts/ Issues	Recommended Mitigating Measures
		necessary. Construct temporary roads if necessary. Use locally available construction material wherever possible to minimize transport distances.
3.6 Road traffic hazards associated with temporary traffic diversion	Accident risks for vehicles and pedestrians.	Contractor to minimize road safety hazard and inconvenience to other road users by taking all appropriate measures.
4.0 Operation and Maintenance	a) Reduction in open water fisheries	a) Allow controlled flooding
4.1 Loss of breeding, nursery, and feeding ground of fishes in floodplain	b) Reduction in fish protein consumption	b) Compensate the loss by fish culture.
4.2 Obstruction to migration of fish	Same as a and b of above	Provide adequate opening in roads and embankments along routes of fish migration but do not allow catching fishes by nets in those locations.
4.3 Reproduction failure and destruction of fish by uncontrolled use of pesticides.	Same as a and b above	a. Adopt Integrated Pest Management for pest control. b. Prevent drainage from agricultural land from reaching to water bodies.
4.4 Drying up of wetlands for agricultural purpose and destruction of habitat for fish, birds etc.	a. Reduction in fishery b. Elimination of species of fish, birds, amphibians, etc.	a. Avoid complete drying up of wetlands and swamp land. b. Restore alternative habitat for endangered species.
4.5 Spreading of nuisance plants from borrow pit e.g. water hyacinth.	Damage crops	a. Incorporate destruction of such plants in maintenance program. b. Convert the plants into compost for application as a soil conditioner/ manure.
4.6 Discharging of nutrient enriched agricultural land drainage in surface water	a. Causes eutrophication and surface water pollution. b. Makes the water unsuitable for uses. c. Destroys aquatic environment.	Prevent agricultural land drainage from reaching surface waters.
4.7 Reaching residues of pesticide in surface and ground waters from agricultural lands	a. Causes water pollution. b. Contaminates sources of water supply. c. Pesticides residues accumulate in bio-mass.	a. Reduce use of pesticides through Integrated Pest Management (IPM) b. Prevent agricultural land drainage from reaching surface water.

Activities Affecting Environmental Resources	Potential Environmental Impacts/ Issues	Recommended Mitigating Measures
4.8 Erosion of road and embankment surfaces and sides, road openings, bed and banks of rivers/ canals and subsequent siltation in downstream.	a. Causes damage to road and embankment. b. Affects stability of road/ embankment and their structures. c. Increases turbidity of water. d. Siltation of canal bed and agricultural lands.	a. Select appropriate soils for road and embankment construction. b. Compact the road materials properly. c. Provide proper slope for surface drainage d .Provide proper vegetative cover e. Provide adequate openings for discharge of flood and accumulated rain water
4.9 Backflow of water through drainage canals.	Causes early flooding.	Install regulator to control inflow and outflow through drainage canal.
4.10 Use of irrigation water with high and imbalanced salt content.	a. Increases soil salinity. b. Increases soil alkalinity/ acidity c. Alters soil texture and permeability d. Affects soil fertility	a. Use surface water where available b. Conduct chemical analysis of ground water before use and select the aquifer producing good water c. Determine salinity of surface waters in coastal areas before use as irrigation water.
4.11 Loss of Agricultural Land	a. Deprives a group of farmers of their means of living. b. Increases landlessness in the area. c. Reduces employment in agriculture d. Affects agricultural production.	a. Rehabilitate the affected people. b. Generate employment opportunities in other activities. c. Compensate the loss by introducing intensive agriculture
4.12 Obstruction to Navigation and Plying of Boat	a. Disruption of cheap mode of transportation. b. Adverse effects on communication.	Provide opening at major routes and construct road structures leaving adequate clearance above high flood level or provide boat pass for plying of boats.
4.13 Change in land ownership pattern within project area.	Inequitable distribution of project benefits	Regulation of land ownership transfer in the project area
4.14 Inadequate Considerations to Land use and Landscape.	Landscape disfigurations by irregular borrow pits, deep cuts, fills, unplanned growth of shops, and other services.	a. Replant disfigured surfaces b. Prevent unplanned construction and unauthorized uses of roads and embankments.
4.15 Road maintenance by workers and LCSs not conscious about road safety.	Potential road accident hazard	Road safety awareness training.

34. Other environmental impacts includes soil erosion, temporary interruption of natural drainage, and local flooding, traffic disruption, increased traffic hazards, work site safety, cultural problems, etc. These are briefly described in the following section:

a. Soil erosion

35. The construction related clearing, excavating and grading of earthworks and borrow pits trigger the process of soil erosion because the soil is cleared of vegetation and becomes

unstable. Road widening of narrower Upazila roads will involve the removal of roadside trees, and thus induce runoff erosion as well as pothole formation. Soil disturbance will be significant if earthworks are done in the rainy season. The recommended mitigating measures against soil erosion are (a) regular surveillance of erosion prone slopes, (b) maintenance of the slopes of the embankment to the surrounding lower lands, preferably at a ratio of 1:2, (c) plantation of indigenous tree species with turfing and their caretaking by locally organized community groups. Farmers of the locality should be discouraged to sell the top soil and contractor be restricted in buying those required to rebuild embankment section of the road.

b. Temporary interruption of natural drainage, and local flooding

36. Road improvement works often require temporary diversion routes for the traffic which might contribute to changes in the flow of surface water leading to localized flooding-cum-drainage congestion. This impact is commonly encountered in areas of bridge and culvert rehabilitation. However, the problem can be avoided through appropriate planning of diversion structures and the undertaking of rehabilitation tasks in the dry season.

c. Pollution from construction materials, equipment and dust

37. Dumping of construction spoils, including accidental leakage of oil, grease and fuel in equipment yards, is an important hazard. Both surface and groundwater might be polluted from these contaminants. Related to these sector of hazard is the use of such materials (by construction contractors) as toxics, inflammable and volatiles, which might endanger the physical and human habits of the area.

d. Traffic disruption

38. All road rehabilitation work will necessarily involve temporary disruption of the normal traffic. Careful construction scheduling and appropriate diversion routes might reduce the traffic congestion and discomfort of the road users.

e. Increased traffic hazards

39. The use of various categories of construction materials and equipment will cause nuisance, and even hazards, to local residents in terms of increased generation of noise, dust and unhealthy odors as well as vibration of heavy machinery. Homesteads and vegetation within the vicinity of construction works are likely to suffer especially from dust pollution.

f. Work site safety

40. The short-term impact issue involves the safety problems of the construction workers, and the provision for sanitation and drinking water facilities at work sites. The lack of the latter facilities might severely affect the construction workers' health condition and work efficiency.

g. Cultural problems

41. Temporary frictions between the local residents and the construction workers may not be uncommon in certain locations, but these do not pose a serious problem because of the general homogeneity of the population in the Project area.

D. Environmental Assessment for Subprojects and/ or Components

1. Major components of the project

42. The Project will include the following components:

a. Output A: Road connectivity improved with climate-proofed design

43. This component comprises (i) upgrading upazila roads, and (ii) upgrading union and village roads. The underpinning thrust is on improving and climate proofing rural roads in 12 coastal districts. The project will upgrade 130 km of upazila roads, 174 km of union roads, and 233 km of village roads, providing year-round connectivity between agricultural production areas and markets and to the other parts of the country. 3,050 meters of bridges/culverts will be construct or upgrade. Greening the roads will be mainstreamed to create a green belt and avenues for meeting aesthetic recreational needs, reducing the surface run-off discharge and checking erosion due to heavy rainfall on the slope of the embankment, reducing the encroachment on road reserve areas, and drought proofing with measures, such as, pasture development, strip and block plantation, and horticulture plantation. The design of the roads will be "climate-proof" in reaction to the challenges of climate change. A climate resilient rehabilitation approach has been adopted. This includes constructing the road crest level to 800mm above the maximum normal design life flood level; embankment protection primarily by means of a combination of turf and shrubs, with additional geotechnical measures where there is high risk of active erosion and special measures adjacent to structures together with increased cross drainage. Following table shows recommended changes to existing LGED standards for rural roads to enhance climate resilience.

Table 1: Changes to existing LGED Standards

	Adaptations and Comment
Pavements	➢ All pavement designs to have a full width drainage layer incorporated into the pavement at either improved subgrade or sub-base levels. ➢ Sub-base widths to be at least 0.25m wider than overlying base. ➢ Upazila roads to have a narrow verge (minimum 0.9m) to reduce land-take. ➢ Village roads to have sand –aggregate sub-base rather than a thickened sand cushion. ➢ Concrete pavement roads to have sand-aggregate sub-base under the cement concrete base. Brick edging is not required if form-work is used. ➢ Special flood roads to have either concrete or mortared brick verges. ➢ Passing places to be adopted at appropriate intervals if traffic justifies their use.
Earthworks	➢ Minimum of 0.6m above local highest normal flood/tide level for all roads. ➢ An additional height for effective Sea Level rise to be adopted based on local circumstance (0.2m used in subproject analysis).
Drainage	➢ Increase of cross drainage structures to an average of 2 per km and linked into rehabilitated internal polder system.
Compaction	➢ Current levels of compaction of pavement layers in the LGED Standards are adequate but will require use of appropriate mechanical plant. ➢ Compaction of embankment in thin layers is possible with closely monitored labor-based methods, although small compactors would be preferable.
Quality Control	➢ Existing training LGED manuals on construction procedures and quality control to be strictly adopted and enforced. ➢ Increased use of simple on-site testing and monitoring equipment.

44. Roads have been selected for upgrading, through a participatory process with stakeholders, on the basis of length, poverty incidence, and degree of connectivity. Adequate cross drainage structures, such as, bridges and culverts will be constructed. Provisions for road safety such as road signs, delineators and bollards near the approach to bridges, and reflectors added to tree trunks and provision of loading and unloading zones will be incorporated into the design of upazila roads. Women belonging to labor contracting societies (LCSs)[7] will be engaged to improve road shoulders, embankment stabilization, planting of native trees on roadsides, planting of shrubs, turfing on embankment and other road maintenance works.

b. Output B: Improved Market Services with Specific Provision for Climate Vulnerable Groups and Women

45. Infrastructure of 88 GCMs will be improved under the project with 15% of space allocated to women. Each market will be connected either to an existing paved road or to one of those to be improved under the project. The market improvements will include (where relevant) paved trading areas, sheds, water supply system, drainage facilities, sanitation facilities, and market offices. In selected large markets, provision of mini water supply, deep hand operated tube wells, and sweet water ponds with pond sand filters (generally in Khulna and Satkhira Districts, where ground water quality is problematic) will be installed. Three suitable markets will be identified where at present no electricity supply is available and Rural Electrification Board has no plans in near future of providing the electricity. In these 3 markets, women market section shops, toilets and street lighting will be electrified using solar photovoltaic cells. Such electrified market place sections will improve the quality of life of the people, especially women, within the influence zone of the market.

46. Some key elements within growth centers or large markets will be made climate resilient. These are: new market sheds; these will be raised on concrete plinths to a level above the existing maximum normal monsoon high tide level plus the effective maximum SLR. The project will also improve 186 community markets and 11 women's markets sections in existing community markets. This subcomponent will build/improve physical markets (common shed, fish shed, open paved/raised area, women section, toilet block, internal drainage etc), build 'commodity collection points, and build 37 boat landing platforms (ghats).

47. The project will construct or extend around 15 multipurpose cyclone shelters; improve about 10 existing cyclone shelters and upgrade around 15 km of cyclone shelter access tracks. Designs will take account of future sea level rise and other adjusted design requirements due to climate change effects. Strict compliance with relevant Bangladesh building codes with respect to wind loading and floor bearing capacities will be needed. The emphasis will be on ensuring adequate water storage, sustainable power supply and appropriate toilet facilities which can be used during the extreme climatic event. Associated access roads/tracks will be upgraded to the equivalent of village road climate resilience standard. A provisional sum is allocated to provide for construction of *killas* in selected locations where there is a demonstrated long-term need, and sufficient land is readily available adjacent to a new or existing cyclone shelter.

c. Output C: Enhanced climate change adaptation capacity

48. The project will strengthen the capability of LGED staff and local government units through training and initiation of a knowledge management system, with particular emphasis on incorporating climate resilience and adaptation measures during the design, implementation and

[7] LCSs comprise poor women with limited income-earning capabilities who carry out routine maintenance on rural roads using basic hand tools and materials supplied by LGED.

maintenance of rural infrastructure assets. These complementary elements will provide local communities with more effective transport to markets, and better access to social services under normal and emergency circumstances. Other aspects of capacity development training include contract management, financial management, participatory methods, construction supervision, quality control, and application of knowledge management principles in project implementation, operation and maintenance, gender and development, and monitoring and evaluation.

49. The project will also enhance knowledge management for climate change. The focus is on development of a framework for enhancing institutional learning and knowledge sharing. This will entail more effective knowledge capture, compilation, storage and sharing on climate resilience principles in the design, construction and maintenance of rural infrastructure assets. The project will develop tools to enhance knowledge management including strengthening the LGED MIS/GIS system, and providing a special web-portal; a portal interface designed for technical planning and design inputs and supporting learning and networking with other external agencies.

2. Environmental Criteria of Subproject Selection

50. All the 12 districts under the project were prioritized for project intervention on the basis of climate change sensitive area like flooding, drainage congestion, water logging, soil condition, salinity intrusion, etc. and a number of social, economic and environmental indicators such as poverty level, food security, land use, agricultural production, input availability, land suitability, location specificity, environment-friendliness as well as accessibility. Environmental conditions which will influence the selection procedure will include such parameters as (a) flood proneness and regional hydro-meteorology, (b) surface and groundwater availability, (c) transportation requirements for accessibility of product to the market and for the population, and (d) potential impacts of climate change and variability including climate induced disasters. On the other hand, the following criteria will be used for excluding sites which might have significant negative environmental impacts:

(i) Ecologically sensitive area such as reserved forests, critical wetlands, protected areas, etc.

(ii) Potential for disrupting the life and property of the indigenous population;

(iii) Need for significant amount of land acquisition and resultant compensation; and,

(iv) Encroachment on cultural features like places of worship, cultural heritage sites, graveyards/ cemeteries, historical monuments, etc. (no such encroachments are envisaged).

3. Procedures for Environmental Assessment of Subprojects

51. The CCRIP is classified as a ‘Category B’ project and an IEE report has been prepared during the project formulation phase. The basic infrastructural facilities for the proposed CCRIP is mainly an improvement/ upgrading and/ or rehabilitation of project comprising a large number of schemes, and does not involve new and major road construction and will neither have any adverse environmental effect nor will require any significant resettlement task.

52. Environmental assessment of subprojects will involve three phases: (a) project preparation; (b) implementation; and (c) post-project monitoring. The first task in preparing the

IEE report in the project preparation phase is to screen and identify potential positive and negative environmental impacts of the subproject, and review the available literature and data on environmental conditions of the area in which the subproject is located. This will be followed by preparing a detailed checklist of environmental parameters to be examined and assessed for the subproject through field inspection. These checklists will be formatted in accordance with the ADB's Guidelines, and include such impact issues (for assessment) as topography, flooding conditions, drainage of the area, regional hydrology, general transportation of the goods and population at micro level, and perception of climate change impacts.

53. The Environmental Specialist will analyze and interpret the data to prepare the IEE report for the subproject, which will include suggested measures for mitigation of potential negative environmental impacts and outline the monitoring plan to ensure compliance of the mitigation measures. During the project implementation phase, the environmental consultant will intermittently review the impacts of project actions on local and regional environment; conduct surveillance of the implementation with respect to soil erosion, hydrology, cross drainage works and success of engineering practices; advise the PMO on climate adaptation and disaster risk reduction options to cope with climate change impacts; advice and support the LGED in building its in-house capacity for environmental and climate risks assessment through training programs and workshops; and motivate the stakeholders/ beneficiaries on all aspects of the changing climate in the region.

54. During the post project phase, the environmentally trained and sensitized LGED staff will mainly focus on environmental monitoring tasks with a view to identifying long term impacts. The monitoring plan prepared in the IEE report will involve supervision and surveillance of local drainage conditions, local flood protection needs and measures, measuring awareness and acceptance levels of adaptation options and coping strategies for climate change impacts etc.

4. Environmental Screening

55. The environmental screening of the subprojects shall be done by using the Rapid Environmental Assessment (REA) checklist (included as Annex 2). The REA checklist shall be filled prior to detailed design of the proposed investment. Findings of the environmental screening shall conclude if an IEE is required or a brief Environmental Due Diligence Report (EDDR) will be adequate for the infrastructure. The IEE or EDDR shall be attached with detailed design of the infrastructure.

5. Process for Environmental Due Diligence

56. An EDDR will be prepared which will compile information on environmental assessment and management plan as available from measures undertaken in the project documents. The consolidated EDDR will be submitted to the authority with a basic objective to collate and analyze the actual field level addressing of environmental impacts and environmental management measures that are being integrated in the project documents. The report will also review the project compliance with environmental regulations of Government of Bangladesh (GOB) and the environmental safeguards requirements of the Asian Development Bank. The EDDR will be a brief environmental statement of the subproject with only significant impacts, if any and proposed mitigation measures. The report shall be prepared by adopting following procedure:

(i) **Collection of information:** Coordination shall be maintained with the focal person of safeguard desk, and technical team for documenting site-specific

environmental concerns. Local stakeholders including local government bodies, teachers and students shall be consulted during documentation of the information.

(ii) **Preparation of environmental due diligence report:** The information on physical, biological and socio-economic and cultural environment of the subproject area will be compiled in coordination with the technical and social team. The EDDR shall be prepared with REA checklist added with any site-specific and significant environmental impacts. The proposed template for the EDDR is presented in Annex 3.

6. Process to Prepare Initial Environmental examination

57. There could be few subprojects attracting initial environmental examination for which IEE report shall be prepared. The IEE process shall involve following:

(i) **Scoping and preparation of ToR for IEE Study:** An IEE scoping is a planning exercise to determine the scope for the IEE study. Scoping quickly assess the existing environmental status of the project area, lists the likely environmental impacts, and advise methodology of assessment. The TOR also advises team of experts for the assessment and study schedule.

(ii) **Assessment Methods:** An outline of the activities for conducting IEE study is presented below:

- Desk Study: Review of information such as maps, reports, and EARF for the Project. Checklist for collecting site information is also finalized.
- Consultations: communities and local stakeholders (Chairman and Members of Union Parishad, teacher, students, parents, social workers, women, local journalist, resource user, representative of local government bodies, affected person, etc.) shall be consulted by means of Focus Group Discussions (FGD). If required, discussion with concerned Government offices (Department of Environment; Forest Department; Fisheries Department, LGED, BWDB, etc.) will also be undertaken.
- Field Assessment: Assessment of the potential and significant environmental concerns shall be done to collect data and analyze any potential impacts.
- Sampling and Testing: Special tests may be necessary in certain cases where water pollution issues need to be investigated (water quality for arsenic or fluoride content, water quality for iron, salinity, etc. and noise level, PM 10/PM12 in air, etc.).
- Consideration of Alternatives: The environmental implications of different alternatives will be briefly assessed, particularly focusing on location of infrastructure, design and orientation, method of construction, source of construction materials, and schedule of construction).
- Identification of Environmental Impacts and Mitigation Measures: The impacts will be identified in terms of their significance, extent, reversibility, and duration.
- Design of Environmental Monitoring Plan: The IEE or EDDR shall propose EMP where monitoring requirements for potential environmental

impacts are identified, mitigation measures prepared, method of mitigation measure developed, indicators suggested, frequency of undertaking monitoring activity decided, cost estimated, and responsible agency for undertaking the monitoring identified. EMP report format and parameters used for environmental monitoring is presented in Annex 6 and 7.

- IEE Report: IEE report shall be prepared in brief following the template presented in Annex 5.

7. EARF Compliance with ADB Safeguard Policies

58. Since the project has very limited potential for adverse environmental impact (soil erosion, local drainage and flooding conditions), full-blown EIA is not required. In the task of compliance monitoring and supervision the environmental assessment requirements and safeguard policies of ADB will also be fully conformed to.

59. The implementation period is six years and it is recommended that the implementation tasks be closely monitored in order to evaluate the project's efficiency and effectiveness. Hence, regular reviews are to be carried out by ADB. The mid-term review will be conducted jointly by the government and the ADB during the third year of project implementation. The mid-term review will evaluate all aspects of the project design, implementation and management, including environmental and social impacts.

60. Both ADB and the GOB require that development projects do not result in unacceptable damage to any physical cultural resources. The CCRIP is involved in the improvement/ upgrading and/ or rehabilitation project comprising a large number of schemes, and does not involve new and major road construction and the project actions do not have any potential for adverse environmental impacts to sites and structures of cultural value (viz., mosques, temples, churches, graves, archaeological remains, aesthetic locations).

E. Consultation, Information Disclosure, and Grievance Redress Mechanism

1. Public Consultation

a. Introduction

61. Successful implementation of the project requires coordinated efforts of various stakeholders at different levels. Hence, consultation at different levels was used as a tool to inform and educate stakeholders about the proposed action both before and after the development decisions were made. Public consultation was useful for gathering environmental data, understanding likely impacts and community's needs and preferences.

62. The various alternatives could be evolved and sustainable mitigation measures could be formulated through consultations. It assisted in identification of the problems associated with the project as well as the needs of the population likely to be impacted. This participatory process helped in reducing the public resistance to change and enabled the participation of the local people in the decision making process. The involvement of the various stakeholders ensured that the affected population and other stakeholders are informed consulted and are allowed to participate at various stages of project preparation.

63. The public consultation was carried out in March 2012 to April 2012 as part of the field works. Some details of public consultation including photographs have been included in the Annex 11.

b. Objectives

64. The main objective of the consultation process was to minimize negative impacts of the project and to maximize the benefits of the project. Other objectives of the consultation process were the following:

(i) To promote public awareness about the proposed project especially amongst the potentially impacted communities/ individuals;
(ii) To educate the communities/ individuals close to project roads about the proposed course of action and the project alternatives;
(iii) To solicit the views of communities/ individuals residing near rural roads proposed for construction on environmental and social problems;
(iv) To gather inputs from the affected communities/ individuals in crucial decisions regarding mitigation of the identified environmental and social issues;
(v) To stimulate community self evaluation and analysis; and
(vi) To ensure lessening of public resistance to change by providing them a platform in the decision making process.

65. Public consultation will be conducted both at screening stage as well as IEE stage. Public consultations will be held at three levels as:

(i) Local level (village level/ block level) villagers through which roads are passing;
(ii) District level consultations involving Deputy Commissioner, XEN, revenue department;
(iii) Project Implementation Office (PIO) officials, UZ Engineers of LGED; and
(iv) Institutional level consultations.

c. Information Disclosure

66. Since the proposed CCRIP is mainly an improvement/ upgrading and/ or rehabilitation project comprising a large number of schemes, and does not involve new and major road construction, it is considered as a Category B project.

67. The LGED will provide relevant environmental information, including information from the documents as above in a timely manner, in an accessible place and in a form and language(s) understandable (in Bengali) to affected people and other stakeholders. For illiterate people other suitable communication methods will be used. It will also organize meetings and seminars in the locality to inform people effectively.

d. Grievance Redress Mechanism

68. The EU of LGED will establish a mechanism to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance. The grievance mechanism should be scaled to the risks and adverse impacts of the project. It should address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism should not impede access to the country's judicial or administrative remedies. The affected people will be appropriately informed about the mechanism. PIO/ LGED will work as a Grievance Redress Committee (GRC) for hearing the complaints of different stakeholders and for their appropriate resolution. Other than disputes relating to legal rights, it will review all

grievances relating to any complain and other LGED interventions. Grievances will be redressed within two to four weeks from the date of lodging the complaints.

69. If resolution attempts at the PIO level fail, the PIO will refer the complaints to Project Director along with the minutes of the hearings. If a decision made at this level is found unacceptable by the aggrieved person, the project director (PD) can refer the case to LGED with the minutes of the hearings. To ensure impartiality and transparency, hearings on complaints will remain open to the public. The GRCs will record the details of the complaints and the reasons that led to acceptance or rejection of the particular cases. The PIO/ PD will keep records of all resolved and unresolved complaints and grievances and make them available for review as and when asked for by LGED, ADB and other development partners and any entities interested in the program. The key functions of the GRCs shall be to (i) record the complains, categories and prioritize them; (iii) settle the grievances in consultation with complainer and the Project staff; (v) report to the aggrieved parties about the decision/solution; and (vi) forward the unresolved cases to higher authorities.

F. Institutional Arrangement and Responsibilities

1. Institutional Arrangement and Responsibilities

70. The executing agency will be Local Government Engineering Department (LGED) in the Local Government Division of the Ministry of Local Government, Rural Development, and Cooperatives. A project steering committee will provide policy guidance for project implementation. The committee will meet twice a year to review the progress of project implementation. A suitably staffed project management office (PMO), to be established by LGED at its headquarters in Dhaka, will implement the project. The Chief Engineer of LGED, assisted by the project monitoring and evaluation unit, will be responsible for project implementation and coordination. The PMO will have one office in each of the three regions. A project director in the Dhaka headquarters will be assisted by two deputy project directors; regional office will be responsible for the day-to-day implementation and supervision of project activities. The PMO will be assisted by consultants with expertise in engineering design and supervision, climate resilience, economics and finance, social and gender development, participatory approaches, environmental and climate assessment, monitoring and evaluation, and local governance. The LGED district offices, headed by executive engineers, will be responsible for implementing subprojects under the guidance of the PMO. The LGED has the responsibility for the improvement, upgrading and maintenance of Upazila roads (UZRs), Union roads (UNRs) and Village roads, Growth Center Markets (GCMs) and Ghats (River Jetties) including other rural infrastructures.

71. The Environmental Management Plan (EMP) will cover more important short term mitigation measures that will include dry season construction work, erosion control from earthworks, careful location of borrow pits, temporary provision for drainage and traffic diversion, sanitation and hygienic provisions for the construction workers, and safe storage/ transportation of construction materials. Long term mitigation measures will include *inter- alia* efficient soil compaction, intensive scheme of roadside tree plantation, ensuring 1:1.5 ratio for the embankment slopes, rehabilitation of borrow pits by the contractors, careful design of cross drainage structures to allow flood water passage and prevent water-logging, minimizing agricultural land loss and prompt compensation for any acquisition, and adequate number of road safety signs and markings at vulnerable or hazardous sections.

72. Field investigations revealed that none of the impact issues will produce high degree of negative environmental effect. The potential long-term negative impacts relate to soil erosion, tree/ vegetation removal, water logging or drainage congestion, air and water pollution, agricultural land loss, navigation and traffic/ road safety. These have to be addressed through five sequential stages of the project cycle, viz., design, contracting, construction, supervision, and operation and maintenance. Most long-term adverse impacts can be mitigated by giving special emphasis on maintenance.

73. Regular project reviews conducted by the Government, ADB, IFAD and KfW will cover physical implementation, financial performance, implementation of action plans, implementation of environmental management plan and identification of problems that may need to be addressed early on. A comprehensive Mid-Term Review (MTR) is planned for the third year of the implementation of the project.

2. Capacity Development

74. Capacity on environmental management and climate risk assessment and adaptation needs to be strengthened at all levels of the EA including LGED/ MOLGRD&C, Project Implementation Unit (PIU)/ CCRIP. CCRIP will implement capacity building measures through training, exposure visit to climate vulnerable areas.

Table 2: Capacity Development Program

Sl. No.	Particular of Activities	Remarks
1.	Orientation of ADB's and country specific environmental safeguards and compliance measure	BRM will invite relevant participants nominated by CCRIP
2.	Orientation on climate risks, vulnerability and adaptation assessment	CCRIP will organize training with support from the consultant and resource person
3.	'Climate-proofing' of vulnerable infrastructure	CCRIP will organize training with support from consultants and resource person
4.	Promotion of 'Green Road'	CCRIP will organize training with support from resource person
5	Integrating climate change in project design and operation	BRM will invite relevant participants nominated by CCRIP

G. Monitoring and Reporting

75. The EU of LGED will monitor and measure the progress of implementation of the EMP. The extent of monitoring activities will be commensurate with the project's risks and impacts. In addition to recording information to track performance, the LGED will undertake inspections to verify compliance with the EMP and progress toward the expected outcomes. For projects likely to have significant adverse environmental impacts, the borrower/ client will retain qualified and experienced external experts or qualified NGOs to verify its monitoring information. The EU of LGED will document monitoring results, identify the necessary corrective actions, and reflect them in a corrective action plan. The EU of LGED will implement these corrective actions and follow up on these actions to ensure their effectiveness.

76. The EU of LGED will prepare periodic monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. The EU of LGED will submit at least semiannual monitoring reports during construction for projects likely to

have significant adverse environmental impacts, and quarterly monitoring reports for highly complex and sensitive projects. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Such periodic reports will be posted in a location accessible to the public. Project budgets will reflect the costs of monitoring and reporting requirements.

H. Staffing Requirements

77. Environmental assessment and related monitoring/ supervision tasks will be carried out by one environmental consultant with climate change expertise. It is expected that the environmental consultant of the project will work in close collaboration with the Department of Environment to remain updated on all environmental assessment requirements and comply with all rules and regulations. The environmental consultant will work in close collaboration with the environmentally trained LGED staff at the district and upazila levels. The environmental consultant will work in collaboration with the Project Management Office (PMO) and LGED, in advising LGED and Project-related staff and consultants on environmental matters including climate change impact issues, mitigating actions, and adaptation strategies and options.

ANNEX 1: Proposed Environnemental Management Plan (Construction and civil works)

Anticipated Project Related Environmental Impacts

Potential Environmental Impact/ Issue	Proposed Mitigation Measures	Timeframe	Location	Responsibility	Estimated Cost (Tk.)
Drainage congestion/ water logging	• Consider the drainage system of the whole area in subproject design; • Maintain cross-drainage at all times during construction; • Prevent all solid and liquid wastes entering waterways by collecting solid waste and wastewater from brick, concrete; • Drainage facilities will be integrated with water supply options and sanitary latrine facilities in planning and design.				
Losses of tress and vegetation	•Consider alternation options to reduce the loss of trees and vegetation; •A green fence will be raised with native tree species around the subproject/ both sides of the road alignment ; •Plant same species of trees and vegetation as compensatory measures.				
Dust and noise pollution	•Spray of water during dry season and in windy conditions; •Immediate compaction after construction of base course; •Cover the stockpiles of fine materials in construction yard; •Plan the work schedule of noise creating activities in consultation of local community; •Employ best available work practices on-site to minimize occupational noise levels.				
Soil erosion during construction	•Careful arrangement to stop soil erosion by adopting proper protection measure before starting earthworks.				
Blocking of roads/ access/ approach	•Construction materials and machinery should not be placed in a manner that blocks any roads, paths or local accesses; •Unloading of construction materials should be carried in a manner and time so as to avoid blockage of roads/ paths/ access; •Waste should not be placed on the roads.				
Water pollution from construction activities	•Prohibit direct disposal of solid and liquid wastage into nearby water body; •Spoil Management Plan should be implemented by the contractor.				

Potential Environmental Impact/ Issue	Proposed Mitigation Measures	Timeframe	Location	Responsibility	Estimated Cost (Tk.)
Occupational health and safety	•Implement suitable safety standards for all workers and site visitors; •Provision of first aid facility; • Arrangement of safe drinking water and sanitation facilities for the labors working in the “subprojects”.				
Day lighting and ventilation system	•Adequate windows in proper direction in consultation with stakeholders; •Provision for adequate ventilation in the rooms and offices.				
Arsenic contamination in drinking water	•Identify unions and upazilas based on DPHE survey where shallow or deep tube-wells are feasible; •Analyze local surrounding arsenic test results and recommend for tube-wells or not; •Adopt rain water harvesting, pond sand filter, piped water supply; •After installation of tube-wells, presence of arsenic in the drinking will be tested and be used only it satisfies the Bangladesh Standard.				
Selection of appropriate location for water source and sanitary latrine	•Discuss with stakeholders and select a location which is convenient for cyclone shelter and not impacting on trees or any other common property resources; •A minimum distance of 15 m should be maintained between a tube-well and a latrine to prevent contamination of water resources. In case of shallow shrouded hand tube-wells, this distance should be 20 m as horizontal filters are used in this type of tube-wells.				
Extreme climate (e.g. cyclone, storm surge) and natural disasters (e.g. earthquake), etc.	•Adoption of appropriate adaptation and disaster risk reduction strategy, emergency preparedness and recovery, training/ orientation program for the stakeholders on climate change, disaster and earthquake, etc. •Construction of cyclone shelter to cover the urgent needs of community, students and teachers. •Cyclone shelters located in the earthquake prone areas should be designed and constructed in way to be disaster and earthquake resilient or climate-proof.				

ANNEX 2: Rapid Environmental Assessment (REA) Checklist

Name of Subproject……District: ……..Upazila:
Union: ……... Village: ……..
Type of Subproject: …….
Major Activities under the Subproject: ……

Screening Questions	Yes	No	Remarks
A. Project Siting Is the subproject area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site			
▪ Legally protected Area (core zone or buffer zone)			
▪ Wetland			
▪ Mangrove			
▪ Estuarine			
▪ Special area for protecting biodiversity			
B. Potential Environmental Impacts Will the Project cause…			
▪ Impairment of historical/ cultural areas; disfiguration of landscape or potential loss/ damage to physical cultural resources?			
▪ Disturbance to precious ecology (e.g. sensitive or protected areas)?			
▪ Alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?			
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?			
▪ Increased air pollution due to project construction and operation?			
▪ Noise and vibration due to project construction or operation?			
▪ Involuntary resettlement of people? (physical displacement and/ or economic displacement)			
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?			

Screening Questions	Yes	No	Remarks
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?			
▪ Social conflicts if workers from other regions or countries are hired?			
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?			
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?			
▪ Risks to community health and safety due to the transport, storage, and use and/ or disposal of materials such as explosives, fuel and other chemicals during construction and operation?			
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			
▪ Generation of solid waste and/ or hazardous waste?			
▪ Use of chemicals?			
▪ Generation of wastewater during construction or operation?			

Climate Change and Disaster Risk Questions	Yes	No	Remarks
▪ Is the subproject area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?			
▪ Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?			
▪ Are there any demographic or socio-economic aspects of the subproject area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			
▪ Could the subproject potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?			

Environments, Hazards and Climate Change

Environment	Natural Hazards and Climate Change
Arid/Semi-arid and desert environments	Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems & complex pastoral and systems, but medium certainty that 10–20% of dry lands degraded; 10-30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.
Humid and sub-humid plains, foothills and hill country	More than 500 mm precipitation/yr. Resilient ecosystems & complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heat waves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity & compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture-based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.
River valleys/ deltas and estuaries and other low-lying coastal areas	River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/ typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/ likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.
Small islands	Small islands generally have land areas of less than 10,000 km^2 in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea-level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.
Mountain ecosystems	Accelerated glacial melting, rock falls/ landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermontane valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.
Volcanic environments	Recently active volcanoes (erupted in last 10,000 years – see www.volcano.si.edu). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/ lahars and/ or gas emissions and occasionally widespread ash fall.

*Note: Please add any other screening questions relevant to the demonstration. Also provide additional comments and/ or positive impacts in 'remarks' column.

Required level of Environmental Assessment (IEE or DDR)	
Reason:	
Screening done by/ date:	
Environment category approved by/ date:	

Recommendations:

Filled and signed by Assistant Engineer (signature, name and date) ……
Reviewed and signed by Executive Engineer (signature, name and date)

ANNEX 3: Outline of Environmental Due Diligence Report

1. Introduction: (1 paragraph on the proposed works)

2. Existing Environmental Setting (1 page): (a table of salient feature covering local environmental setting of subproject area which may include physical, vegetative, and social & cultural settings. Disaster risks and indications of potential impacts from climate change will be covered. A sketch showing environmental features of the subproject and its surroundings to be included)

3. Areas of major concern and mitigation measure: (REA checklist) followed by a list of site-specific environmental impacts, if any, and the proposed mitigation measures for them. Please also refer to Table 1 for specific mitigation measures appropriate for environmental impacts incurred during the implementation of the subproject.

4. Conclusion

ANNEX 4: Format for Preparing Environmental Management Plan

Serial no.	Work Activity	Indicative impacts	Proposed Mitigation Measures	Cost Estimate	Schedule of Implementation	Implementing and Supervising Responsibility

ANNEX 5: Outline of Initial Environmental Examination (IEE) Report

1. A full Environmental Assessment (EA) report should be concise and should focus on the significant environmental issues. The report's level of detail and sophistication should be commensurate with the potential impacts. The target audience should be project designers, implementing agencies, and borrower and bank staff.

2. The EA report should include the following items:

(a) **Executive Summary.** Concise discussion of significant findings and recommended actions.

(b) **Policy, Legal, and Administrative Framework.** Discussion of the policy, legal, and administrative framework within which the EA is prepared. The environmental requirements of any co-financiers should be explained.

(c) **Project description.** Concise description of the project's geographic, ecological, social, and temporal context, including any off-site investments that may be required by the project.

(d) **Baseline Data.** Assessment of the dimensions of the study area and description of relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Current and proposed development activities within the project area (but not directly connected to the project) should also be taken into account.

(e) **Environmental Impacts.** This is identification and assessment of the positive and negative impacts likely to result from the proposed project. Mitigation measures, and any residual negative impacts that cannot be mitigated, should be identified. Opportunities for environmental enhancement should be explored. The extent and quality of available data, key data gaps, and uncertainties associated with prediction should be identified / predicted. Topics that do not require further attention should be specified.

(f) **Analysis of Alternatives.** This section includes systematic comparison of the proposed investment design, site, technology, and operational alternatives in terms of their potential environmental impacts; capital and recurrent costs; suitability under local conditions; and institutional, training, and monitoring requirements. For each of the alternatives, the environmental costs and benefits shall be quantified to the extent possible, and economic values should be attached where feasible. The basis for the selection of the alternative proposed for the project design must be stated.

(g) **Mitigation Plan.** This section is for identification of feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels, and estimation of the potential environmental impacts; capital and recurrent costs; and institutional, training, and monitoring requirements of those measures. The plan should provide details on proposed work programs and schedules. Such details help ensure that the proposed environmental actions are in phase with engineering and other project activities

throughout implementation. The plan should consider compensatory measures if mitigation measures are not feasible or cost-effective.

(h) **Environmental Management and Training.** This is an assessment of the existence, role, and capability of environmental units on-site, or at the agency and ministry level. Based on these findings, recommendations should be made concerning the establishment and/ or expansion of such units, and the training of staff, to the point that EA recommendations can be implemented.

(i) **Environmental Monitoring Plan.** Specification of the type of monitoring, who would do it, how much it would cost, and what other inputs (e.g., training) are necessary.

(j) **Appendices**

(k) **List of EA Preparers - individuals and organizations.** (ii) References—written materials used in study preparation. This list is especially important given the large amount of unpublished documentation often used. (iii) Record of Interagency/ Forum/ Consultation Meetings—including lists of both invitees and attendees. The record of consultations for obtaining the informed views of the affected people and local NGOs should be included. The record should specify any means other than consultations that were used to obtain the views of affected groups and local NGOs.

ANNEX 6: Environmental Management and Monitoring Framework

1. Monitoring will include:

- Implementation Status of mitigation measures as listed in the Environmental Management Plan (EMP). Please report if the EMP measures are complied/ being complied/ not complied. If not complied, give reasons and recommend corrective measures with implementing agency.

- Impact Monitoring: Impact monitoring will focus on key indicators of the impacts predicted in the EMP. Report on impacts occurred due to implementation of the project and mitigation measures adopted. Assess whether the identified impacts were accurate and the mitigation measure designed and implemented were sufficient/ adequate/ effective. Suggest corrective measures. The corrective measures will be monitored for its compliance and reevaluated next time again.

ENVIRONMENTAL MONITORING FORMAT

Detail of Infrastructure:
Location:
Reporting Date:
Reported by:

Sl. No.	Activity (List of activity from EMP of IEE report)	Potential Impact	Mitigation Work (as in EMP)	Current Status (with supporting data*) and Follow-up Required	Remarks

Note: The monitoring format shall be attached to the monthly progress report.
* Data could be numbers and % of female in work group; Numbers of training with numbers of participants (M/F); numbers of trees removed and replanted etc.

2. A safeguard monitoring report may include the following elements:

- Background/context of the monitoring report (adequate information on the project, including physical progress of project activities, scope of monitoring report, reporting period);
- Changes in project scope and adjusted safeguard measures, if applicable;
- Qualitative and quantitative monitoring data;
- Monitoring parameters/indicators and methods based on the monitoring plan/ program previously agreed upon with concerned DPs;
- Monitoring results compared against previously established benchmarks and compliance status (e.g., national environmental emission and ambient standards and/ or standards set out in the ADB's safeguard policy and guidelines; timeliness and adequacy of environmental mitigation measures; IR compensation rates and timeliness of payments, adequacy and timeliness of IR rehabilitation measures including serviced housing sites, house reconstruction, livelihood support measures, and training; budget for implementing EMP, RP, or IPP, timeliness and adequacy of capacity building, etc.);

- Monitoring results compared against the objectives of safeguards or desired outcomes documented (e.g. IR impacts avoided or minimized; livelihood restored or enhanced; IP's identity, human right, livelihood systems and cultural uniqueness fully respected; IP not suffer adverse impacts, environmental impacts avoided or minimized, etc.);
- If noncompliance or any major gaps identified, include a corrective action plan;
- Records on disclosure of monitoring information to affected communities;
- Identification of key issues, or complaints from affected people, or recommendations for improvement;
- Monitoring adjustment measures recommended based on monitoring experience/trends and stakeholders response;
- Information about actual institutional arrangement for implementing the monitoring program/ plan provided or adjusted, as may be required;
- Proposed items of focus for the next report and due date.

ANNEX 7: Parameters for Environmental Monitoring

1. The following parameters will be monitored:

Issues of monitoring	Parameters	Measurement unit	Quantity	Remarks
Water pollution	Turbidity	JTU		
	DO	mg/l		
	pH	-		
	BOD	mg/l		
	COD	mg/l		
	Arsenic	mg/l		
	Iron	mg/l		
	Coliform (fecal)	N/100 ml		
	Salinity	mg/l		
	Manganese	mg/l		
Air pollution	Suspended dust particle	$\mu g/m^3$		
	Carbon monoxide	$\mu g/m^3$		
	Lead	$\mu g/m^3$		
	SO_x	$\mu g/m^3$		
	NO_x	$\mu g/m^3$		
Noise pollution	Shrillness of sound	Decibel		
Soil pollution	Fertility	Increase/ decrease		
Others				

ANNEX 8: Training Program

1. In order to ensure effective and timely implementation of the EARF, in particular, and to enhance the environmental management capacity of the Project Management Unit (PMO), CCRIP, LGED, local contracting agencies, local government institutions such as Union Parishad, Market Management Committees, Local Community Leaders, and NGOs, and other stakeholders, in general, a comprehensive training program has been planned to be implemented during the life of the project. The training program should equip the members of the PMO and other LGED Engineers, who will be directly involved in the planning, design and implementation of the project, to understand and appreciate the EARF requirements; to prepare and review the screening reports, IEE, and EMPs; and to monitor the implementation of the subproject specific EMPs. The PMO staff will further train other engineering staff of the LGED and will expose senior members of the LGED to environmental, social and climate change issues associated with the rural transport and market improvement subprojects. Such a group of senior staff can then be given the responsibility of active dissemination of the culture of environmental/ social/ climate change consciousness and ethics within the rest of the organization. Once the staff of the PMO have received appropriate training and have gained adequate experience through the implementation of the EMP, they are expected to resume leadership role within the LGED in providing training and the implementing future projects. In order to disseminate environmental experience gained by the LGED, each staff would be required to maintain good records and prepare dissemination notes on specific issues and problems encountered and resolved, and how the experience gained could be managed and disseminated within the LGED at different functioning levels. Additional environmental training in the form of on-the-job training on road construction and environmental management on any running ADB assisted projects where good environmental management practices are being followed could also be arranged for the PMO staff. Having received adequate training, these staff will be encouraged to train other staff.

2. Table 2 below lists out the training modules that will be prepared and used for the environmental capacity building initiatives targeted to the various entities responsible for implementing/ monitoring/ supervising the EARF.

Table 2: Training Modules for Environmental Management of CRICZP

Sl. No.	Training Recipients	Mode of Training/ Venue/ Timeframe	Environmental Aspects to be covered in the training module	Training Conducting Resource Personnel/ Agency
1	Environmental staff of EMU and PMO, CCRIP, LGED associated with design and construction supervision	Lecture System Workshops day 1) and Group Discussion (day 2)/ LGED HQ/ End of March 2013	• Environmental Management overview • Environmental Regulations and Acts • Environmental Management Framework for CCRIP • Environmental issues associated with rural transport improvement projects in Bangladesh • Planning for environmentally sustainable construction and operation of rural roads and structures • Environmental Screening and Assessment Process • Environmental Management Plan • Environmentally sound construction practices • Long term environmental issues in rural roads construction management	Environmental Specialist, PPTA, CCRIP

Sl. No.	Training Recipients	Mode of Training/ Venue/ Timeframe	Environmental Aspects to be covered in the training module	Training Conducting Resource Personnel/ Agency
2	All technical staff of PMO, District and Upazila staff of LGED and DSM Consultant and Contractors	Lecture System Workshops (day 1) and Group Discussion (day 2)/ Each Greater Project Districts/ June/ July – every year during 2013 – 2018	• Environmental and Social Dimensions of Rural Transport Projects • Environmental Management overview • Environmental Assessment • Environmental Management Plan - Implementation, Supervision and Monitoring • Environmental Regulations and Guidelines • Environmental Issues associated with rural road projects in Bangladesh • Environmentally sound construction management Practices • Rural Transport Projects and Environmental and Safety Issues	Environmental Specialist, DSM Consultants
3	Environment staff of EMU, PMO, concerned LGED staff at HQ, District and Upazila levels, Contractors and DSMC	Workshop (1 day/ LGED HQ/ Nov 2013	Salient Features of the following GOB policies which has relevance to CCRIP: • National Environment Management Action Plan (NEMAP) • Sustainable Environment Management Program (SEMP) • National Land Transport Policy • National Road Safety Strategic Action Plan • Land use policy	Experts from DOE / MOEF, Ministry of Communications, Roads and Highways Department, Bangladesh Road Transport Authority (BRTA) and Ministry of Land
4	All staff of EMU / PMO entrusted with environmental related matters	Short term training course (2 days)/ LGED HQ/ Oct 2013	• Environmental Safeguard Policies of the ADB • Environmental Assessment for ADB assisted Projects • Environmental Regulations, Acts and Clearance Procedures • Environmental data collection and monitoring analysis • Hands on training on compliance monitoring and operation stage monitoring	BRM, ADB officials/ External Agency
5	EMU / PMO Staff for Environmental related matters	Visits to case study areas and expert lectures (3 days)/ on-going ADB funded road construction/ improvement projects/ April/ May 2014	• Erosion and Sedimentation Control Techniques • Bridge and Culverts Construction and Maintenance • Earth retaining structures on rural roads • Slope stability and re-vegetation of exposed earth • Siting criteria for ancillary sites such as borrow pits, brick-fields, workforce camps, material storage yard, dumping sites etc. • Disposal of Construction Waste • Recycling of Road Construction Materials • Environmental Information Management System	Environmental Specialist, DSM Consultants
6	**Stakeholder Training Workshops**			
6A	**Upazila and Union Roads including Structures**			
	Stakeholders of Upazila Roads/ Union Roads viz. Union Parishad/ Pourashava members of the subproject area, Religious and Community leaders in the project area, Representatives from each of the subproject covered	Lecture System Workshops or Group Discussion/ 1 day in each Upazila every year, LGED Upazila Office/ June or July, 2014 – 18; Short term training course 1 day in each project district every year,	• Environmental issues related to Construction and Maintenance of rural roads and structures, • Project Implementation schedule, Construction methods planned, Ancillary sites selected, Institutional hierarchy during implementation of the project with the names of the concerned	EMU/ DSM Consultants

Sl. No.	Training Recipients	Mode of Training/ Venue/ Timeframe	Environmental Aspects to be covered in the training module	Training Conducting Resource Personnel/ Agency
	villages/ hamlets/ small settlements, NGOs working in the project area and other concerned Government department stakeholders (like service/ utility providers)	LGED District Offices/ June/ July, 2014 – 18 Audio Visual Communication/ 1 day on each subproject	officials of DSMC, LGED and Contractors, Simple do's and don'ts during project implementation etc.	
6B	**Growth Center Markets**			
	Stakeholders of Growth Center Market subprojects viz. Union Parishad /Pourashava Members of the GCM area, Concerned Market Management Committee members, Religious and Community leaders in the project area, NGOs working in the project area and other concerned government department stakeholders (like service/ utility providers)	Lecture System Workshops or Group Discussion/ 1 day in each Upazila every year, LGED Upazila Office/ June or July, 2014 - 18 Short term training course 1 day in each project district every year, LGED District Offices/ June/ July, 2014 – 18 Audio Visual Communication/ 1 day on each subproject	• Environmental issues related to market facilities • Project Implementation schedule, Construction methods planned, Ancillary sites selected, Institutional hierarchy during implementation of the project with the names of the concerned officials of DSMC, LGED and contractors, Simple do's and don'ts during project implementation, etc • Operation and maintenance of tube wells, sanitation facilities, slaughterhouse waste treatment systems, solid waste management practices	EMU/ DSM Consultants
6C	**Cyclone Shelters**			
	Stakeholders of Cyclone Shelters subprojects viz. Union Parishad/ Pourashava members of the Cyclone Shelter area, Concerned Cyclone Shelter Management Committee members, Market Committee members (if any GCM is located adjacent to Cyclone Shelter), Boat Owners Association, Religious and Community leaders in the project area, NGOs working in the project area and other concerned government department stakeholders (like service/ utility providers)	Lecture System Workshops or Group Discussion/ 1day in each Upazila every year, LGED Upazila Office/ June or July, 2014 – 18; Short term training course 1 day in each project district every year, LGED District Offices/ June/ July, 2014 – 18 Audio Visual Communication/ 1 day on each subproject	• Environmental issues related to Construction and Maintenance of cyclone shelter facilities • Project Implementation schedule, Construction methods planned, Ancillary sites selected, Institutional hierarchy during implementation of the project with the names of the concerned officials of DSMC, LGED and contractors, Simple do's and don'ts during project implementation etc	EMU/ DSM Consultants

ANNEX 9: Terms of Reference for Environmental Specialist

1. The environmental specialist will (i) assess the environmental impacts of the project, including physical, ecological, social environments and climate and disaster risks; (ii) conduct a comprehensive appraisal of the environmental impact of the project activities in line with the ADB's Safeguard Policy Statement (2009); and (iii) propose appropriate mitigation measures for the identified environmental impacts. The main outputs from the environmental specialist are (1) supervision and monitoring of the project activities in the field level; (2) reporting about environmental compliance and implementation of suggested mitigation (environment) measures including climate adaptation and disaster risk reduction measures; (3) contribution to the environmental part of the monthly, quarterly, annual, midterm and final reports; (4) providing assistance for preparation of environmental audit report to be prepared by the externally deployed consultants; and (5) preparation of environmental due diligence report.

2. The environmental specialist must have a graduate degree in environmental science or environmental engineering or closely related field of study with 15 years experience in related areas including specific expertise in climate change issues in Bangladesh. Inputs may be intermittent over the period of 48 months until the submission of completion report for the CCRIP.

ANNEX 10: Implementation Cost for EMP

1. The environmental screening and categorization and subsequent environmental assessment shall be undertaken parallel with the planning and design of the subprojects. The Environmental Assessment will need to be integrated with the designs and its recommendations will be incorporated into the designs and the contract documents at all stages of the preparation and will continue during the implementation of the project. As part of good engineering practices in the project, there have been several measures such as erosion prevention, avoidance of ponds filling, grass turfing, rehabilitation of borrow areas, tree plantation, road safety, signage, provision of temporary drains, etc., the costs for which will be included in the EMP budget for the subprojects. The summary budget for the Environmental management costs for the Project is presented in the Table 3.

Table 3: Environmental Budget

Sl. No.	Items	Proposed Amount (US$)
1	Environmental Consultants	120,000
2	Environmental Mitigation/ Enhancement	200,000
3	Environmental Training	50,000
4	Community Consultation	20,000
Total		**390,000**

ANNEX 11. Public Consultation

1. Consultation and information disclosure will be a continuous process during the preparation of the environmental assessment document and implementation of the EMP. The PMO/ LGED will ensure to conduct meaningful consultation with affected people and concerned stakeholders, including civil society and facilitate their informed participation. The meaningful consultation shall begin early in the subproject preparation stage and carried out in an ongoing basis throughout the subproject cycle, timely disclosure in understandable format by the local stakeholders; consultation is organized in congenial environment without intimidation, and is gender sensitive. The process and results shall be documented and incorporated in the environmental assessment report. Some photographs of public consultation during preparation of EARF are given below:

Discussion with Upazila Engineer of Amtoli


Market committee of Amragachia

Mahipur Bazaar stakeholders


KII with Chairman of Sundarban Union

Dialogue with Rakhain leader

Fishermen village