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1. INTRODUCTION

The proposed Rural Improvement Transport Project (RTIP or the Project) falls within the framework of the Government's strategy for Rural Infrastructure Development and is a follow-up project of two earlier IDA-financed Rural Roads and Markets Improvement and Maintenance Projects: RMIMP-1 and RRMIMP-2 that were successfully completed in June 1997 and June 2002 respectively. The Project is proposed to be implemented in 21 districts of Bangladesh with the financial assistance of IDA (World Bank) over a period of 5 years. The project has been categorized as Environmental Category A. Accordingly, the Local Government Engineering Department (LGED) of the Ministry of Local Government, Rural Development and Cooperatives, Government of Bangladesh, has completed the project preparation including the engineering design of the prioritized sub-projects for first years works program and the environmental and social analysis of the project. This is the EA Summary of the draft environmental assessment and social impact assessment prepared as part of the project preparation.

2. PROJECT DESCRIPTION

In supporting GOB objectives of the growth of the rural economy and poverty reduction, the development objectives of the project are: (i) to remove physical bottlenecks, improve quality and enhance sustainability of rural transport and market services; and (ii) to improve local institutional capacity for effective rural infrastructure investment and efficient rural infrastructure management, including maintenance. To meet the above development objectives, the project will produce the following main outputs: (i) Improvement of about 1100 km of priority feeder roads (FR) including associated structures and about 500 km of rural roads (RR1) (ii) Construction of about 15,000 m of drainage structures on RRs (iii) Periodic maintenance and rehabilitation of approximately 1,500 km priority feeder roads (iv) Improvement of about 150 growth centre markets and 45 river jetties (ghats); and (v) Increased role of local governments and communities in management and financing of local transport and trade infrastructure. The project will build on experience and lessons learned from the recently completed RRMIMP-2, and will complement and reinforce its achievements. Total Project cost would be US$ 255 million.

The location of project districts is shown in Fig.2.1. A brief description of the project components, their respective interventions and perceived benefits are presented in Table 2.1.
**Table 2.1: Description of the project components, proposed interventions and perceived benefits under each of the components**

<table>
<thead>
<tr>
<th>Item</th>
<th>Improvement of feeder roads (FRA / FRB) and bridges</th>
<th>Improvement rural roads type 1 (RR1) and bridges</th>
<th>Periodic maintenance of feeder roads</th>
<th>Construction of small structures on rural roads (SSRs)</th>
<th>Improvement of Growth Center Markets</th>
<th>Construction of river jetties / ghats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compo nent Description</td>
<td>1100 km of feeder roads (129 FRA roads totaling 853km and 29 FRB roads totaling 267km) over 5 years of which 300 km FRB in 1st year.</td>
<td>About 800km RR1 roads will be improved based upon the participatory planning involving local bodies and cost-sharing approach. Similar to the FRB Roads, bridges up to 30m span will be constructed. No road will be improved under 1st year program.</td>
<td>The project incorporates periodic maintenance component of about 1500-km feeder roads and targeted rural roads within the project area. The LGED with assistance from the DSMC will select and prioritize the sub-projects for design and implementation based on an annual periodic maintenance program.</td>
<td>15000 structures of up to 20m span will be constructed, gap upto 3m will be covered with pipe culvert and above 3m box culvert, 1st year program includes 4000 SSRs to be implemented based upon participatory planning and community cost sharing approach structures.</td>
<td>About 150 selected growth center markets will be improved in the project districts.</td>
<td>About 45 jetties / ghats will be constructed in the project districts.</td>
</tr>
<tr>
<td>Proposes interventions</td>
<td>* Widening of the existing road embankment to standard top width of FRB/FRA 7.30m and raising the embankment above HFL (highest flood level) at a slope of 1.15 to 1.2 as appropriate.</td>
<td>* No widening will be done but height raising as appropriate will be done.</td>
<td>* Pavement Resurfacing</td>
<td>* New Construction / Replacement / Widening / Rehabilitation of small structures up to 20 m span.</td>
<td>Re-location of existing shops and other structures located on the khas land proposed for the development of the market. Construction of internal roads, market pavements, parking spaces, slaughter sheds, sales sheds, open sales platforms, paved sales platforms, cattle sales yard, women's marketing corners, small workshops and artisans stalls, tree plantation, facilities for water supply and sanitation including tube wells, toilets along with septic tanks and soak pits, storm water drains, sullage drains, solid waste collection vats.</td>
<td></td>
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<td></td>
<td>* Construction of new pavement, new base layer, 25mm bituminous coating, single surface dressing as appropriate.</td>
<td>* Construction/rehabilitation of structures.</td>
<td>* Pavement Shape Correction</td>
<td>* Participatory planning and community cost sharing</td>
<td>* Construction of facilities for water supply and sanitation, solid waste management, electricity, multi-purpose shelters.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Land acquisition</td>
<td>* Land acquisition</td>
<td>* Major Shoulder Repairs</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Through improvement of the existing poor conditioned feeder roads, all selected roads would be made fully all weather operational and accessible to the fast-moving motorized vehicles which will promote the commercial activities in the rural areas by increased and better transportation of goods throughout the country and will bring about the positive changes in the socio-economic conditions of the rural poor.</td>
<td>Through improvement of the existing poor conditioned feeder roads, all selected roads would be made fully all weather operational and accessible to the fast-moving motorized vehicles which will promote the commercial activities in the rural areas by increased and better transportation of goods and will bring about the positive changes in the socio-economic conditions of the rural poor.</td>
<td>With the implementation of the periodic maintenance of the selected feeder roads, these roads would be made fully all weather operational and better accessible to the fast moving motorized vehicles, which in turn help increase in the commercial and service activities in the respective areas and thus help reduce the poverty of the rural poor.</td>
<td>With the construction of the small structures on rural roads, the existing gaps of the roads will be eliminated, which will give both motorized and non-motorized vehicles an opportunity of uninterrupted communication between markets, villages and different roadside communities that will help increase in commercial and service facilities in the areas. Moreover, it would improve environment by reducing/removing drainage congestion and water logging and would promote irrigation</td>
<td>Improvement of the growth centers through better trading facilities, reducing/removing crops spoilage/deterioration (if any), removing the environmental problems and providing the environmental services, will help increase the trading activities, minimize the health risk due to existing poor environmental conditions and thus would contribute to the reduction of the poverty of the rural poor.</td>
<td></td>
</tr>
<tr>
<td>Perceived benefits</td>
<td>Through improvement of the existing poor conditioned feeder roads, all selected roads would be made fully all weather operational and accessible to the fast-moving motorized vehicles which will promote the commercial activities in the rural areas by increased and better transportation of goods throughout the country and will bring about the positive changes in the socio-economic conditions of the rural poor.</td>
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</table>
3. APPLICABILITY OF THE WORLD BANK’S SAFEGUARDS

The project has been classified as Category A project by the Bank, owing primarily to the uncertainties and management of resettlement issues involved. The Bank’s safeguard policies / directives that would be triggered by the proposed project are listed in Table 3.1 along with appropriate rationale and associated documentation carried out to ensure compliance.

Table 3.1: Applicability of Bank’s Safeguard Policies

<table>
<thead>
<tr>
<th>Safeguard policies</th>
<th>Applicability</th>
<th>Rationale</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment (OP / BP / GP 4.01)</td>
<td>Yes</td>
<td>The project has been classified as Category A, projects and will require EA to meet the Bank's requirements.</td>
<td>Environmental Analysis carried out and Environmental Management Framework (EMF), Environmental Management Plans (EMP) and Environmental Codes of Practice (ECP) prepared and being reviewed by Independent Review Consultants. Further EA preparation and environmental management will be undertaken as per the approved EMF.</td>
</tr>
<tr>
<td>Natural Habitats (OP / BP 4.04)</td>
<td>No</td>
<td>Sub-projects do not have any potential to affect natural habitats (confirmed in all sample case studies).</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Safety of Dams (OP / BP 4.37)</td>
<td>No</td>
<td>Sub-projects do not have any potential to affect any dam (confirmed in all sample case studies).</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Pest Management (OP 4.09)</td>
<td>No</td>
<td>The project is a rural transport improvement project and none of the project interventions have any direct linkage with pest management issues.</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Involuntary resettlement (OP / BP 4.12)</td>
<td>Yes</td>
<td>The feeder road improvement component involves land acquisition and displacement of people, though on a limited scale.</td>
<td>Resettlement Policy Framework for the Project and Resettlement Action Plan for First year works have been prepared. Further RAP for yearly works program will be prepared by the LGED.</td>
</tr>
<tr>
<td>Indigenous peoples (OD 4.20)</td>
<td>Yes</td>
<td>The feeder road improvement component has potential to impact some indigenous communities.</td>
<td>Indigenous Peoples Development Plan has been prepared.</td>
</tr>
<tr>
<td>Cultural Property (OP 4.11)</td>
<td>Yes</td>
<td>The project has a potential to affect cultural / religious property if appropriate avoidance measures are not taken.</td>
<td>Social Analysis has been carried out and Social Screening report prepared to document the integration of the proposed preventive and avoidance measures to the project designs.</td>
</tr>
<tr>
<td>Projects in Disputed Territories (OP / BP / GP 7.60)</td>
<td>No</td>
<td>The entire project area lies within the political boundaries of Bangladesh.</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Projects in International Waterways (OP / BP / GP 7.50)</td>
<td>No</td>
<td>The project location is limited to land transport and inland waterways.</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

4. ENVIRONMENTAL ASSESSMENT PROCESS

The overall objective of the environmental assessment (EA) carried out during the project preparation has been to ensure that the sub-projects associated with the RTIP are environmentally sound and sustainable. The EA process adopted for the project included an environmental analysis involving background studies, environmental screening, and case studies resulting into development of the environmental management
framework (EMF), Environmental Management Plans (EMP) and Environmental Codes of Practice (ECP). The environmental assessment framework that has been followed during the project preparation is summarized in Table 4.1.
Table 4.1: EA Process During Preparation Stage

<table>
<thead>
<tr>
<th>Project Stage</th>
<th>EA Stage</th>
<th>EA Framework</th>
<th>Particular Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Feeder Roads Improvement</td>
</tr>
<tr>
<td>Preparation</td>
<td>Environmental Screening</td>
<td>Policy, Institutional Framework</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Sub-Sector Baseline, National &amp; Regional Issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identify from Above Issues relevant for the Project</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select case studies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Adequate) Sampling (to capture all possible combinations, and concerns) based on background studies</td>
<td>300 km FYP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identify all potential impacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop Screening Criteria and Environmental Management Framework (EMF)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop EMP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Codes of Practice (ECP)</td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>Further EA</td>
<td>Need for Further EA/EMP as per EMF required works</td>
<td>(for other than First Year Programme)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implement EMP or Environmental Code of Practice (ECP)</td>
<td>EMP</td>
</tr>
</tbody>
</table>

Note: Community participation is integral to all stages and sub-stages of Project Preparation. A separate and full Documentation on Consultation is required.
5. ENVIRONMENTAL ANALYSIS

The objectives of the Environmental Analysis have been: (i) To collect information on existing environmental conditions; (ii) To undertake a preliminary evaluation of sub-projects in order to define the focus for the environmental screening, design and management, and monitoring during implementation; and (iii) To carry out an environmental screening of the sub-projects (under each component) to determine the magnitude of actual and potential impact and to ensure that environmental considerations are given adequate weight in selection and design of proposed sub-projects.

While the first two objectives have been achieved through background studies and environmental surveys, the last objective has been met through undertaking a credible number of sample case studies for each project component.

5.1 BACKGROUND STUDIES

Extensive reconnaissance field visits were undertaken and relevant background documents prepared by various Government Departments, NGOs, and International Development Agencies in Bangladesh were collected and studied thoroughly to gain environmental background information. The study benefited through consultation with relevant Ministries, Government Departments and agencies, International Development Organisations, prominent national and regional NGOs representatives and experts working in the field of environmental management in Bangladesh.

The background studies included:

An appraisal of the Government's environmental policies and plans and the environmental legal and regulatory framework have been undertaken.

An overview of national and regional environmental assets and issues,

Assessment of overall environmental dimensions and issues in the project area,

Establishing baseline environmental conditions of the project districts,

- An assessment of potential indirect and cumulative environmental impacts due to the overall project interventions.

Identification of appropriate and practical mitigation measures to the identified potential adverse impacts and delineation of opportunities for environmental enhancements in the project area.

5.1.1 APPRAISAL OF ENVIRONMENTAL POLICIES AND PLANS

In order to promote sustainable development in the country through conservation of environment and natural resources, the Government has formulated several policies and plans for environment-friendly development such as National Environmental Policy (1992), The Government’s Forestry Policy (1994) National Environmental Management Action Plan (NEMAP, 1992), National Land Transport Policy, The Fifth Five-Year Plan (1997-2002). The proposed project is within the overall framework of the stipulated strategies, policies and plans of the Government and would contribute to enhancement of the pertinent environmental objectives.

As per the Environment Conservation Rules of Bangladesh (1997), the project falls in the environmental category of "Orange B" and accordingly the requirements will be met in due course of time.

5.1.2 NATIONAL / REGIONAL ENVIRONMENTAL ASSETS AND ISSUES

Achieving environmentally sound development has emerged as the greatest challenge for the dominant development paradigms all over the world. For a developing country like Bangladesh it has become a formidable task, with its inherent resource constraints, geomorphologic instabilities, political instabilities, weak institutional infrastructure, and paucity of well-established modalities for establishing a framework for sustainable development. An appraisal of the national / regional environmental assets and issues provided necessary background information to undertake a preliminary evaluation of the sub-projects in order to define the focus of the environmental screening and case studies.
Land and Physiography: Broadly the physiography of Bangladesh can be grouped into three major units: hill soils (12 per cent), old alluvial soils (8 per cent), and recent alluvial soils (80 per cent). Recent alluvial soils are found in the Gangetic alluvium, Teesta silt, Brahmaputra alluvium, and coastal saline tracts. The deposits of the Ganges and many of its tributaries have formed Gangetic alluvium.

The topography of Bangladesh is extremely flat, with local relief ranging between 1 and 2 meters. At least 20 per cent of the area of the country consists of low-lying tidal plains, with elevations of less than 3 meters above sea level. Due to the flat terrain, rivers have extremely low gradients. As an active delta of three of the world's major rivers, suitable conditions prevail for agricultural activities in Bangladesh. Agriculture is of paramount importance to the country. Most of the land area is occupied by agriculture, forest, and habitat. Four-fifths of the population depends directly or indirectly upon agriculture. Nearly half of the National Product is from agriculture in Bangladesh.

Of the total area, agricultural land comprises 64.2% (9.25 million ha), state forest 15.4%, private forest 2.4%, urban area 8.1%, water bodies 6.5% and other 3.4%. The major environmental issues relating to land resources span various sectors of the economy, because almost all areas including agriculture, water, forests, habitat, industry, and horticulture, compete for the use of land.

Implications for RTIP: The roads, GCM and jetties all will have built upon the existing lands and thus the sub-project interventions have potential to affect the soil quality and the landscape of the adjacent environmental setting.

Hydrology: Bangladesh is the largest delta in the world formed by the Ganges, the Brahmaputra, and the Meghna river system. This delta is characterized by flat terrain interlaced with the intricate system of rivers and tidal channels, which carry an enormous quantity of sediment-laden water downstream. The three major rivers have a huge catchment area of 1,554,000 sq. km, spreading over five countries, namely, Bhutan, Nepal, China, India, and Bangladesh. There are about 700 rivers, canals, and streams in Bangladesh, with a total length of approximately 22,155 km, which occupies a riverine area of about 9,384 sq. km.

Thus, a vast amount of water flows through Bangladesh. The rivers of Bangladesh also carry huge amounts of sediment, an estimated 2.4 billion-m.tons/year (Milliman and Meade, 1983). These sediments are subjected to coastal dynamic processes, generated mainly by river flow, tide, and wind actions. The ultimate result may be additional new land in some places due to accretion, forming islands called chars, and loss of land in some other places due to erosion.

Bangladesh is also richly endowed with numerous perennial and seasonal waterbodies known locally as haors, beels, baors, khals, pukurs (ponds) and dighies (tanks).

Implications for RTIP: The road improvement activities, particularly widening of the road formation and construction of bridges/ culverts, will have potential to affect the water bodies, an all-important asset for the rural populace.

Groundwater: The water table is generally high because of soil porosity and permeability, and the low topography. In the floodplains it varies from within one meter below the surface in the rainy season to about seven meters or more in the dry season. In the older terraces, it is more than 15 meters during the dry season. In spite of favorable water tables, increasing withdrawal of water for irrigation and domestic use, and a reduction of flow in the Ganges-Padma system have contributed to a lowering of the dry season water table in recent years.

Implications for RTIP: The GCM and jetties will have provisions for potable water supply based on ground water source. The depth of the water table and water quality, particularly with respect to arsenic contamination and/or fecal coliform contamination are important issues of concern which needs careful consideration during planning and design of the water supply and sanitation facilities. It has been reported that depth of the aquifer to be tapped for the tubewell plays an important role in eliminating the risk of arsenic problem in potable water supply.

Terrestrial Ecology: Forests are both environmentally and economically important natural resources in the terrestrial ecosystem. The total land under forest in Bangladesh is about 2.56 million ha, which includes officially classified and unclassified state lands, and forestlands accounted for by village forests and tea or rubber gardens. Although a significant part of the existing forest area is designated as State Forest, most of this land is actually barren of tree vegetation (Forestry Master Plan, 1995). In Bangladesh natural forest areas constitute almost 31 per cent, and forest plantation 13 per cent of forest areas. Only 5 per cent of
existing forestlands are designated as protected areas. In terms of per capita forestland, Bangladesh ranks amongst the lowest in the world, with about 0.02 ha per person.

The forests of Bangladesh have been disappearing at an accelerating rate. The good to medium density forest of the Chittagong Forest Division had shrunk from approximately 30,000 ha in 1985 to 20,000 ha in 1992. In Cox's Bazaar, natural forest cover dropped from 31,300 ha in 1985, to about 24,300 ha in 1992. In Sylhet only about 6,000 ha, i.e., 15 per cent of the actual forest area had remained in its original state in 1987. In Sundarbans, 78 per cent of the forest had canopy closure of 75 per cent or more in 1961, which was reduced to 65 per cent in 1984. As of 1989 only about 17 per cent of the total legitimate Sal forest area remained across central and northwest Bangladesh (FMP, 1995).

The study area does not include the habitat of the Bengal Tiger probably the most notable of Bangladesh's fauna species. However many small members of the cat family, such as three members of the civet family (including the Indian Civet which is now listed as an endangered species) are found throughout the study area.

Birds and reptiles, particularly migratory birds have the largest representative populations, followed by, wild pigs, deer and otters.

In recent years, an estimated 109.92 million trees have been planted in the urban areas and as strip plantations along the roads, highways, railways, and embankments.

**Implications for RTIP:** None of the projects roads have been identified as traversing through the forest area. Road improvement requires fuel for bituminous heating and will use bricks as sub-base / base material, which generally consumes firewood for burning. There is also a possibility that the workforce may use wood from the nearby private forest areas as cooking fuel wood. Moreover, almost all roads have the roadside avenue tress of various species types and sizes, including homestead trees, and road widening will require cutting of a large number of trees.

**Aquatic Ecology (Freshwater and Coastal Wetland):** Wetlands are invaluable components of the environment and bio-diversity in Bangladesh. Bangladesh possesses enormous wetland areas, among which the principal ones are rivers and streams, freshwater lakes and marshes, including *haors*, *baors*, and *beels*, water storage reservoirs, fish ponds, flooded cultivated fields, and estuarine systems with extensive mangrove swamps. The coastal and inland wetlands encompass the vast floodplains and delta system of the Ganges, Meghna and Brahmaputra rivers. The total area of the wetlands in the country has been variously estimated at seven to eight million hectares, or about 50 per cent of the total land surface.

The wetlands in Bangladesh are increasingly being recognized as habitat and refuge for a large variety of wildlife, and a safe nesting site for avifauna. The marsh vegetation associated with wetlands also forms important breeding areas for a wide variety of waterfowl, and roosting places for a large number of resident and migratory birds.

The nutrient products of wetlands in Bangladesh are carried by rivers and floodwater, and benefit the systems downstream. The grazing systems in these regions support cattle that recycle nutrients, enrich soil, and are used as draft animals. The plant diversity provides refuge for predators of pests, e.g., snakes, frogs, and certain fish species, and this helps agriculture in general. Bangladesh does not possess adequate finances and infrastructure for sewage systems on a large scale, but this function is naturally and effectively performed by the wetlands, which serve as a filtering system through recycling of toxic pollutants.

The wetlands of Bangladesh are being drastically affected by the impacts of the burgeoning human population. In the Ganges-Brahmaputra floodplain alone, approximately 2.1 million ha of wetland have been lost to flood control, drainage and irrigation development. Severe erosion in the catchment areas is causing increased siltation, and having major impacts on the key wetland areas. The exploitation of the haor wetland ecosystem began due to ever-expanding agrarian settlements, and they are being reclaimed as agricultural land for production of rice. The beels are being drained, and embankments built to save crops from flash floods. These changes in land use patterns have occurred in tandem with a decline in fish and migratory birds. Swamp forests that were once extensively distributed are now on the verge of extermination.

**Implications for RTIP:** The majority of RTIP roads occur in low-lying floodplain areas characterized by criss-crossed rivers, canals and vast wetlands. GCMs are on the elevated lands of the active river floodplain. Jetties are to be located along riverbanks.
Bio-diversity: The terrestrial and aquatic areas of the country support a large number of diverse biological populations, both plant and animal. Mangrove forests form a unique environment of floral-faunal assemblages. The Sundarbans support a very rich and diverse fish fauna of 400 species, 270 species of birds, and over 300 species of plants. It is an important staging and wintering area for migratory shorebirds, gulls, and terns. They comprise the largest remaining tract of habitat for the Royal Bengal Tiger (*Panthera tigris*). St. Martin’s Island is an important nesting area for marine turtles, and a wintering ground for migratory shorebirds.

There is an abundance of waterfowl and wetland-dependant birds in the *Haor* Basin. A total of 125 species of waterfowl are known to occur, of which 53 are resident breeding species or breeding summer visitors. 284 species of birds were recorded in the Northeast region, of which 89 are true waterfowl. Thirty species of birds are largely or wholly dependent on wetland ecosystems, with 42 bird species observed in wetlands or adjacent floodplains and 123 species in dry land. Despite massive habitat losses, the *Haor* Basin remains an internationally important wintering area for migratory waterfowl, principally ducks and shorebirds. Coastal wetlands support an even larger number of migratory birds, including some highly endangered species.

**Implications for RTIP:** None of the sub-projects are located in the Sundarbans or any internationally recognized wetlands. As such, no potential impacts on the important bio-diversity aspects are expected. However, an immediate impact of the road improvement will be clearing of vegetation and roadside trees and would cause noisy environment in the remote rural areas, forcing the native wildlife (fox, snakes are the most wildlife species found) to move to new shelter.

Endangered Species: The adverse effects of recent developments can easily be discerned in the dwindling populations of native fauna in the wetlands. The Sundarbans now provide the only natural habitat to ensure long time survival in the wild of the world’s largest genetically viable population of the Royal Bengal Tiger (*Panthera tigris*).

Among the 150 recorded waterfowl in the wetlands of Bangladesh, over 70 are now nearly extinct. The Grey-leg Goose (*Anser anser*), Brahminy Duck (*Tadorna ferruginea*), and Mukra or Comb Duck (*Sarkidiornis melanotos*) have disappeared, while the white winged Wood Duck is almost on the verge of extinction.

The Marsh Crocodile or Mugger (*Crocodylus palustris*) is now represented in Bangladesh by only a few individuals in the large private marsh adjoining a saint’s grave at Bagerhat. Another allied species, Gharial (*Gavialis gangeticus*), is also nearly extinct with an estimated total population of 8-10 individuals. In the wetlands of the *Haor* Basin, seven species of mammals and reptiles are highly endangered. These are the Common Otter (*Lutra lutra*), Smooth-coated Otter (*Lutra perspicillata*), Fishing Cat (*Felis viverrina*), Black Pond Turtle (*Geoclemys hamiltonii*), Black Monitor Lizard (*Varanus bengalensis*), Rock Python (*Python molurus*) and Monocellate Cobra (*Naja naja kauthia*).

At least four plant species confined to wetland habitats are tentatively listed as threatened. In the *Haor* Basin, Makhna (*Euryale ferox*) is over-exploited lor its edible seeds, and the wild rose of Bengal (*Rosa involucrata*) is being depleted at an alarming rate through loss of habitat.

**Implications for RTIP:** No potential impacts on the endangered species are expected.

**Agriculture:** In Bangladesh 75% of the population depends directly or indirectly on agriculture for its livelihood. The sector accounted for 32% of the country’s GDP in 1996/1997, a level at which it has stabilized since 1994/1995 after declining from 37% in the early 1990s.

**Implications for RTIP:** Agricultural lands surrounding the major part of most of the project roads form the general landscape and will be affected by road widening. Additionally, the usual practice of using agricultural lands for borrow-pits and brickfields from where bricks are supplied for road construction will also affect agricultural lands.

**Fisheries:** The fisheries sub-sector contributes about 10% to agricultural GDP and 3% to total GDP. One million people are directly employed in fishing, which also relates to our culture and environment.

**Implications for RTIP:** Most roads go through floodplains, a natural breeding ground for open water fisheries. Roads obstruct the free movement of fish during floods and schools them towards the cross-drainage structures where they are caught. Also roads prohibit the natural drainage of the accumulated fertilizer and pesticide residues on agricultural lands, damaging the breeding ground of fisheries. There are...
a large number of roadside ponds adjacent to the roads and widening in many cases may require fill-up of
a substantial part of them, affecting the yield rate and total yield.

Human Resources: Bangladesh has a population of over 130 million, and with more than 830 persons per
sq. km is the most densely populated country in the world. The demand for land is enormous, because of
the population density, and a very low land-person ratio intensifies the competition for the very limited land
resources for different uses. Conversion of the vast population to a productive human resource remains the
greatest development challenge.

It is estimated that more than 40 per cent of the population regularly consume less than the absolute
critical minimum of 1800 kilo calories per day. These 50 million people are amongst the poorest in the
world by any standard of development. These deprived people are also extremely vulnerable to disaster
and disease. The challenges posed by this massive poverty are enormous for a country with accelerating
environmental degradation of an over-populated land base.

For most of the people of the country health problems are the result of malnutrition and bad living
conditions. A recent widespread catastrophe occurs in the health sector from the arsenic contamination of
groundwater. For drinking water almost cent percent population depends on groundwater resources.

Implications for RTIP: Health impact on the brickfield workers will occur from the air pollution of the
burning of fuel wood used in brickfields, also workers involved in the burning of bitumen will also be
affected. Impact from consumption of arsenic contaminated water is likely to occur in the GCMs and
construction camps.

Disasters (Issues and responses): Natural and man-made disasters are common in Bangladesh. The
most devastating cyclones and floods of the world occur in Bangladesh. The victims themselves know best
how to cope with these disasters.

Implications for RTIP: Majority of roads occur on active river floodplains. A large-scale flood may damage
many parts of the roads. Roads in Bangladesh are usually used as temporary shelters for the poor during
high floods. Sometimes poor people who become homeless from riverbank erosion or char erosion get
permanent roadside shelters in the form of line slums.

5.2 POTENTIAL REGIONAL IMPACTS AND MITIGATION MEASURES

Based on the background studies, major environmental attributes and corresponding issues having
relevance to the proposed project interventions in the project area are identified. Potential regional impacts
due cumulative affects of the sub-projects associated with the RTIP and corresponding mitigation
measures have also been dealt with.

Buffer Zones: There is a need for the introduction of safety and environmental buffer zones for rural roads
that carry mechanized vehicles, in particular for those roads, which, through improvements, can be
expected to have an increase in traffic. This is both an environmental and public safety issue. Most first
year rural roads have an embankment base with minimal shoulders to the edge of the embankment. It is
possible that some roads will have the pavement extended to the very edge of the alignment, thus
encouraging vehicular traffic to use the entire road surface. This is a particular issue associated with some
of the roads stretches constructed on embankments where there is a drop of several meters from the road
to land (or water) below.

This has the potential for environmental impacts to vegetation, in particular trees, for water pollution and
erosion and sediment issues. Additionally, if the pavement is extended to the very edge of the roadway,
the need to remove trees is increased.

Extension of the pavement also poses safety issues for pedestrians and rickshaws that have no safe area
away from motorized vehicles, and for motorized vehicles that are overtaking or passing.

These issues would require a long-term holistic policy intervention at the national level, which are beyond
the scope of the proposed project.

5.2.1 OVERVIEW

Environmental impacts from the Project can broadly be classified as that taking place during construction
and during operation. The environmental impacts during construction are highly dependent on (i) the
incorporation of the mitigating measures identified in the EA or EMP into bid documents and specifications (ii) the contractor's work habits, especially those related to storage of construction materials, clearance of the site (e.g. tree felling), cleanliness of the work sites; and (iii) project management's strict enforcement of the correct construction practices and standards;

Based on past experience of rural roads and market improvement projects in Bangladesh, the proposed project is not expected to pose any major environmental challenge. Overall the project will have positive environmental aspects - the provision of drainage structures will reduce water logging; bitumen surfacing will eliminate the dust hazard; hard shoulders will improve road safety; road safety measures will reduce congestion and accidents; trees will be planted on the embankment slopes of all improved roads, more than compensating for tree felling during construction; the physical environment, health standards and quality of life in the markets and ghats will be improved through provision of free draining paved areas, sanitary latrines, garbage disposal facilities and arsenic free potable water supplies. The use of labour intensive construction and maintenance methods and of local materials will be promoted.¹

However, the RTIP, combined with other past / ongoing / proposed projects in the project regions, may have some cumulative environmental and social impacts at the regional level. Although, these impacts are not expected to be significant, their identification and remediation will ensure that potential adverse impacts will be kept at minimal levels and promote sustainable use of physical and natural resources. As no information about actual / potential impacts caused by other past / ongoing / proposed projects in the project regions is available it is almost impossible to predict the cumulative impacts. Based on review of available background materials, general environmental issues as a result of the proposed widening of roads including stripping of topsoil for fill materials and brick manufacturing, potential removal of roadside trees; soil erosion on road cuts and fills and stripped borrow areas, construction in flood prone areas, siting of road side ponds / ditches and subsequent downstream sedimentation of water bodies, impact on settlements, impact of roadside borrow areas for road embankments; crossing of rivers and drainage canals etc. Other potential environmental issues are mostly construction related, such as air and noise pollution during construction and operation; dust and smoke from material transport, crushers and asphalt plant during construction; soil contamination and water pollution from spills of oil fuel and lubricants; encroachment of right of way by squatters; operation of borrow pits and camps; problems with slope stability due to erosion and / or poor drainage. These potential direct primary impacts could extend to regional level as secondary or tertiary impacts.

5.2.2 TOPOGRAPHY / LAND / SOIL

Impacts on topography, land, and soil in the project area will occur due to embankment widening, development of borrow pits, brick manufacturing and crushing and other construction related activities such as disposal of unused waste materials, solid wastes, construction camps, and material storage yards etc.

Agricultural Land: The main impacts on agricultural land will be temporary or long term encroachment on land, sedimentation, loss of soil fertility, changes in seasonal water flows, disruption of irrigation practices, and spread of pest plants and animal diseases due to equipment uses between construction sites.

Since the project does not involve any new road construction, other than the creation of borrow pits and brickfields, soil impacts are not expected to be a serious concern. It is recommended that, as far as possible, soil disturbance should be avoided in the rainy season so as to minimise soil erosion and resultant siltation in the neighboring drainage channels.

During the operation of the project, the impact on land is indirect. The project is expected to increase the economic activity in the region. The increased economic activity could cause changes in the land use pattern, intensity of agricultural cultivation, more use of chemical fertilisers and mechanised agriculture, and population density.

5.2.3 HYDROLOGY AND DRAINAGE

Surface Hydrology: The surface hydrology of the project area is not expected to be adversely affected by the proposed project. Amounts of additional run-off will be small. Drainage in some areas will be improved due to the creation of improved bridges and culverts. Potential impacts on the flood characteristics are discussed below:

¹ Rural Infrastructure Strategy Study, SA 1 Infrastructure Division of the World Bank, 1996.
Haors and Beels (Wetlands): Improved drainage in certain areas could have an impact on wetlands, but no significant areas of direct impact have been identified. The area of beel wetlands, referred to collectively as Chalan beel, perhaps the most important wetland area in the Rajshahi portion of the project area, is fed by storm water runoff, inflow from Atrai river and back-up from Jamuna, which will not be directly impacted by the project. Cumulative impacts resulting from both improved transportation and agriculture development, however, can be anticipated. It has been reported, wetlands in this area have been reduced by poldering, construction of several flood protection embankments by BWDB, drainage for agriculture and extensive groundwater development for irrigation during the last two decades. The cumulative impact of the RTIP and other development projects are likely to continue this trend. In haors, beels and other low-lying areas, every effort must be made to maintain the natural flow of water and seasonal drainage. Haor vegetation, such as sedges, reeds and rushes, and traditional cropping regimes such as jute should not be impacted upon as they provide important filtration systems for the aquatic ecology and a quality water supply. A constant flow of water through wetlands is also essential for the prevention of increases in salinity levels, particularly in the dry season.

A further issue associated with wetlands is the need for works supervisors and construction crews to minimize the spread into these areas of water hyacinth, an introduced aquatic plant species that has negative impacts on water quality, biodiversity and local economies, particularly those based on fisheries. In many areas communities have contained water hyacinth. Utmost care should be taken that holding banks are not breached or plants are not caught up on equipment or machinery and spread. Where water hyacinth is not contained, machinery and equipment should be completely cleaned prior to moving onto the next construction site.

Flooding: The low-lying flood plains of greater Dhaka, covering Manikganj, Munshiganj, much of Dhaka and Narayanganj and parts of Gazipur and Narshingdi Districts, are more deeply flooded than other parts of the RTIP area. The most extreme is Munshiganj District, large parts of which are deeply flooded during the monsoon season. The water table in the project area is generally high because of soil porosity and permeability, and low topography. In the floodplains it varies from within one metre of the surface in the wet season to seven metres or more during the dry season. Generally, watertables are gradually becoming lower.

Road embankments have the potential to impede the flow of flood water and hold water for greater periods. The pressure of major floods may also erode or damage the roads and their embankments. Retaining floodwaters for longer periods of time will also have detrimental impacts on vegetation and human activity with secondary impacts being loss of production and income, and potential for changing biodiversity balances.

Cross drainage - causeways and culverts: Poorly designed causeways and culverts and drainage pipes with insufficient drainage capacity may cause erosion and back up of floodwater and/or flash flooding. Additionally, causeways can cause erosion and saturation problems beyond the planned drainage line if they are not adequately designed for the fall of the drainage line.

The potential for expansion of the rural road network in general, and the building up of existing roads to contribute to longer, more frequent and serious floods due to obstruction of the natural drainage system (delta) of Bangladesh. East-west aligned roads have a greater potential for impacting on flood regimes. In effect, the rural road network may act as a giant poldering system. While such an investigation is larger than this analysis or project, it is an issue that needs consideration.

Flood damage: Flood prone roads may incur wave damage, especially if they are close to jetties / ghats. In alluvial and riverine areas, roads and bridges may be subjected to erosion by floods.

Drainage: In many areas, there is potential for degradation of soil and water, particularly associated with agricultural land, through poor drainage from roads. Adequate and effective drainage plans, suitable for the terrain of each site must be incorporated into the individual road designs.

5.2.4 SALINITY

Changes in hydrological flows may result in higher salinity levels over a period of time. These levels can accumulate to a point where land becomes unproductive and ecological systems are altered (see Hydrology).
In the Pabna district, the project has the potential to increase soil and water salinity levels. The district is experiencing a slow rise in salt levels and research indicates this may be due to a reduced or less vigorous seasonal flushing process. Roads, particularly those with high embankments and on the east-west alignment, most likely play a significant role in this reduced flushing.

The Brahmanbaria (B. Baria) and Chandpur regions experience tidal fluctuations and upsurges that carry and deposit marine salt deposits up the river system unless flushed with strong downstream flows.

Impacts of salinity can be immediate, but long-term impacts are the most serious, the most significant being changes to ecosystems, agricultural production capacity and soil and water degradation.

5.2.5 HEALTH AND SAFETY

Health and safety issues concern the following:

Construction workers: Safety hazards should be explained to construction workers prior to commencement of construction. If possible, workers who will be placed closest to motorised traffic should be provided with reflective safety vests. Safe siting of construction workers, in particular brick-breakers, needs to be addressed. A dedicated area, fenced with safety signs should be installed for brick-breakers. Warning signs need to be placed well in advance of construction sites. Protective barriers may need to be considered. In some cases, detours may be necessary and temporary extensions of the embankment should be incorporated into work plans.

Health issues: Health issues, including handling of toxic substances and communicable diseases should be incorporated into an introductory address to workers. Where construction workers are brought in from other areas, workers should be advised to respect the local community. Easy to follow pamphlets on sexually transmitted diseases and prevention should be provided.

Additionally, local Union representatives and representatives of women’s groups should be invited to attend and provide input to these health and safety introductory sessions.

General safety: Where construction work is on narrow, and raised roads, safety issues for vehicles, in particular buses and trucks will need careful consideration. Bus pull-off bays should be considered in the design. A dedicated lane for pedestrians, cyclists and rickshaws should be a design component.

5.2.6 TREES AND WOODLANDS

Road widening, whether it be widening the pavement to the edge of the shoulder, or widening the embankment will require removal of trees and other vegetation growing along a large number of the roads. While many trees will need to be removed because they are in the path of widening activities or because they pose safety hazards, there are also many which could be saved through the cutting back of branches. Prior to construction, a vegetation management plan should be drawn up, indicating which trees need to be removed, which trees require trimming and which trees do not require treatment. The plan should include a revegetation (if removal is extensive) or replanting (if only a few individual trees are removed) plan. This plan should be developed in consultation with the local community.

Many of the existing trees are so close to the road in some cases that they appear to be a support for road embankments. Engineers and construction crews need to analyze each individual situation and plan for appropriate remedial action to be incorporated in the design.

5.2.7 ARCHAEOLOGICAL AND CULTURAL SITES

There are a number of cultural and archaeologically important sites that are within the general area of the RTIP, but not necessarily within project road alignments. These sites have been identified on design plans for the first year works, and noted as requiring protection from construction work impacts. In particular, the Hindu Temple on the Taltola-Anandabazar Road, which is close to both roadwork and bridgeworks, will need to be protected during construction.

5.2.8 HAZARDOUS SUBSTANCES

The feeder and rural roads improvement and maintenance works will involve the use of bituminous material and petro-chemicals, all of which should be treated as environmentally hazardous substances. Use of these substances will adhere strictly to the EMP stipulations.
5.3 OPPORTUNITIES FOR ENVIRONMENTAL ENHANCEMENTS

RTIP presents a number of opportunities for providing environmental enhancement and roadside rehabilitation measures. Some of these measures, which may be undertaken under this project, are described hereunder:

5.3.1 REHABILITATION OF DEGRADED AREAS

Apart from replacing trees that are lost through construction activities there is an opportunity to provide supplementary plantings in areas without trees which have experienced environmental degradation (e.g., soil erosion and/or loss of tree cover), particularly in market or village areas or future road side rest areas devoid of trees and areas along the banks of the rivers/canal/drains.

5.3.2 REHABILITATION OF BORROW PITS/DRAINAGE DITCHES ALONG THE ROADS

Poorly drained ditches along the roads lead to stagnant water bodies with risk of disease or accidents for local residents. Roadside ditches in village and market areas are prone to disposal of solid, liquid and even toxic wastes. New borrow pits excavated in these areas will exacerbate the problem.

5.3.3 IMPROVED ACCESS TO COMMUNITY WATER SUPPLY

Opportunity exists to provide improved access to the local village ponds located adjacent to the project roads/GCMs so that the community can more easily collect water, bathe and wash. The location of bathing and washing ghats may be provided in consultation with the local villagers.

5.3.4 DEVELOPMENT OF EXTRACTED BORROW AREAS AS FISH PONDS

Some of the recommended potential quarry sites are close to villages. After extraction of the blue metal, these sites will be developed as water tanks for multipurpose uses or as cattle troughs in consultation with the landowner and local villagers. The associated cost is included as the restoration cost of the selected quarries.

5.3.5 IMPROVEMENTS TO EXISTING AND ADDITIONAL BUS STOPS

Frequently, pavements are not widened for bus stops and in some locations the widening is utilised by waiting passengers. The result of these circumstances is that buses frequently stop in the travelled lane to load and unload passengers. Widening of pavement at bus stops to provide pull outs for the bus and delineating a passenger waiting area by using paving stones will provide more safety as well as improved traffic flow. Where possible, new bus stops with siting benches and drinking water facility may be added.

5.4 ANALYSIS OF ALTERNATIVES

Analysis of Alternatives has been carried out to compare proposed project interventions/sub-projects design, site, technology, and operational alternatives in terms of (i) potential environmental impacts; (ii) capital and recurrent costs; (iii) suitability under local conditions; and (iv) institutional, training and monitoring requirements. The environmental costs and benefits for each alternative (if any) are estimated to the extent possible. Economic values are attached if warranted and feasible. The alternatives examined included:

- Alternatives to the proposed Project Intervention
- "Do Nothing" Alternative
- New Alignment / Road Network Alternative
- Alternative Construction Materials
- Alternative construction Materials

5.5 FINDINGS OF THE CASE STUDY

Under the Feeder Road Improvement component, all the thirty-six (36) 1st year roads have been included for sample case studies. The sample size considered for GCM Improvement, Periodic Maintenance of
Feeder Roads, Large Bridge Construction, Ghat/Jetty Improvement, RR1 Improvement, and Small Structures on Rural Roads are 13, 4, 4, 6, 4 and 5 respectively. Comprehensive data/information were collected using descriptive environmental checklists, through participatory consultative process, comprising mainly Focus Group Discussion (FGD), Key Informants Interview. The major/key findings of the case study are presented hereunder.

5.5.1 FRB ROAD IMPROVEMENT

The key environmental issues of the FRB roads from their implementation are (1) agricultural land-loss from road widening/height raising/slope correction; (2) damage to batter slopes of the road embankment due to erosion from annual river floods, rain-cut and slope instability at the pond/canal/river locations; (3) Partial loss of roadside ponds from road widening/height raising (4) use of bricks as construction materials in roads (5) boat communication and navigation.

The potential loss of agricultural lands due to the proposed embankment widening is Irreversible. However, where possible, reduced batter slope of 1:1 to 1:1.5 in accordance with site soil conditions instead of 1:2 batter slopes has minimised the extent of this impact. Use of agricultural lands as borrow areas will be avoided on this project. The contractor will collect the sands/soils from barren land/riverbeds/chars for use in the road improvement.

Durability of Feeder Roads in Bangladesh is often questioned due to damage to the embankment's batter slopes during monsoon. Proper compaction of embankment soils along with grass turfing and plantation of erosion protective trees/long grass on batter slopes will be ensured for protection of road embankment against erosion. Construction of earth retaining structures (brick/RCC toe wall), gunny bag rip-rap along the batter slopes along the water bodies such as ponds, rivers, canals will also be considered, where necessary, to minimize impacts on the water bodies as well as to provide reasonable protection against major slope failure.

Loss of ponds from the road improvement would result in fish yield reduction affecting the nutrient intake of many rural poor. Reduction in pond loss has been suggested by construction of earth retaining structures/toe wall along the embankment at the relevant length.

Use of bricks in the construction of roads would result in loss of agricultural lands, reduction in fuel-wood, affect the health of the labors. Use of stones/rock aggregates has been suggested to eliminate these impacts.

Construction of bridges without navigation clearance would result in disruption in cheap waterway communication affecting the rural trading activities. It has been suggested to provide required navigation clearance while constructing the bridges over rivers/canals that are used as waterway communication route.

5.5.2 PERIODIC MAINTENANCE OF FRB ROADS

There is no major/key issue associated with the implementation of the periodic maintenance of the feeder roads. However, attention would be paid on such areas as slope stabilization of the sub-project roads, vegetation management, traffic management, and flooding condition of the area, while implementing the sub-projects.

5.5.3 CONSTRUCTION OF MAJOR BRIDGES

Implementation of the major bridges would require focusing on riverbank stability, approach road stability, navigation and boat communication, and agricultural lands. River bank is stable at the proposed locations of all the 4 investigated bridges; approach roads of two major bridges get damaged due to wave action of flood water; all bridges require a navigation clearance of 1-2m; and construction/improvement of the approach roads of these bridges would result in agricultural land-loss though in minor scale.

5.5.4 CONSTRUCTION OF MINOR STRUCTURES ON RURAL ROADS (SRRs)

Like major structures, implementation of the minor structures on rural roads would require focusing on bank-stability of the streams, approach road stability, navigation and boat communication, and agricultural lands. However it has been found that all the structure locations are stable; navigation clearance would be required only for one structure; all approach roads need slope-protection works to protect them from being
damaged due to erosion caused by wave action of flood water; and construction/improvement of the approach roads require permanently occupying agricultural lands.

5.5.5 GROWTH CENTRE MARKET IMPROVEMENT

The major/key environmental issues of the GCMs are: (1) lack of drinking water supply (2) lack of confirmation of water quality (3) lack of sanitation (4) lack of proper management of solid waste and slaughter wastes (5) poor drainage condition of storm water and tubewell water.

Lack of drinking water supply and confirmation of the water quality of the tubewells has severe health impact and for overcome of this problem it has been recommended to install required number of tubewells with confirmation of potable water quality (by testing on arsenic, fluoride, iron) while improving the markets. Arsenic is a big national issue in Bangladesh and it has been suggested to install tubewells at greater depth (more than 100m) to have arsenic free water in arsenic affected regions/areas of Bangladesh.

Installation of required number of sanitary latrines with provision of septic tanks/soak well as appropriate in the context of groundwater depth has been recommended.

For management of solid wastes that comprise of over 90% organic wastes (vegetable wastes mainly) and slaughter wastes (of cows and goats), income-generating option such as recycling of wastes through composting for organic fertilizer has been suggested. Some poor can find jobs in such recycling activities in rural areas. Moreover it would have a replication impact of such technology in the rural areas, which is seen as positive impact on agricultural soils.

Instead of construction of deep drains that are used as line garbage pits in the GCMs, internal road-cum-drains (a depressed internal road used as footway within the market that in addition to it serves the drainage purpose of storm water) have been recommended to construct.

5.5.6 CONSTRUCTION OF GHAT/JETTY

Implementation of the jetty/ghat construction requires improvement of the approach roads, construction of facilities for water supply and sanitation, solid waste management, electricity, multi-purpose sheds in addition to its construction of ghat/ghat (Landing, loading and unloading facility).

It has been found that out of 6 ghats, 3 ghats are located at the unstable bank requiring riverbank protection work at the proposed ghat locations; Construction of approach road for one ghat is required while the approach roads for the remaining 5 ghats require improvement; none of the investigated ghats has any facility for water supply, sanitation, solid waste management, multi-purpose sheds.

6. ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)

The purpose of the Environmental Management Framework (EMF) has been to establish the process and institutional arrangement requirements for the environmental management during planning, design, implementation and operation and maintenance stages of the project.

The EMF aims to ensure that (a) the sub-projects are subjected to an appropriate level of EA (b) the sub-project activities do not create any serious impacts on the local community and environment, (c) appropriate mitigation and enhancement measures are implemented adequately and effectively and (c) potential inconvenience to the local public during construction stage is minimized.

To achieve these objectives, the following strategies will apply (1) all the proposed sub-projects under each of the project components will be screened by LGED through the screening process and the results are documented properly. (2) The minimum mitigation measures are included in the bidding /contract documents as appropriate and the compliance will be monitored and the results recorded systematically.

6.1 ENVIRONMENTAL SCREENING AND ASSESSMENT FRAMEWORK

The main objectives of the environmental screening are (1) to identify the key environmental issues in the sub-projects; (2) to determine the magnitude of actual and potential impacts; (3) to ensure that environmental considerations are given adequate weight in selection and design of proposed sub-projects.
(4) to categorize the sub-project; and (5) to recommend the type of environmental analysis recommended for the sub-project.

Three levels screening process has been developed to appropriately categorize the sub-projects into three environmental categories (1/2/3) based on the environmental analysis and findings of the sample case studies undertaken by the LGED/PPC.

**Category 3:** Sub-projects that are likely to have minimal or short-term impacts on the environment and that can easily be addressed through standardized mitigation measures.

**Category 2:** Sub-projects that have some moderately significant environmental impacts, that are site-specific in nature, and do not significantly affect human populations or alter environmentally important resources such as wetlands, natural forests, prime agricultural area etc.

**Category 1:** Sub-projects that have potentially significant adverse impacts that are sensitive, diverse, or unprecedented, or that could affect an area broader than the sites subjected to physical works.

Any sub-project requiring mandatory environmental clearance from the GoB will fulfill all requisite conditions (including preparation of Initial Environmental Examination (IEE) and/or an EIA, if required by DoE) before such sub-project is taken up for implementation under the RTIP.

The environmental screening and assessment will result in mitigation and management plans that need to be implemented through the concerned LGED Executive Engineers and Upazila Engineers with the assistance of the EMU of the PIO (HQ) and the DSM Consultants. Close monitoring and supervision of their implementations will be ensured by the PIO / LGED in order to review and assess the effective and timely implementation.

The EMF includes Environmental Codes of Practice (ECP) and model Environmental Management Plans (EMPs) for each of the six project components viz. Feeder Roads Improvement, Rural Roads Type-1 (RR1) Improvement, Growth Center Markets (GCM) Improvement, River jetties (Ghats) Improvement, Feeder Roads Periodic Maintenance and Rehabilitation, major bridge construction. These documents would be used as guide by LGED/DSM Consultant to prepare sub-project specific EMPs or environmental specification clauses for incorporating into respective construction contract documents during the Design and implementation stage.

In order to address the environmental management requirements, sub-project specific EMPs have been prepared for all 37 feeder roads finalized for improvement for the first year works. The EA and preparation of EMPs for subsequent years’ work programs will be undertaken according to the recommendations in the EMF. It need not be over emphasized that community consultation and information disclosure would continue to form an integral component of the entire planning, design and implementation process including the EA process.

The proposed screening process has been shown in Table 6.1.

### 6.1.1 IMPLEMENTATION ARRANGEMENTS

A steering committee chaired by the secretary of the Local Govt. Division (LGD) of the Ministry of Local Government, Co-operatives and Rural Development will be established for overall Co-ordination and monitoring of the project. A Project Co-coordinator (PC) will be appointed to co-ordinate the project activities.

The planning, design and implementation of the sub-projects will be managed by two Project Implementation Offices (PIO) - each headed by a Project Director. The PIOs, designated as Central - North PIO and Central South PIO would be responsible for 12 & 9 project districts respectively. Similarly, two Design, Monitoring and Supervision Consultants (DSMC) would be engaged by the LGED to assist the respective PIOs in the design, monitoring and construction supervision functions of the sub-projects associated with the RTIP. All the civil works of sub projects would be executed by the LGED Executive Engineer or Upazila Engineers in their respective districts / upazilas through contractors. The DSM consultant would also assist the Executive Engineers / Upazila Engineers in supervision and monitoring of the works. Although most of the civil work contracts shall be implemented through the contractors selected

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2 Potential impacts that could be considered to be limited to construction period only.
Table 6.1: Screening Process for the Project

<table>
<thead>
<tr>
<th>Level</th>
<th>Basic of Screening</th>
<th>Project Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-determined categorization based on past cases findings and similar sub-projects</td>
<td>Feeder Roads Periodic Maintenance and Rehabilitation Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SRRs Construction Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural Roads Improvement Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GCMs Improvement Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural Jetties (Ghats) Construction Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feeder Roads Improvement Sub-projects</td>
</tr>
<tr>
<td></td>
<td>To be determined based on sub-projects anticipated criteria and scales of</td>
<td>Screening using a pre-determined criteria based on sub-projects' anticipated actions and scales of interventions</td>
</tr>
<tr>
<td>2</td>
<td>interventions and scale of interventions and sub-projects</td>
<td>SRRs having span 12m to 20m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 2 / 3 Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Screening using project component - Specific Screening</td>
</tr>
<tr>
<td>3</td>
<td>To be determined based on both sub-projects and extent of intervention and specific screening</td>
<td>Sub-projects having a bridge of more than 100m span</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-projects having a proposed bypass or a major re-alignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-projects having one or more bridges of span up to 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 1 Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 2 Sub-projects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 3 Sub-projects</td>
</tr>
</tbody>
</table>

Screening using project component - Specific Screening

Screening using project component - Specific Screening

Screening using project component - Specific Screening

Screening using project component - Specific Screening

Screening using project component - Specific Screening
through World Bank standard procurement procedure for such works, small labor intensive works such as ancillary earth works on rural roads associated with the SRR sub projects and road side tree plantation and maintenance will be undertaken through specially formed Labor Contracting Societies (LCS).

The Environmental screening and preparation of EA, and implementation of the environmental mitigation measures during the 5 year Design and Implementation period would be the responsibility of the EMU of the PIO. The EMU will comprise one Executive Engineer (Environment) and two Assistant Engineers (Environment) - each dedicated to one of the PIOs.

The PPC (Project Preparation Consultants) have been engaged by the LGED to assist the PIO (RRMIMP-II) in the project preparation until the appointment of the DSM Consultant. The Environmental, Social, Resettlement and Participation Specialists of the PPC have been responsible for preparation of the EA and SA as the TOR approved by the World Bank.

The DSM (Design Supervision and Monitoring Consultants) Consultants are to be selected through ICB and are expected to have in-house capacity to prepare EA, to advise on and to supervise the implementation of the EMF and the EMPs including making the decisions regarding environmental categorization or the sub-project, to assess the applicability of relevant ECP to the sub-projects, preparation of site specific environmental designs and modifications to the mitigation and enhancement measures, as necessary, during the sub-projects' implementation.

The DSM consultants will also document an Environmental Supervision Manual in the beginning of their contract to confirm the environmental supervision procedures and systems including inspection, monitoring and reporting mechanisms to be followed by each associated parties during the sub-project implementation.

The execution of the works including environmental management measures will be the responsibility of the contractors. It is expected that the contractor will have adequate environmental expertise to incorporate environmentally sound construction practices.

The overall institutional arrangements for implementation of EMF during the project preparation, and design and implementation stages are delineated in Table 6.2.
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>PIO</strong></td>
<td>Overall monitoring of the EA preparation and integration of EA recommendations into project designs and Implementation of the plans (bidding and contract documents)</td>
<td>Ensure Implementation EMF and compliance with load covenants</td>
<td>Overall monitoring of the EMP implementation and compliance to GOB environmental requirements and Bank’s loan covenants</td>
</tr>
<tr>
<td><strong>PCC</strong></td>
<td>Environmental analysis comprising background studies, environmental screening and case studies</td>
<td>Sub-project specific EMPs for 1st year works</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Model EMPs for each project component or type of sub-projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Incorporate EA recommendations into designs and implementation plans of 1st year works.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Finalise EA Outputs (EMF/EMP/ECP) based on recommendations of the Independent Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IR Consultants</strong></td>
<td>Independent Review of EA Process and outputs prepared during Project Preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upazila Engineer</strong></td>
<td>Assisted PIO/PCC during environmental surveys and Community consultation</td>
<td>Prepare Routing Slip for promised sub-projects</td>
<td>Assist XEN in supervision of the EMP/ECP provisions by the contractors</td>
</tr>
<tr>
<td><strong>XEN</strong></td>
<td>Assisted PIO/PCC during conduct of sample case studies including participation community consultation</td>
<td>Undertake Environmental Screening and/or Environmental survey</td>
<td>Supervise EMP/ECP implementation by the contractors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitor EMP/ECP implementation by the contractors and supervised by the UE</td>
</tr>
<tr>
<td><strong>DSMC Consultant</strong></td>
<td></td>
<td>- Assist EMU in review of Environmental Screening and Categorisation of prioritised sub-projects</td>
<td>Assist XEN in Supervision and Monitoring of EMP/ECP Implementation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Carry out LEA or EIA, as required by the Environmental Screening and Categorisation Framework</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Incorporate LEA or EIA recommendations into sub-projects design and implementation plans</td>
<td></td>
</tr>
<tr>
<td><strong>EMU</strong></td>
<td></td>
<td>- Review environmental screening and categorisation as submitted by the concerned XEN</td>
<td>In collaboration with DSMC, prepare and conduct training programs for LGED contractors’ field staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Monitoring EA preparation by DSMC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Ensure integration of EA/EMP recommendations into project designs and Implementation Plans by the DSMC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- In collaboration with DSMC, prepare and conduct training programs for LGED Engineers</td>
<td></td>
</tr>
<tr>
<td><strong>Contractor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Auditing Agency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>World Bank</strong></td>
<td>Review EA preparation by the LGED/PCC</td>
<td></td>
<td>Environmental supervision and review of further EA preparation</td>
</tr>
</tbody>
</table>

Note: Participatory community consultation will be essential activities at all stages of the project cycle.
6.2. ENVIRONMENTAL SCREENING OF SUB-PROJECTS

Applying the screening criteria developed for the EMF, environmental screening of the sample sub-projects has been undertaken to test the applicability of screening criteria, to confirm the suitability of the screening procedure and to ensure that the sub-projects to be implemented under the first year works program of the RTIP responds to the screening and assessment framework. The summary findings of the screening is presented below.

6.2.1 ENVIRONMENTAL MAPPING OF THE CASE STUDY SUB-PROJECTS

In order to determine the location sensitivity of the sub-projects at macro-level, all the sample case study sub-projects are first located on four (4) ecological maps (physiography, 1998 highest floods, wetland and ecological zoning maps). Micro-level mapping has also been undertaken based on the detailed field investigations of the sample sub-projects. While an alignment profile (roads) or site plan (markets, jetties, and structures) and hot-spot maps were prepared for the sub-projects other than the feeder road improvement, the topographic surveys maps of the alignment undertaken for the road designs were used for identifying environmental assets located along the feeder roads improvement sub-projects. Various environmental and cultural features in and around the site/alignment has been marked for individual site analysis. The sub-project wise environmental sensitivity maps and the environmental site analysis or hot-spot analysis findings are included in the respective component Case Study Documentation. It has been found that none of the samples are located in any sensitive area such as reserve or protected forests, wildlife sanctuary, internationally or nationally wetland identified for protection. However, part alignment of one of the feeder roads (Sariakandi - Chandanbasia road in Bogra district) runs over a flood protection embankment constructed by the BWDB after 1998 extreme floods.

6.2.2 CATEGORISATION OF THE SAMPLE CASE STUDY SUB-PROJECTS

Feeder Roads Improvement

Considering the type and extent of the activities proposed for different sub-projects depending on the project's strategy to bring the road to the standard FRB cross-section, the potential impacts could be far-fetched and must be looked into from a broader perspective. None of the sample case study sub-projects (Also First year Works program sub-projects) are located in any nationally or internationally known sensitive area. However, the sub-project may require substantial location specific information and data and could warrant a limited analysis to come up with suitable mitigative measures. Therefore, all three categories 1, 2, and 3 has been considered. For Category 3 sub-projects environmental survey would be adequate to identify key environmental issues and potential impacts or potential conflicts between the intended formation widening and road side environmental resources such as fish ponds, trees, wetlands located within the proposed road reserve and accordingly identify appropriate mitigation measures and good environmental practices as provided in the Environmental Codes of Practice for incorporation of the same into the sub-project designs and contract documents. For Category 2 projects, it is recommended to conduct a limited EA (LEA) and associated EMP for the candidate feeder road improvement sub-projects. In case, any sub-project falls under Category 1, it will require a full or detailed Environmental Assessment (EA) or Environmental Impact Assessment (EIA).

Based on the environmental sensitivity mapping and the information collected through detailed field investigations, all the feeder road improvement sub-projects samples (also first year works program sub-projects) have been subjected to environmental screening following the process and criteria developed and as presented above.

Environmental categorization of the FRB Road Improvement has been done applying selected screening criteria. It has been fond that out of 37 FRB Roads of 1st year works program 25 sub-projects fall under Category-2 and the rest 12 sub-projects fall under Category-3. This is because that most roads have typical problems, which are manageable through following best construction practices; and mitigation/preventive measures of the impacts are known and easily manageable; and also they do not have environmentally sensitive features.

Rural Roads Improvement

4 numbers of samples RR1 (Rural Road Type-1) Roads were studied. It has been fond that 2 sample sub-projects fall under Category-2 and the rest 2 falls under Category-3. This is because that the roads would not be widened and as such environmental issues are very limited and the mitigation measures of these
issues are known and easily implementable; and these sub-projects also they do not have environmentally sensitive features.

**Feeder Roads Maintenance**

All the 6 samples studied are in Category 3. As there is no widening or raising of the formation is involved, the potential environmental impacts are minimal and standard mitigation measures coupled with best construction practices would satisfactorily address these impacts.

**Structures**

Four large bridges (spans 30 - 75m) and 5 small structures (culverts) have been studied under the sample case study. It has been found that except one large bridge, which falls under Environmental Category-2, all other structures fall under Environmental Category-3.

**Growth Center Markets Improvement**

All the 13 markets studied have typical and more or less similar environmental problems, however theirs extent are different. It has been found that 7 Growth Center Market Improvement sub-projects fall under Environmental Category-2 and the rest 6 fall under Environmental Category-3. Unknown-ness of groundwater quality and mismanagement of solid wastes in the markets that may lead to the groundwater pollution are two important factors behind majority of the sample sub-projects falling under Environmental Category-2.

**River Jetties / Ghat Construction**

6 ghats were studied. It has been fond that all the ghats of the sample case study fall under Category 2. Again unknown-ness of groundwater quality is the prime factor behind sample sub-projects falling under Environmental Category-2.

### 6.3 ENVIRONMENTAL MONITORING, SUPERVISION AND AUDITING FRAMEWORK

To ensure that the Environmental Management Framework (EMF) is effectively implemented, and remains responsive to the changing environmental conditions, emerging concerns, recommended revisions and site-specific issues. It has been suggested to establish the Environmental Monitoring, Supervision and Audit Framework for the RTIP.

### 6.4 ENVIRONMENTAL MONITORING

Objectives of EMF will not be achieved through the collection of primary data, but rather through monitoring information collected through other Government Departments / Organizations, Local Govt. Bodies (TNO, Upazila Parishad, Union Parishad), Road Users Committee, and civil society sources. This will be ensured by a programmed monthly visit of the EMU Engineers to the sub-projects and having an interaction with these stakeholders, in addition to the ongoing information received directly to the EMU.

On the basis of this information, the EMU may recommend revisions to the EMF, and highlight local concerns to the Executive Engineers and Upazila Engineers. Details of changing conditions, emerging concerns, recommended revisions and local issues will be included in the quarterly reports provided to the Project Director / Project Coordinator, RTIP and the World Bank. The EMU may take necessary help of the DSM Consultants in undertaking its environmental monitoring functions.

### 6.5 ENVIRONMENTAL SUPERVISION

Supervision of EMF implementation will be conducted at two levels. At the district level, as part of its overall supervisory responsibilities, the Executive Engineers (XEN), will be required to ensure that the assigned Assistant Engineers (AE) and Upazila Engineers (UE) are correctly using the Environmental Screening Checklists and Screening Formats, and that the ECP/EMP recommendations are included in the construction contract documents of the approved sub-projects are implemented in a timely manner and correct reporting procedures/forms are being used by the contractors / supervisors. At the LGED, HQ level, EMU with the assistance of the DSM consultant will conduct six monthly supervision of EMF implementation by selecting representative samples of category 3, 2,and 1(if any) sub-projects.

### 6.6 ENVIRONMENTAL AUDITING
The Project Coordinator, RTIP will arrange for an environmental auditing through an external agency to assess the effectiveness of the EMF implementation. The external agency could either be an independent civil society organization or an independent Quality Assurance (QA) Consultant.

The principal focus of the audit will be to assess the extent to which the EMF has lead to the implementation of the environmental codes of practices and appropriate mitigation measures in accordance with the EMPs / Environmental Specifications in the sub-projects.

It is recommended that the environmental auditing agency must audit 15% of sub-projects under each of the 3, 2, 1 (if any) category. The representative sample sub-projects would be selected methodically ensuring regional representation and follow up of the preceding audit. To ensure effective follow up of the preceding audit, it is recommended that out of 15% samples, 5% sub-projects shall comprise those samples from the preceding audit program that have major non-compliance.

The cumulative impacts of large number of sub-projects being taken up under the project may be examined to attempt to evaluate the effectiveness of the proposed EMF system. The applicability, effectiveness and efficacy of the set of environmental codes of practices shall also be assessed and recommendation to be made to improve the ECP for various project components.

6.7 ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM (EIMS)

Number of sub-projects (approximately 2800) to be implemented over 5 years in 21 districts are to be documented with use of the process of collection, compilation, storage and retrieval environmental information regarding environmental surveys, screening and categorization, community consultation, EA preparation, periodic updates, environmental management monitoring and compliance related to each sub-project and the project at a whole has to be maintained effectively for initiating prompt action and effective implementation of the project, a user-friendly computer documentation system is required. The EIMS should be installed and maintained at the EMU / PIO level and be integrated with the overall project information system, which is already operational in the LGED.

6.8 ENVIRONMENTAL CAPACITY BUILDING AND TRAINING

The LGED has its headquarters in Dhaka but implements rural infrastructure works through offices in each of the 64 Districts – each headed by an Executive Engineer (XEN) – and in each of the 460 Thanas - each headed by a Thana Engineer (TE). One of the responsibilities of the TE is to provide technical advice and support to the local government bodies including the Thana Development Coordinating Committees (TDCC), the elected councils (Parishads) in each of the 4,451 Unions, and the Market Management Committees. The LGED is fully aware of the environmental implications of its rural infrastructure development works, and has a Programme to address environmental issues at the planning and design stages of its projects.

The proposed training programme should equip the members of the Environmental Management Unit (EMU) to understand and appreciate the EMF requirements, to prepare and review the screening reports, LEA, and EMPs; and to monitor the implementation of the EMPs. After completion of the training, they would expose senior members of the LGED to environmental and social issues associated with the rural transport and market improvement and maintenance sub-projects. Such a group of senior staff can then be given the responsibility of active dissemination of the culture of environmental / social consciousness and ethics within the rest of the organization.

The training modules to be worked out for the project need to be of relevance to the specific context of the LGED functions focusing on environmental good practices related to the following aspects: (i) Environmental Safeguard Policies of the World Bank (ii) Environmental Assessment for World Bank assisted Projects (iii) Erosion and Sedimentation Control Techniques (iv) Bridge and Culverts Construction and Maintenance (v) Earth retaining structures on rural roads (vi) Slope stability and re-vegetation of exposed earth (vii) Siting criteria for ancillary sites such as borrow pits, brick-fields, workforce camps, material storage yard, dumping sites etc. (viii) Planning and Design of Sanitation Facilities in GCMs (ix) Storm Water Management (x) Solid Waste Management (xi) Integration of Environmental Assessment with Project Design and Implementation Plans (xii) Participatory Consultation.

6.9 REPORTING SYSTEM
The reporting system during planning and design including environmental screening and categorization and EA preparation works of the sub-projects will operate linearly with Upazila Engineer reporting to the Executive Engineer and the Project Director, the Executive Engineer will report to the Project Director and the Project Director to the Chief Engineer, LGED. The DSM Consultants will report to the PIO.

The reporting system during construction will operate both linearly and laterally with the contractor reporting to the Executive Engineer/Upazila Engineer and the DSM Consultants, who in turn shall report to the EMU and PIO.

6.10 ENVIRONMENTAL BUDGET

As part of good engineering practices in the project, there have been several measures as erosion prevention, protection/avoidance of ponds, grass turfing, rehabilitation of borrow areas, tree plantation, road safety, signage, provision of temporary drains, etc. The costs for which have been included in the EMP budget for first year works sub-projects and will continue to be included in the EMP budget for second to fifth year works sub-projects associated with the RTIP. Only those items not covered under budgets for construction and RAP are shown in the EMP budget. The EMP costs include (i) Mitigation/Enhancement Costs (ii) Monitoring Costs (iii) Training and Seminar/Workshop Costs. In addition to the EMP budget, the establishment and operation of the EMU, consultancy fees for the environmental audit consultant, additional environmental training for the EMU staff, Union Parishad members, other environmental staff of PIO/LGED district and Upazila staff will have to be budgeted for. A provision of US $ 3 Million has been proposed.

6.11 PUBLIC AND STAKEHOLDER CONSULTATION AND DISCLOSURE

Participatory consultation is both an essential criteria and important strategy for an integrated environmental and social analysis process, the project design and implementation. As required by the Bank, views of the project affected people and NGOs have been fully taken into account during the project preparation and continue to form as a basis for design and implementation of sub-project throughout the implementation period of the RTIP. Participatory consultation process including an effective feedback mechanism and information disclosure has been developed and incorporated for implementation during the entire duration of the project. This has been documented under a stand-alone separate volume as "Participatory Consultation".

As required by the Bank, it will be ensured that views of affected/benefiting groups and NGOs will be fully taken into account and where it is not possible due to some practical reasons, the specific reasons will be identified and will be communicated to the concerned stakeholders including the affected people. Such consultation will occur, at a minimum, at selection of the sub-projects, during environmental screening, and assessment, if undertaken, and while formulating the EMPs. The relevant information prior to these consultation is a timely manner and in a form that is meaningful for, and accessible to, the groups being consulted. The information disclosure that will be adopted for the project is shown in Table 6.3.

<table>
<thead>
<tr>
<th>Stage of consultation</th>
<th>Information dissemination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Consultation</td>
<td>Documentation of a summary of the project description and objectives, and potential adverse effects of the proposed project.</td>
</tr>
<tr>
<td>(Nov., 2002)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Draft EA and SIA reports (English) at LGED HQ in Dhaka, World Bank (Dhaka and Washington) and LGED website.</td>
</tr>
</tbody>
</table>

7. ENVIRONMENTAL CODES OF PRACTICE

Several Environmental Codes of Practices (ECPs) have been prepared to define methods and/or procedures to be followed by LGED District and Upazila Engineers, Consultants, designers and contractors...
for the avoidance or mitigation of adverse environmental effects that may arise out of sub-projects. These codes will be used as the best practice guidelines.

8. ENVIRONMENTAL MANAGEMENT PLANS

8.1 MODEL ENVIRONMENTAL MANAGEMENT PLANS (EMPs)

Model EMPs for selected sub-projects, including a feeder road improvement, a feeder road periodic maintenance, a rural road improvement, a major bridge construction, a growth center market improvement and a jetty/ghat construction, have been prepared with an aim to guide the LGED / DSM Consultants to prepare sub-project specific EMPs, as necessary, during the design and implementation stage of the project. These model EMPs contains practical means (detailed specifications and contracting procedure) to implement the recommended mitigation measures; implementation schedule and supervision program; site supervision, inspection, monitoring and auditing arrangements; institutional arrangement, management and training as essential elements to be adhered to by the parties concerned.

For effective and timely implementation of the EMPs, Environmental Management Action Plan (EMAP) for each component of the project have been prepared. Each EMP incorporates such items as environmental impact/issue, mitigation measures, location of the impact/mitigation measures, timing of the implementation of the measures, responsible organizations for the desired implementation and supervision/monitoring of the implementation, and corresponding contract clause.

8.2 EMP FOR FIRST YEAR WORKS

In addition to the model EMP for each project component, sub-project specific EMPs for all thirty six feeder road improvement sub-projects to be implemented under first year works program have been prepared. The A sub-project EMP provides practical mitigation measures to address the following environmental impacts/issues of a sub-project: Pre-Construction Stage: (1) Clearance approvals and permits (2) Land and building acquisition (3) Training (4) Construction plants, machinery and vehicles (5) Work site survey, pegging and approval (6) Vegetation Clearance; Construction Stage: (7) Construction traffic management (8) Erosion (9) Sedimentation (10) management of stockpiles, spoil heaps and batters (11) Noise (12) Waste management (13) Impacts of bricks materials (14) protection of sensitive environmental issues (15) protection of vegetation (16) archeological sites (17) socio-environmental issues (18) embankment construction/widening (19) drainage (20) topsoil saving and re-use (21) disposal of materials (22) reinstatement of services (23) borrowpits (24) stockpilling (25) Workforce camps (26) Workforce management (27) Dust nuisance (28) Gaseous air pollution (29) Noise (30) siltation (31) alteration of drainage (32) partial filling of minor waterbodies (ponds/tanks/canals) (33) contamination from waste (34) contamination from fuels and lubricants (35) Sanitation nad waste disposal in construction camps (36) Increase in waterborne, insect-borne communicable diseases (37) cultural resources (38) Hazards and hazardous materials (39) Soil erosion; Post Construction Stage: (40) re-vegetation (41) Site decommissioning (42) Ancillary site rehabilitation Operational stage: (43) environmental monitoring (44) dust (45) vehicular air pollution (46) noise (47) safety and noise disturbance (48) contamination from spills due to traffic movement and accidents (49) Maintenance of storm water drainage system.

Provisions of periodic self audit by the contractors using a prescribed environmental checklist has been made to ensure that EMP is being implemented in accordance with the agreed specification.

The Engineer/DSM Consultant will undertake site supervision and inspection in conjunction with the contractor at pre-construction, construction and post construction stages of a sub-project.

Under each EMP, an Environmentai Monitoring Program has been prepared to ensure the effectiveness of environmental safeguards/mitigation measures during the construction period and beyond. The monitoring plan at construction stage focuses on the monitoring of dust, vehicular emission, noise pollution, water pollution, vegetation loss. It emphasises the importance on the monitoring of road batters, retaining/gabions/wing walls, drains, re-vegetation/plantation 1st year & 2nd year, erosion and sedimentation.

A compliance and reporting system to be followed by the contractor and the Engineer/DSM Consultant has been designed to demonstrate compliance with the Contract Specifications and the EMP.
Provision for records, audits and corrective action has been kept in a EMP where the contractor will keep EMP Records, the Engineer/DSM Consultant will do site audits, and the contractor will do corrective action(s) recommended by the Engineer/DSM Consultant in the time specified. The DSM Consultant will prepare a final audit summary at the completion of the contractor’s contract. In addition, an independent environmental audit will happen annually.

In the EMP, a provision for environmental training of the LGED engineers and staffs has been made to perform effective monitoring of the implementation of the designed EMP.

Moreover the EMP includes environmental enhancement measures, for roads, they are (1) rehabilitation of borrowpits/drainage ditches, improved access to community water supply, pond improvements, improvement of existing and provision of additional bust stops.

Finally the EMP incorporates the estimated budget required to implement the EMP.

9. RESETTLEMENT FRAMEWORK OF THE PROJECT

There are seven components of the RTIP such as (1) Feeder Roads Improvement, (2) Periodic Maintenance of the Road, (3) Rural Road Type-1 (RR1) Improvement, (4) Growth Center Improvement, (5) Construction of Jetty/Ghat, (6) Construction of Major Bridges on roads, (7) Construction of Minor Structures on Rural Roads. Land acquisition will be restricted only to Feeder Road Improvement inclusive of the structures thereon. It has analyzed that out of the total 37 first-year feeder roads of about 300 km spreading over 15 districts, 30 roads will need land acquisition of approximately 68 hectares that would affect approximately 5500 land-owner households and 11000 persons. The acquisitions for widening, wherever required, will mostly be in strips and the acquisition will displace households and business that may have been squatting on LGED and other public lands. As these and any other potential adverse impacts are to be mitigate according to the World Bank’s safeguard.

However, given that the magnitude of the acquisition and the impact details of the entire project, which are required to prepare a standard Resettlement Action Plan (RAP), it has been decided that LGED would instead prepare a Resettlement Framework (RF) for the entire project. The RAPs would be prepared separately for each phase after land acquisition needs and their locations are determined. The RF, as proposed contains (i) a legal framework outlining the principles and guidelines which will be used to acquire lands and mitigation of adverse impacts; (ii) a detailed mitigation policy matrix; (iii) an organization framework to plan and implement the mitigation measures; (iv) a grievance redress procedure for the project affected persons (PAPs); (v) a framework to monitor progress in land acquisition and RAP preparation and implementation. With this RF in place, the RAPs will basically include location-specific impact details and, if necessary, review/revision of the mitigation measures; resettlement budget and the implementation schedule.

The RF has been prepared by using the Bank’s Operational Policy on Involuntary Resettlement (OP 4.12) and the Acquisition and Requisition of Immovable Property Ordinance, 1982 of Bangladesh. As done in all Bank-financed projects, the RF has proposed to use the law to legalize the acquisitions as required in the present land administration system of the country. However, the principles and guidelines of the OP 4.12 have been used to plan and implement the impact mitigation policies. The following principles and guidelines will be used for land acquisition, formulation of compensation/entitlement policies, and planning and implementation of the resettlement activities.

9.1 LAND ACQUISITION AND MITIGATION PRINCIPLES

Minimizing Adverse Impacts: To the extent feasible, the project will consider alternative engineering designs to avoid or minimize land acquisition in order to minimize its adverse socioeconomic impacts on the people and communities. Under unavoidable circumstances, considerations will be made to (i) avoid or minimize displacement from homesteads; (ii) avoid or minimize displacement from buildings/structures used for permanent business/commercial activities; (iii) use least productive lands; and (iv) avoid acquisition of community facilities like educational significant, and the like.

Mitigation Principle: Where displacement unavoidable, resettlement of the project affected persons (PAPs) will be planned and developed as an integral part of the project, and will be implemented as a development program. In addition, the RF has used the following principles to determine the nature of impacts that would require mitigation and the PAPs who would be entitled to assistance under the project:
(i) absence of legal title will not be considered a bar to assistance, especially for the socially and economically vulnerable persons and groups; (ii) homestead-losers, including the households/persons squatting on public lands, will be given the options of physical relocation in designated sites or any locations they choose, and will be assisted with relocation; (iii) the project will rebuild or provide access to alternatives, where community facilities and affected; (iv) economically well-off persons who use their social and political influence to use public lands will not qualify for assistance; and (v) the project will not be used to collect arrear land development or any other taxes.

**Project Affected Persons:** (i) Owners with legal titles/agreements to the lands and other properties; (ii) squatters and others using public lands; (iii) users of vested and non-resident properties; (iv) sponsors/beneficiaries of development programs using public lands (e.g., economically vulnerable groups); (v) Persons with usufruct rights; and (vi) Communities/groups where impacts are community-wide. Certain guidelines will be used to determine eligibility of the affected persons for compensation/assistance.

### 9.2 COMPENSATION/ENTITLEMENT MODALITIES

**Impacts to be Mitigated:** Since the most preferred "Land-for-land" option is not feasible in land-scarce Bangladesh, the compensation for lands will be fixed at their replacement value, and for other affected properties at replacement costs or market price, which will qualify for compensation/assistance: (i) land of all kinds, (ii) all non-land assets, such as houses/structures, trees, crops and other immovable assets, that are situated on the acquired lands, (iii) physical relocation in cases of homestead loss, (iv) temporary income loss by business operators and their employees, (v) loss of rental income from houses/structures built on acquired private lands, and (vi) loss of use of vested and non-resident properties, which are not under lease. No compensation will however be paid for (i) acquired lands for which the affected persons do not possess legal titles acceptable to the Deputy Commissioner, (ii) equipments, machineries or parts thereof, which can be dismantled and moved away intact, (iii) loss of use of vested and non-resident properties under lease, and (iv) loss of rental income from houses/structures built on public lands.

**Cut-Off Dates:** Cut-off dates will be established to identify the non-land assets that will qualify for compensation, and to discourage attempts to abuse the mitigation policies by defrauding the project. These are the dates on which census of the affected persons and their assets are taken. No person or his/her assets will qualify for compensation unless they appear in the census taken on the cut-off dates.

**Compensation Payment:** Given that the existing law will be used to legalize the acquisition, a part of this compensation will be assessed and paid to the title-holding PAPs by the Deputy Commissioners (DCs—responsible for the acquisition). If the payment, 'compensation-under-law' or CUL, is lower than the replacement value/market price, LGED project office will directly pay the difference (top-up) to make up for the shortfall. The compensation/entitlement due to all other PAPs, who are not recognized by the law, will also be directly paid by LGED project office. **LGED will ensure that the compensation/entitlement due to the PAPs are paid in full before they are evicted from the acquired private and public lands.**

**Grievance Redress:** LGED will establish a grievance redress procedure to deal with various non-legal issues that may arise during preparation and implementation of the resettlement activities. They more often involve PAPs or affected assets missed by census/baseline surveys, and minor disputes concerning co-ownership, co-inheritance, etc of the affected properties. A Grievance Redress Committee (GRC) under each contract will try to resolve such issues amicably by bringing together the contestants. Decisions made by the using this mechanism will be binding on LGED. The GRCs will not provide legal advice to the contestants, and its proceedings will be recorded and monitored.

### 9.3 IMPLEMENTATION ARRANGEMENTS

The Project Implementation Office (PIO) at LGED, headed by a Project Director, will prepare and implement the phase-wise land acquisition and the resettlement action plan. In carrying out the resettlement activities, LGED will utilize its existing staff up to the Upazilla levels, and will appoint additional field staff under the project. The key LGED staff consists of an executive Engineer (XEN) in each district, a Upazilla Engineer (UE) and a surveyor, with other supporting staff at the Upazilla. The project will appoint a full-time District Sociologist (DS) in each district and a Community Organizer in each Upazilla. In these efforts, the PIO will be actively assisted by the DSM consultants by providing full-time services of an experienced Social Scientist, a Resettlement Specialist and a Land Acquisition/Implementation Specialist. As and when necessary, services of another sociologist and a participation specialist will also be available for planning and implementation of the resettlement activities.
Implementation Procedure: Land acquisition projects begin with the selection of the roads and other physical components and determination of the acquisition requirements and their locations, preparation and submission of the acquisition proposals to DCs, who then invokes the legal acquisition process. The RF clarifies all the major time-consuming steps in the legal process. Some of the process tasks, such as census of the affected persons and their assets, could begin only after identification of acquisition requirements and their exact locations on the ground. The RF clarifies all major tasks and steps in order for timely completion of land acquisition and RAP preparation and implementation.

Monitoring and Evaluation: The pre-requisites for land acquisition and RAP preparation are selection of the physical components, and determination of acquisition requirements and their exact locations on the ground. Monitoring will consist of an array of steps related to these tasks, and others involved in the process leading to commencement of the civil works. The project will set up and operate an integrated system by using verifiable indicators to monitor and report progress and performance, in terms of the integrated schedule of these tasks. The RF includes an integrated schedule with monitoring indicators and formats to report progress on land acquisition and RAP implementation.

9.4 LAND ACQUISITION AND RESETTLEMENT BUDGET

The major direct cost items are lands of all kinds, houses/structures, and standing tress, compensation for which will be paid at replacement/market price. There may also be a few items, such as temporary income loss, house construction grants, etc. which will add to the cost of resettlement. In addition, there are overhead and administrative costs, such as those for the project-financed LGED staff and the Design, Supervision and Monitoring (DSM) consultants. The budget provided in the RF for the entire project is based on the replacement/market value estimated for various items, which will be affected under the first phase works. Provision of US$9 million has been proposed for land acquisition and R&R activities under the project.