Government of the People's Republic of Bangladesh
Ministry of Local Government, Rural Development and Co-operatives
Local Government Division
Local Government Engineering Department (LGED)

City Region Development Project (CRDP)
ADB Loan No. 2695-BAN

Environmental Safeguards Assessment
Initial Environmental Examination (IEE) Report

KHULNA DRAINAGE AND FLOOD PROTECTION SUBPROJECT
Package Nos: CRDP/LGED/KLN/NCB/2012/W-01—07
Khulna City Corporation

July 2013

CURRENCY EQUIVALENTS

(as of 31 March 2013)

Currency unit	–	BDT
BDT 1.00	=	$ 0.0127
$1.00	=	BDT 79

ABBREVIATIONS

ADB	–	Asian Development Bank
CEO	–	Chief Executive Officer
CDIA		Cities Development Initiative for Asia
CRDP	–	City Region Development Project
DOE	–	Department of Environment
EARF	–	Environmental Assessment and Review Framework
ECR	–	Environmental Conservation Rules
EMP	–	Environmental Management Plan
GRC	–	Grievance Redress Committee
GRM	–	Grievance Redress Mechanism
IEE	–	Initial Environmental Examination
KCC	–	Khulna City Corporation
KCPA	–	Khulna City Planning Area
KMP	–	Khulna Master Plan
LGED	–	Local Government Engineering Department
LGI	–	Local Government Institution
MDSC	–	Management, Design and Supervision Consultant
NGO	–	nongovernment organization
NOC	–	no objection certificate
O&M	–	operations and maintenance
PIU	–	Project Implementation Unit
PMCU	–	Project Management Coordination Unit
RCC	–	Reinforced Concrete Construction
ROW	–	right of way
RPM	–	respiratory particulate matter
RSS	–	resettlement support staff
SPS	–	Safeguard Policy Statement
SWM	–	Solid Waste Management
UTM	–	Universal Transverse Mercator (coordinate)

CONTENTS

List of Tables

List of Figures

Appendices:

I. INTRODUCTION

A. Background

1. The Government of Bangladesh (GOB) has undertaken the City Region Development Project (CRDP) (the Project) with financial assistance from the Asian Development Bank (ADB) (Loan No. 2695-BAN) together with co-financing from KfW. The CRDP emphasizes economic growth in Dhaka and Khulna city regions of Bangladesh through (i) creation of an enabling environment towards improved governance and capacity building of the local governments, and (ii) prioritized investments in infrastructure sectors in the two regions. The objectives of CRDP are: (i) to improve the regional economic and social context through long-term development plans and investment programs, set within an institutional and regulatory context that will ensure implementation and review; (ii) to improve the capacity and mandate of local government to govern and to invest in improved economic activity at local level; (iii) to improve the economic context for sustainable commercial and industrial growth; and (iv) to meet the economic and social needs of the urban population, as an inclusive aspect of the CRDP. The Project is active in the following City Corporations: Dhaka City Corporation (North), Dhaka City Corporation (South), Narayanganj City Corporation, Gazipur City Corporation and Khulna City Corporation; pourashavas are: Tarabo, Sonargaon, Kanchon, Narshingdi, Kaliakoir, Singair, Manikgonj, Savar, Jessore, Jhikargacha, Mongla Port, and Nowapara, as well as in 36 smaller urban centers (in upazilas) of Dhaka and Khulna City Regions.

2. The Project is formulated to provide opportunities for replication of subprojects in other Local Government Institutions (LGIs) within the identified city regions. The initial environmental examination (IEE) for the proposed Khulna Drainage and Flood Protection Subproject conforms to the requirements of the Environmental Assessment Review Framework (EARF) prepared under the Project Preparation Technical Assistance (PPTA), and complies with Government environmental rules and the Safeguard Policy Statement (2009) of the Asian Development Bank (ADB).

B. Purpose of the IEE

3. The purpose of the IEE is to describe the assessment of environmental impacts due to the Subproject and to specify measures to address impacts. This is an IEE prepared during the implementation phase, since none was completed during the PPTA. The IEE is based on information obtained during detailed design, a review of subproject site plans; a field visit; and secondary data to characterize the environment and identify potential impacts. It contains the results of interviews and consultations with stakeholders. The IEE includes an environmental management plan (EMP) outlining mitigation measures and monitoring requirements. Environmental specifications will be included in procurement documents to support integration of provisions into construction.

4. The Subproject takes place within the built up environment of Khulna City within the area defined by the rivers to the east and the bypass road to the west. It involves construction of rectangular reinforced concrete construction (RCC) drains of varying sizes along streets, roadways, and back lanes; re-excavation (cleaning) and in some cases lining of existing drainage channels (khals); reconstruction or reconditioning of sluice gates; and construction of footpaths and light-duty roadways along drainage channels.

5. The subproject will be implemented by the Khulna City Corporation (KCC), which is owner. LGED and the MDS Consultant maintain offices at Khulna to support the

Khulna Drainage and Flood Protection Subproject, other subprojects at Khulna and subprojects at other locations in the Khulna Division.

C. Environmental Regulatory Compliance

6. Government of Bangladesh. The provisions for environmental protection and pollution control in Bangladesh are contained in the Environmental Conservation Rules (ECR) 1997. This legislation also provides the principal mechanism for assessing and mitigating the environmental impacts of projects. Projects are classified as green, orange, or red. Roadway and drainage improvements under the Subproject are categorized as Orange B category projects, in accordance with Schedule 1 of the ECR. The Department of Environment (DOE) has granted an Environmental Clearance Certificate to the CRDP that applies to all subprojects with the exception of those in the Red Category (water treatment plants and distribution line laying/relaying/extensions, landfills, and bus and truck terminals), by means of a letter No. DOE/Clearance/ 5194 /2013/180 dated 21/07/2013. .

7. Asian Development Bank. ADB categorizes projects as A, B or C depending on severity of impact and level of required environmental assessment, a process that is extended to subprojects. The Subproject has been categorized as B, necessitating preparation of an IEE with elements consistent with the ADB SPS: an EMP describing specific mitigation measures to be taken during construction and operation, monitoring and reporting requirements and procedures; requirements for information disclosure; the result of public consultations undertaken during subproject preparation; and a description of the grievance redress mechanism established under the Project.

8. The IEE report is prepared by the Project Management and Coordination Unit (PMCU) for review by the ADB. Reporting on the findings of subproject IEEs will be made available by ADB via the depository library system and the ADB website.

II. DESCRIPTION OF THE PROJECT

A. Subproject Scope and Components

9. The subproject aims to improve existing problems related to drainage, waterlogged areas, and flooding in Khulna City. Construction of roads/footpaths follow on the traditional and appropriate approach of combining drainage channels and pedestrian arteries. In nearly all cases the proposed works are replacements of existing degraded and undersized drainage features. In the few cases where new features are being installed, these are done along open easements adjacent to roadways. The drainage improvements to be installed under the subproject are listed in Table 1.

Table 1: Khulna City Drainage and Flood Protection Improvements

Package	Lot	Description	Total Length (m)
1	1	a) Construction of RCC drain from Natun Rasta to Abu Naser Hospital Right Side (Ch. 500 - 1315m); b) Construction of RCC Drain starts from Doulatpur Railgate to Kuli Bagan Rail Bosti (Ch.0 - 612m); and c) Construction of RCC Drain starts from Doulatpur Railgate to Kuli Bagan Rail Bosti (Branch Drain) (Ch.0 - 093m)	1,520
	2	a) Construction of RCC Drain start from cemetery road A/C intersection (Dakbangla Mour) to Shamsur Rahman Road (Ch.0 - 455m); and b) Constructions of RCC Drain start from Dharma Shava mour to Press-Club & Dharma Shava mour to Cemetery Road (Ch.0 - 200	655
	3	a) Construction of RCC Drain starts from Natun Rasta to Abu Naser Hospital (Left Side) (Ch 100 - 1311m); and b) Construction of RCC Drain Starts from Khalishpur to Bastuhara via Gowal Khali (Ch. 200 - 710m) and a branch drain (Ch.0 - 245m)	1,966
	4	a) Construction of RCC Drain starts from Khan Jahan Ali road side drain(Castle Salam to Rupsa Square (Ch. 0 - 500m); and b) Construction of RCC Drain Starts from Rupsha Mour to Shilpokala Academy (Ch. 0 - 172m)	672
2	5	a) Construction of RCC Drain start from Dakbangla mour to Bhairab River (Ch.0 – 650m); b) Construction of RCC Drain start from Picture Place morh to Banibabu road (Ch.0 – 350m); c) Construction of RCC Drain start from Jibon Bima Bhaban to Mujib Shoroni Road. (Ch.0+00 - 0+200m) d) Construction of Mandar Khal start from Al-Amin more Mohila Madrasha to Moyur River. (Ch.0+00 - 0+460m)	1,660
3	6	Construction of RCC drain and lining of Matiakhali khal (Ch. 0 - 1680m)	1,680
	7	Re-excavation & Construction of RCC drain and lining of Khatrokhali Khal (Ch. 0 - 1700m)	1,700
	8	a) Construction of RCC drain of Labonchara Gora Khal (Ch. 0 - 557m); b) Re-excavation of Labonchara Sluice Gate-1 (Ch. 0 - 950m)	1,507
4	9	a) Construction of RCC Box drain (Ch.0+000 - 0+270) and excavation(Ch.0+270 - 0+320) on Tamizuddin Khal b) Re-excavation and Construction of RCC Drain in Gollamari North Khal (Ch.0+000 - 0+060m)	380

Package	Lot	Description	Total Length (m)
	10	a) Re-excavation and Construction of RCC Drain in Rayer Mohal Bazar Khal.(Ch.0+000 - 0+120m) b) Re-excavation and Construction of RCC Drain in Rayer Mohal Bazar Road Link Drain.(Ch.0+000 - 0+065m) c) Re-excavation and Construction of RCC and CC Block Lining Drain in Rayer Mahal Mollapara Khal (Ch.0+000 - 0+600m)	785
	11	Re-excavation and Construction of RCC Drain in Batkimari khal (Ch.0+000 - 0+785m)	785
	12	a) Re- excavation of Bastu Hara Khal (Ch.0+000 - 1+900m) b) Re-excavation of Taltola Khal (Ch.0+000 - 0+770m)	2,670
	13	a) Re-excavation and Construction of RCC and CC Block Lining Drain in Nirala Prantic Khal (Ch.0+000 - 0+875m) b) Re-excavation and Construction of CC Block Lining Drain in Nirala East Khal (Ch.0+000 - 0+600m)	1,475
5	14	Mayur River Re-excavation	5,900
	15	Hatia River Re-excavation	5,796
	16	Khadiar Khal Re-excavation	7,300
	17	Re-excavation of Choarichora Khal, Labon Chora Khal Sluice Gate-2 Khal, Horintana Khal	4,690
6	1	Footpath along the Mayur river	N/A
	2	Footpath cum road along the Hatia river	N/A
	3	Footpath cum road along the Khadiar Khal	N/A
7	4	Footpath cum road along the Khatro Khal, Labon Chora Gora Khal, Matia Khali Khal, Labon Chora Khal Sluice gate-1 Khal, South Labon Chora Khal	N/A
	5	Footpath cum road along the Choarichora Khal, Labon Chora Khal Sluice Gate-2 Khal, Horintana Khal	N/A
	6	Footpath cum road along the Bastuhara Khal, Rayer Mohal Mollapara Khal, Nirala Khal, Nirala East Khal, Printik Khal, Taltala Khal, Tamizuddin Khal, Gollamari Khal, Batkimari Khal	N/A

B. Description of Improvements

10. The environmental staff of the PMCU along with Executive Engineer, CRDP, KCC visited and inspected subproject improvements, which provides the basis for the following descriptions. Photographs of representative installations illustrate the basic purpose and issues at stake.

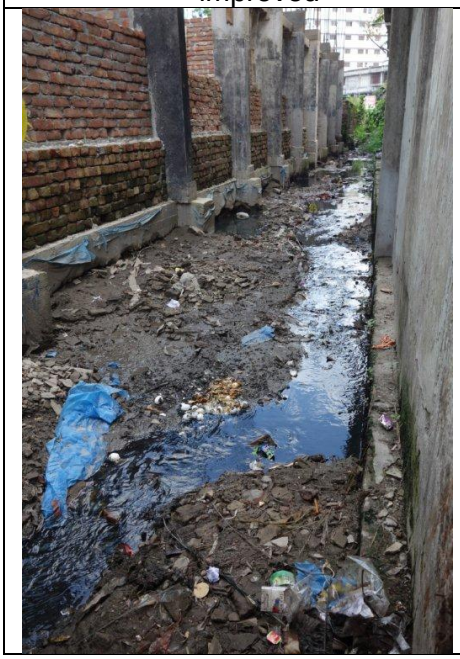
11. Lot 1 (under Package 1) consists of a 0.6 m wide slot drain to replace an existing drain along the frontage of shops on a roadway in Nazari (Ward 1) (Lot 1b); a slot drain to reduce waterlogged conditions in a low income settlement (Lot 1c); and a drain along the Old Khulna - Jessore Road to connect to an existing rectangular drain (Lot 1a). Current conditions at Lot 1b, 1c and the existing point of discharge are shown in Figure 1. These conditions are representative of numerous locations throughout the project area.

Figure 1: Existing Conditions at Interventions Lot 1

a) 1b Minor Slot Drain to be replaced	b) Waterlogged Area improved by Drain	c) Existing Point of Discharge
		

12. Lot 2 (under Package 1) consists of a 800 mm wide rectangular drain (Lot 2a) constructed in a densely populated area (see Figure 2); and construction of a covered slot drain (Lot 2b) at the front of commercial shops connected to the main drain. The large drain, open at the top, will replace the current 'natural flow' between buildings and walls that currently serves to drain the area. The improved drain will discharge to an existing rectangular drain.

Figure 2: Lot 2 & 3 Existing Conditions

Drainage conditions to be improved	Alignment of drain Natun Rasta to Abu Naser Hospital (Left side btwn wall & Pole)
	

13. Lot 3 consists of connecting open rectangular drains of the type installed along roadways in a generally sparsely populated commercial and institutional area in the northwest sector (Ward 3). There is little interference to the construction of these drains.

The Lot is connected with Lot 12a, which is the continuation of routing of the drainage, requiring cleaning of Bastu Hara and Taltola Khals, providing connectivity to the main internal drainage composed of Khudiyar Khal, Mayur River and their connectivity to the Rupsha River at the south extremity of Khulna.

14. Lots 4 and 5 involve construction of slot drains (covered, narrow gauge rectangular drains) in commercial areas of the City, where real estate values are high yet drainage is poor (Figure 3).

Figure 3: Lot 4 & 5 Existing Condition

4.a: Castle Salam to Rupsha Aquare	4.b: Rupsha Mour to Shilpokola Academy
	
5.a: Dakbangla mour to Bhairab River	5.d: Alamin mour to Mayur River
	

15. Lots 6, 7 and 8, comprising Package W-03, are aimed at improving drainage in a interconnected complex of khals, some gated, along the bank of the Rupsha River in the southern part of the City (Figure 4). In general, khals will be re-excavated (cleaned), and in some locations lined with geotextile overlain with concrete block. An open topped rectangular drain will be constructed to replace the earthen embankment for the Khatrokhali Khal. At one location, a sluice gate will be refurbished and the structure may possibly be rebuilt, depending on a detailed evaluation during the design phase. Lots 9 through 13 require in part construction of open-topped rectangular drainage channels in open areas, similar to those described previously. A second aspect of these lots requires re-excavation of existing drainage structures (open box drains) and natural channels (khals) to remove built up sediment, and in some locations, channel protection through use of geotextile fabric and concrete block. In a similar manner, Package No. W-06

consists of three lots involving re-excavation of the major natural drainage features that course from north to south on the western edge of the City, the Mayur and Hatia Rivers and Khadiar Khal.

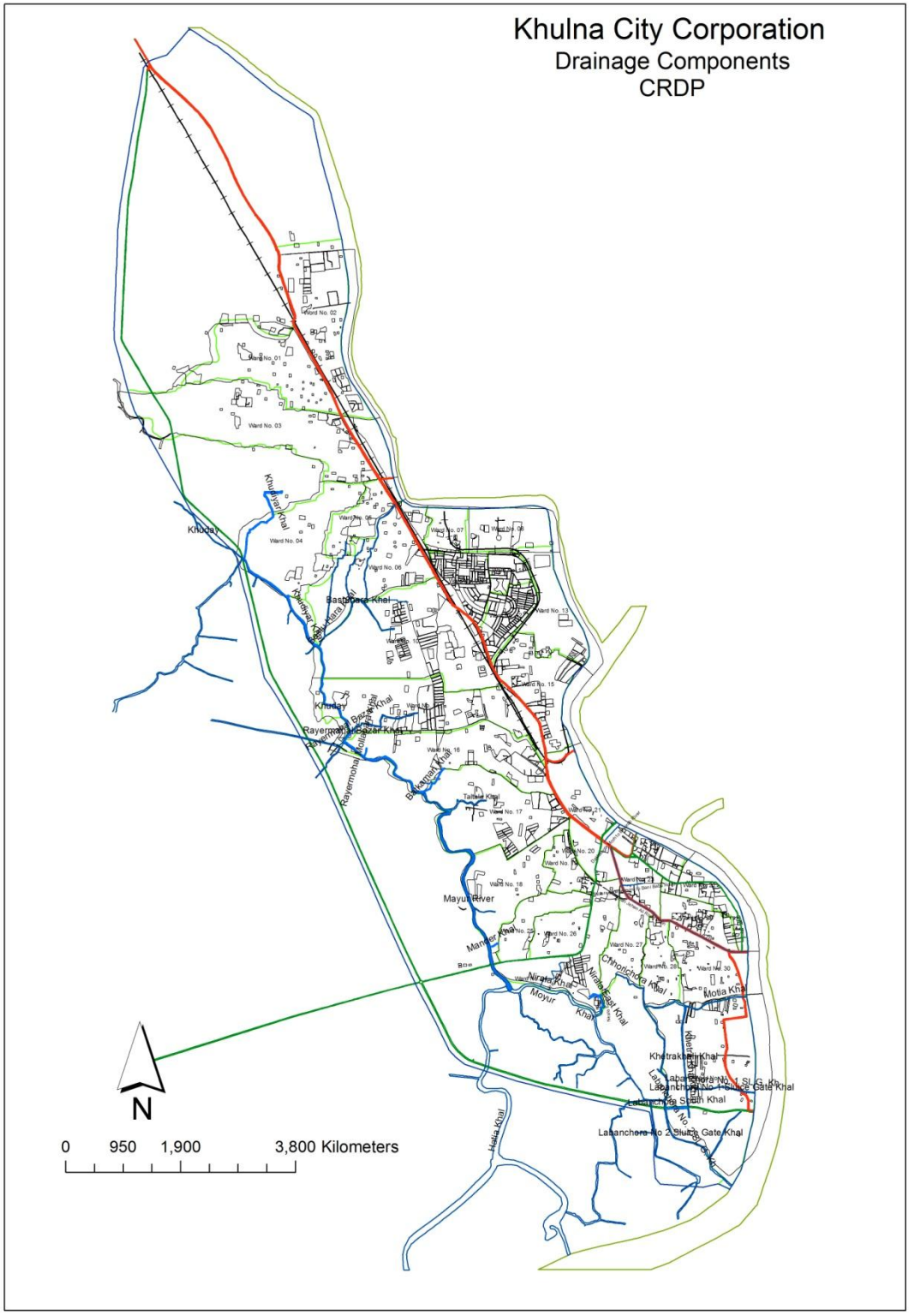
Figure 4: Lot 6, 7, 8, 12, 14 Existing Condition

Lot 6: Matiakhali Khal	Lot 7: Khatrokhali Khal
	
Lot 8.a: Labonchara Gora Khal	8.b: Labonchara Sluice Gate Khal
	
Lot 12.a: Bastuhara Khal	Lot 14: Mayur River
	

16. The cleaning of built structures and re-excavation of natural khals will generate approximately 2,031,400 m3 of materials consisting of plant growth (water hyacinth) and soil. Hyacinth and other plant matter will be stockpiled, allowed to dry and burnt. Excavated soil will contain variable organic and water content, including deposits from septic tank overflows and latrines, and some solid waste. The general approach for handling these materials is to excavate using a bucket excavator, stockpile the materials adjacent to the location and allow them to dewater, and then to dispose of them at designated disposal areas. Three areas have been identified for this purpose, and will be used in proportion to their proximities to sites of generation (see Sec. IV.B for identification of sites).

17. Drawings illustrating typical designs for rectangular box drains, slot drains, channel cross-sections and bank protection can be found in the feasibility study for the subproject. A map showing the location of the subproject, with general reference to the improvements, is shown in Figure 5.

Figure 5:- Khulna Drainage and Flood Protection Subproject



III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location

18. The location for the subproject is the jurisdictional area of Khulna City (the 3rd largest city in Bangladesh) some 333 km by road south-southwest from Dhaka, at 22°49′0″N 89°33′0″E, on the banks of the Rupsha and Bhairab river. It is the 2nd port entry in Bangladesh. It covers a total area of 59.57 km² and composition of 31 wards. All the proposed improvements are located within the City Corporation boundaries, and most fall within what can be considered urban landscapes, with the balance located in peri-urban, or semi-rural environments.

2. Topography, Soil and Geology

19. The area is generally flat and poorly drained. Soils are somewhat porous allowing for some seepage of surface water into the soil. Channelized drainage covers most of the land, in which slowly draining streams transport surface runoff to the Bhairab and Rupsha Rivers.

3. Climate

20. Climate of Khulna is humid during summer and pleasant in winter. Khulna has an annual average temperature of 26.3 °C (79.4 °F) and monthly means varying between 12.4 °C (54.3 °F) in January and 34.3 °C (93.7 °F) in May. Annual average rainfall of Khulna is 1809.4 millimeters (71.2 in). Approximately 87% of the annual average rainfall occurs between May and October.

1. Air Quality

21. No information is available on local air quality. While there are some industrial activities in Khulna, these do not likely contribute appreciably to degradation of air quality. Traffic and dust pollution add to ground level particulates in urban areas.

2. Surface Water

22. The city drains both to the east and the west with the watershed being provided by the railway embankment and Khan Jahan Ali Road. On its eastern side, a long, narrow strip of land (around 9 sq km) drains directly into the Rupsha/Bhairab river. The majority of the city however drains westward into the Mayur river and connecting khals, which in turn connect to the Rupsha River at the southern edge of the City. The city's drainage system is extensive consisting of just under 420 km of which 45 km are main (carrier) drains, 290 km are concrete secondary and tertiary drains, and the remainder are part- or wholly-earthen. Most of the concrete drains have been constructed over the past 20 years.

23. The Cities Development Initiative for Asia (CDIA) support to Khulna City Corporation (KCC) (TA No. 6293 (REG)) reports that "Khulna's drainage network has developed in an unplanned manner, is not properly integrated, is generally in a poor state of repair and suffers from inadequate routine maintenance. As a result, large parts of the city, including much of the commercial core, experience regular and extensive flooding during the monsoon season. [It is estimated] that 70% of the city was prone to flooding in 1991 with over half the households in the city [are] affected by regular flooding and 9% being flooded more than 10 times every year. The Khulna Master Plan (KMP) report identified the whole of Khulna Sadar Thana (containing both old and new commercial centers) and large parts of Khalishpur Thana (the second most populous with several major employers) as being prone to regular flooding and almost two thirds of households having no proper drainage in and around their premises; 40% of slums households experienced severe or regular flooding."

Table 2: Climate data for Khulna

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	25.6 (78.1)	28.5 (83.3)	33.1 (91.6)	34.6 (94.3)	34.3 (93.7)	32.9 (91.2)	31.8 (89.2)	31.8 (89.2)	32.0 (89.6)	32.0 (89.6)	29.9 (85.8)	26.5 (79.7)	31.1 (88)
Average low °C (°F)	12.4 (54.3)	15.4 (59.7)	20.5 (68.9)	23.9 (75)	25.2 (77.4)	26.1 (79)	26.0 (78.8)	26.2 (79.2)	25.8 (78.4)	24.1 (75.4)	19.6 (67.3)	13.6 (56.5)	21.6 (70.9)
Precipitation mm (inches)	13.3 (0.524)	44.4 (1.748)	52.1 (2.051)	87.5 (3.445)	200.0 (7.874)	335.6 (13.213)	329.8 (12.984)	323.5 (12.736)	254.7 (10.028)	129.8 (5.11)	32.1 (1.264)	6.6 (0.26)	1,809.4 (71.236)
Avg. rainy days (≥ 0.1 mm)	2	3	3	6	11	14	17	16	13	7	2	1	95

Source: Weather Base

3. Groundwater

24. Groundwater is saline above depths of 200 m, and arsenic is present in some aquifers. Saline water infiltrates from rivers in the dry season that are saline. More work is needed to understand the dimensions of the problem.

B. Ecological Resources

25. Urban ecology dominates much of the project area, with outlying areas having typical homestead and roadside vegetation. Trees growing at homesteads also provide fuel wood, fodder and other products. A large number of multipurpose trees (fruit, timber, fodder, medicine) are grown in the area. Other than common birds (crows, sparrows, shaliks, cuckoos etc.), no wild animals inhabit the area. Aquatic habitats are common in the project area due to the numerous freshwater lowlands, ponds, wetlands and rivers coursing through the area. Fish diversity in rivers and streams is expected to be decreasing due to surface water pollution from domestic and industrial effluents, though no data are available to support this presumption.

C. Economic Development

1. Land Use

26. Khulna is Bangladesh's third largest city, with a current estimated population of around 1.17 million. Historically the city developed in a north-south linear pattern along the rivers but more recently new development has increasingly occurred to the west between the urban fringe and the western bypass. This population includes the current KCC area (around 960,000 people) and extended areas to the north, west and south. This enlarged area has been termed the Khulna City Planning Area (KCPA). Physical growth has been slow due to a combination of factors: the lack of easily developable land (virtually all new land has to be filled), poor road access to urban fringe areas (few new roads have been built in recent years), a slow rate of economic growth and poor access to housing for much of the population. As a result, the overall urban density (67,994 per sq km) is high by South Asian standards. It is estimated that since 1991, around 85% of new housing has been accommodated within existing urban communities.

2. Industry and Agriculture

27. Khulna has a number of industrial activities that have grown out of its resource base, including fish and shrimp processing, jute mills and wood products industries. Most agricultural production within the project area is home based. A number of large scale industrial units were set up in this district during the period of 1950-70. These industrial units are located mainly in present Khulna City Corporation and its adjacent areas. Khulna Newsprint Mills Ltd, Khulna Hardboard Mills Ltd, Khulna Textile Mills Ltd, Khulna Power Station and seventeen jute mills were established by the bank of Bhairab river. Another important industrial unit - Khulna shipyard Ltd was established in 1957. But now, Khulna Newsprint Mills, Textile Mills and a number of jute mills have already been closed as per government decision. On the other hand, Khulna shipyard Ltd was handed over to Bangladesh Navy for operation.

D. Social and Cultural Resources

1. Demography

28. Most of the people in Khulna are Bengali, as is the case in most of Bangladesh. The long-standing inhabitants of the city are known as Khulnaia and they have a distinctive dialect. Apart from them, the city population is composed of people from the neighboring districts and from Barisal & Faridpur regions of Bangladesh. A large number of people from greater Comilla & Noakhali region also reside in the city. Khulna also has a significant number of Bihari population. Approximately 73 % of the people are Muslim, with 26 % Hindu and about one percent Christian.

2. Educational Facilities

29. Khulna has many prestigious educational institutions. Govt. Brajalal College is the oldest institution of higher education in the city, founded in 1902. Khulna University is the only public university in Bangladesh where student politics is strictly prohibited. Also there is an engineering university, the Khulna University of Engineering and Technology (KUET) and a medical college Khulna Medical College (KMC).

3. History, Culture and Tourism

30. The Sundarbans (world's largest mangrove forest), the home of Royal Bengal Tiger a UNESCO World Heritage Site, is a large coastal flooded forest that lies to the south of Khulna. As per myth, there was a shrine called Khullaneswari temple on the bank of the Bhairab river (about one and a half kilometers to the east of the present Khulna city) and the area is called Khulna after the name of Khullaneswari.

IV. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Planning, Location and Design

31. The interventions proposed under the subproject are the outcome of planning initiated under the Cities Development Initiative for Asia (CDIA) (TA No. 6293 (REG)) as well as other studies focusing on climate change adaptation (Strengthening the Resilience of the Water Sector in Khulna to Climate Change), and a local drainage improvement project managed by KCC called "Development of Infrastructure Facilities, Drainage Network System and Water Supply System for Khulna City". Under the CDIA, which provides the main planning context for the subproject, the old and new commercial districts as well as slum areas were targeted for drainage improvement. All the proposed improvements have been identified through field work to verify that there are downstream points where flows can discharge freely.

32. The typical designs for drainage appurtenances follow the standard approach used in Bangladesh. Existing street drains will be replaced where the old structures are broken and worn, sediments will be removed from channels, and natural drainage channels will be shaped and embankments contoured. These are essential periodic improvements given that facilities degrade over time. Remediation work will upgrade facilities through use of a higher construction specification, and better quality control, than what was used initially.

33. Sufficient planning has gone into the targeting of improvements to assure their usefulness and functionality within the overall drainage scheme for Khulna. There are no adverse impacts that need to be counteracted through alternatives in the planning, location and design of the facilities.

B. Construction

34. Construction presents the greatest potential for the subproject to cause adverse impacts. These are generally associated with safety, convenience, and local air quality impacts (dust). Impacts associated with excavation of sediments from channels are a special concern on the subproject. Most construction impacts can be mitigated through environmental measures that are set out in the construction contract tender documents. Additional provisions are set out for handling excavated materials in a manner that limits the effect of the activity on local people and environmental quality.

35. Construction specifications address the following key areas: worker provisions; use of land for construction purposes; community health and safety; site conditions, materials handling and haul routes; and handling, transport and disposal of excavated materials. A set of these provisions for use in the subproject tender documents is found in Appendix 2.

36. Worker Provisions set out in construction insure that the GOB and ADB policies are complied with regarding employment and worker health and safety, and insure that other aspects of worker provisions are met, such as availability of first aid equipment, potable water services and other facilities at the jobsite. Since the work is done under National Competitive Bidding (NCB), and firms are likely to be based in Khulna, or if not, to obtain workers using Khulna-based labor contractors, there is little likelihood that worker housing will be necessary. Workers will be hired locally, and will travel to the job site from their homes on a daily basis. In any event, construction crews are not expected to be large for any of these packages, consisting of at most 20-30 on any single lot.

37. Use of land for construction purposes requires that local authorities be consulted on locations for storage yards, drying areas for sediment, and other temporary land requirements. Approval must be obtained from landowners for temporary use and payments,

if required, made to legitimate owners. Disposal of wastes at construction or temporary use sites is prohibited, and final cleanup of sites is required.

38. Community health and safety provisions relate to transport of materials along roadways, accident prevention, dust and noise control and use of flagmen to control traffic flow in the construction zone, as follows:

1. Consecutively perform construction on segments of drains and excavation of khals of no longer than 100 m in built-up or settled areas, and complete each length, including removal of waste and debris, before moving to the next length.
2. Locations for storage of equipment will be approved in advance by the PIU.
3. Provide temporary access to shops and homes.
4. Provide passage through the construction area for pedestrian traffic in commercial areas and near schools.
5. Employ flagmen to control traffic flow through construction zones in settled areas and narrow roads that may be blocked due to convergence of oncoming vehicles.
6. Sand for concrete mixing and for fill should be hauled to sites in covered dumps.

39. In order to maintain safe and environmentally acceptable site conditions, the Contractor will provide a Site Environmental Management Plan for conducting work in the construction zone that minimizes interference with ongoing activity, noise and air pollution, congestion and visual impact.

40. The Contractor should close newly installed drains as quickly as possible (e.g. install covers on slot drains) and use other means to limit the amount of dirt that enters the drain. The contractor at completion of the work should turn over to the KCC a newly installed drain free of obstruction and significant amount of dirt or silt deposits.

Handling, Transport and Disposal of Sediments

41. The methods for handling, transport and disposal of sediments excavated from drainage works and khals is dictated by the needs of the job and spatial constraints. This aspect of the work has the potential to interfere with pedestrian and vehicular access, generate dust and odors that are a nuisance for local residents and businesses, and adversely affect public health.

42. The PIU proposes that materials will be excavated, either by hand or by machine depending on the situation, and allowed to dewater and to partially dry in adjacent spaces while construction proceeds (as with a concrete drain) or further excavation proceeds down the line on a natural drainage channel. Materials can be classified into three types:

- Sludge and sediments built up in existing concrete drains and in natural channels, with high initial water content, high organic content, and the potential presence of pathogens and industrial contaminants. These are Class A Materials because of their potential health impact and nuisance to the community.
- Soil that is excavated for formwork during construction of drains, and soil excavated to widen and deepen natural drainage channels and khals. These are Class B Materials because of possible mixing with Class A Materials.
- Rubble and other forms of construction debris from the removal of existing drains. These are Class C Materials and pose insignificant impact.

43. Class A Materials are likely to have a high water content when excavated, and water will need to drain from the mass of materials before it can be transported from the location. Class B and C Materials will be drier when excavated, and therefore can be removed sooner.

44. There are three sites designated for disposal of excavated materials. Photographs showing these sites are in Figure 6 :

- Site 1: A 10 ac site to the south of the City at UTM 45 Q E 763497 X N 2519657, which is currently a low-lying area owned by the KCC at Mouza Mathabhanga used occasionally for growing jute
- Site 2: The KCC sanitary landfill at Sholua UTM 45 Q E 756588 X N 2523015 along the Khulna –Satkhira Rd west of the City
- Site 3: The area adjacent to the Mayur River planned for a linear park at UTM 45 Q E 760781 X N 2533702.

45. Guidelines for handling, transport and disposal of these materials are as follows:

1. All materials, upon excavation or demolition, should be segregated according to their class and handled separately.
2. Class B Materials from construction of small drains (and Class C rubble from old works) should be removed on the day the materials are excavated, or during the following night. Class B Material required for backfilling at the location should be stockpiled out of the way of traffic.
3. Class A Material from existing drains in urban areas may be allowed to dry for a period of two days prior to removal, but should be covered with plastic sheeting in the event of rain.
4. Class A Material (sediments and sludge) excavated from khals and rivers can be allowed to dewater and dry in the available space for a period of up to one week before removal. These materials should not be excavated during the rainy season due to the potential for materials to block access for an extended period.
5. A clear path of access for three-wheeled vehicles, rickshaws and pedestrians should be maintained around stockpiles. The amount of sediment stockpiled at a location is limited by the need to maintain passage through an area.
6. Class A Materials should be sufficiently dry or loaded into sealed dump trucks that will not leak materials onto roadways. Trucks should not be overloaded or cause spillage onto roadways; if there is potential for blowing dust, loads should be covered. Haul routes should be agreed in advance with the PIU.
7. Class A Material should be disposed of only at Sites 1 or 2.
8. Class B Material excavated from Lot No. 1 under Package W-06 can be deposited at Site 3 to raise its elevation in preparation for further development of the proposed linear park.
9. Materials will be disposed of only at approved locations, or at other locations identified by the PIU and agreed to by the PMCU.
10. The contractor must assure sufficient work force to maintain access and to remove materials in a timely manner.

C. Operations Phase

46. The project will improve drainage in an area populated by urban and peri-urban communities. The KCC should regularly inspect and maintain the drains by removing residual dirt and repairing broken concrete work, including the covers of drains, so that the drains do not become clogged and so that they continue to function as originally intended. KCC should:

- Establish a program of regular visual inspection to identify problems early, before they become critical (breakage, plugging, etc.)

- Perform repairs on street drains promptly, and clear sediment and other material that could cause blockage. Limit entry of waste oil and grease to drains.

Figure 6: Disposal Sites of Excavated earth from Re-excavation of Khal & River

Proposed disposal site at Mathabanga Mouza 3.51 km from Rupsha Bridge

Proposed disposal site at Sholua Bazar Landfill 15 km from KCC

Proposed disposal site at Linear Park along the Mayur River 5 km from KCC (left bank as shown in this photo)

V. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Process of Consultation

47. During Project preparation, consultations have been held with the officials / elected representatives of the Khulna City Corporation, apart from the communities in the subproject locations. The issues covered during these consultations included selection of subprojects and identification of key issues including addressing the current needs related to drainage in the Khulna urban area. These consultations provided inputs in identification of the felt needs of the communities, and the relevant stakeholders.

48. Informal public consultation was conducted routinely during inspection of the lots making up the subproject (see Figure 7). The approach taken was to introduce the project to a group of bystanders or residents near the site and to describe potential impacts that might be borne by the group during construction, such as: “during the construction of this drain, the access to your shop will be obstructed,” or “while this khal is being excavated, the materials will be piled in the area near your home.” Inevitably the response was that the difficulty is gladly endured if the project will relieve flooding and improve drainage in the community area. Drainage is a serious concern for Khulna residents and the project, performed according to best engineering and construction practice, is wholly welcomed.

Figure 7: Informal Public Consultation along Subproject Alignments

B. Plan for Continued Public Consultation

49. Various provisions are proposed to ensure continued public participation and stakeholder participation into latter stages of the project. This participatory process will ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process. Further, to ensure an effective disclosure of the project proposals to the stakeholders and the communities in the vicinity of the subproject locations, project awareness campaigns will be carried out. The PMCU will disclose the IEE on its Project website, including any corrective action plans prepared during project implementation and environmental monitoring reports. For the benefit of the community a summary of the IEE will be translated in Bangla and made available at: (i) Office of the PMCU; and (ii) Office of the Khulna City Corporation. Hard copies of the IEE will be available in the PMCU/PIU, and accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document at the cost of photocopy from the office of the PMCU/PIU, on a written request and payment for the same to the Project Director. Electronic version of the IEE will be placed in the official website of the LGED.

VI. GRIEVANCE REDRESS MECHANISM

50. A grievance redress mechanism will be established in Khulna City soon after subprojects commence construction. The first level and most accessible and immediate venue for resolving grievances is the PIU, through the resettlement support staff (RSS) and Project Manager, with assistance from the Resettlement Specialist (National and International-NRS and IRS) of the Management, Design and Supervision Consultant (MDSC). The contact phone number will be posted in the project areas. Grievances will be resolved through continuous interactions with affected persons and the PIU will answer queries and resolve grievances regarding various issues including livelihood impacts, entitlements, and environmental impacts that affect individuals and groups. Corrective measures will be undertaken at the field-level itself within seven days. All grievances will be documented with full information of the person and issue.

51. Should the grievance remain unresolved, the PIU's Project Manager, will activate the second level of the Grievance Redress Mechanism (GRM) by referring the issue (with written documentation) to the local Grievance Redress Committee (GRC) of the City Corporation, who will, based on review of the grievance, address them in consultation with the RSS of the PIU and PMCU, and affected persons. A hearing will be called, if necessary, where the affected person can present his/her concern/issues. The process will promote conflict resolution through mediation. The local GRC will consist of the following persons: (i) Chief Executive Officer of the City Corporation (GRC Chair); (ii) representative of the head of the City Corporation; (iii) representative of the affected persons; (iv) official of the land registry department; (v) official of the DOE's divisional office; (vi) town planner of the City Corporation; and (vii) Environmental Specialist/RSS of the PIU. The local GRC shall meet twice a month, unless the Project Director informs that there are no grievances to address, or they shall meet as needed as per the severity of the grievance. The local GRC will suggest corrective measures at the field level and assign responsibilities for implementing its decisions.

52. The functions of the local GRC are as follows: (i) provide support to displaced persons on problems arising from land acquisition (temporary or permanent); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) record grievances of displaced persons, categorize and prioritize them and provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

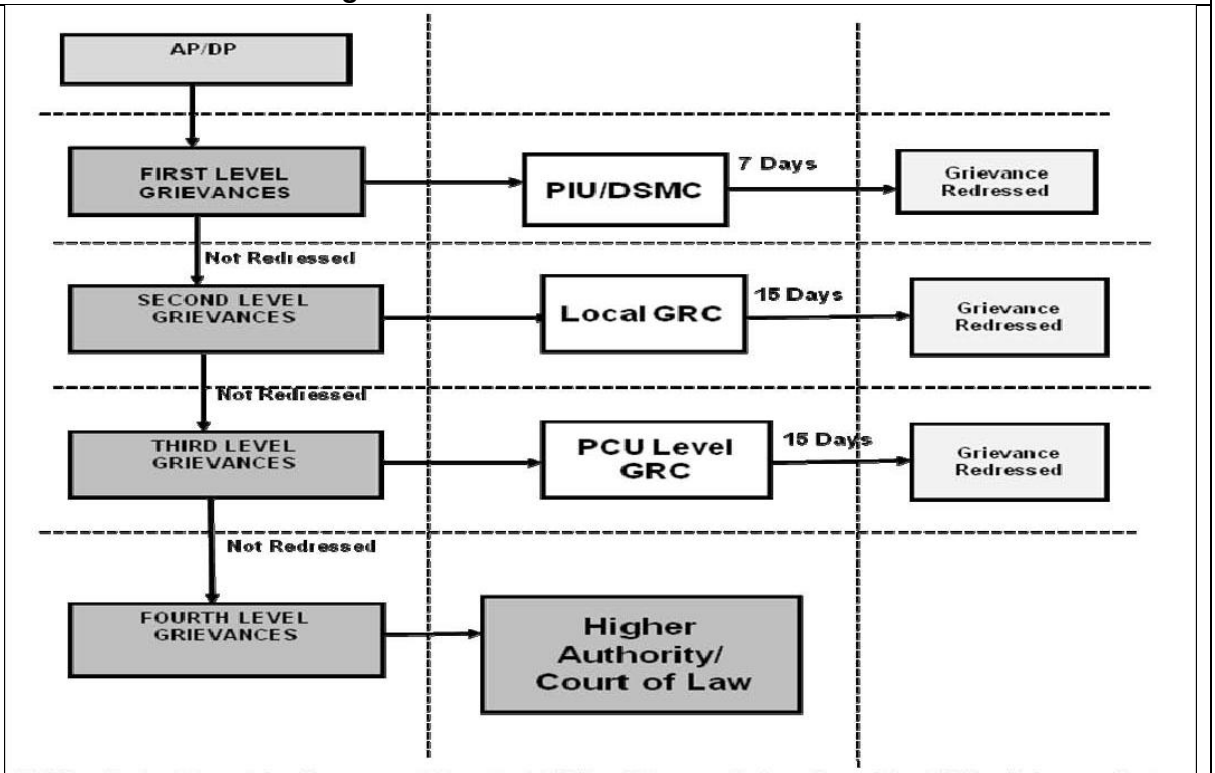
53. Should the grievance still remain unresolved, the PIU Project Manager, will activate the third level of the GRM by informing the PMCU Project Director who will, based on review of the local GRC minutes and consultation with the PIU Project Manager, activate the PMCU level GRC. This committee shall be comprised of: (i) Project Director PMCU, (ii) Environmental/Resettlement Officer of the PMCU; (iii) representative from Land Ministry, (iv) representative from DOE; (v) representative of the displaced persons; and (vi) Environmental/Social Safeguards officer of the PIU.

54. The GRC at the PMCU level shall meet based on the receipt of grievances, and the meeting shall be convened within 7 days of receipt of the grievance by the PMCU, and grievances redressed with 15 days. The Environmental / Resettlement Safeguards Officer of the PMCU will be responsible for processing and placing all papers before the PMCU GRC, recording decisions, issuing minutes of the meetings and taking follow up action to see that formal orders are issued and the decisions carried out.

55. In the event that a grievance is not addressed by the PIU, local GRC, or the PMCU GRC, the displaced person can seek legal redress of the grievance in the appropriate Courts

(the fourth level of the GRM). A grievance redress mechanism and procedure is depicted in Figure 8.

Figure 8: Grievance Redress Mechanism



DSMC = Design Supervision Management Consultant, GRC = Grievance Redress Committee, GRM = Grievance Redress Mechanism, PIU = Project Implementation Unit, PMCU = Project Management Coordination Unit.

VII. ENVIRONMENTAL MANAGEMENT PLAN

56. The IEE for this package has been prepared in accordance with ADB Safeguard Policy Statement's requirements for environment category B projects and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject. The complete IEE can be downloaded from
< http://www.lged.gov.bd/ProjectLibrary.aspx?projectID=237>

57. The environmental management plan (EMP) describes the proposed mitigation measures in relation to potential impacts, and the means for assuring their implementation via monitoring. Institutional arrangements and costs related to mitigation and monitoring are described.

A. Summary of Environmental Impacts and Mitigation Measures

58. Table 3 lists the potential environmental impacts and the mitigation measures including the responsibilities for implementing the same. Costs associated with implementing the mitigation measures are incorporated into the contractor's cost estimate and, for measures during the operational period, into the budget of the KCC.

B. Institutional Arrangements for Project Implementation

59. LGED is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan. LGED is assisted by a Project Steering Committee (PSC), to provide policy guidance and coordination across all towns and subprojects. LGED has established a Project Management Coordination Unit (PMCU) to manage all aspects of loan project implementation, coordinate construction of subprojects across all towns, and ensure consistency of approach and performance. An Environmental and Social Officer (ESO) has been appointed to coordinate social and environmental issues. Environmental review of projects and monitoring implementation of mitigation measures are primary functions of the ESO within the PMCU.

60. The PMCU is assisted by Design and Supervision Consultants (DSC) who assist in overall project implementation, preparation of master plans for infrastructure, design infrastructure improvements, manage contract tenders and supervise construction. International and domestic Environmental Specialists are staffed within the MDSC. The IEE has been prepared by the Environmental Specialists assisting the MDSC at the time of the detailed design. Costs for mitigation measures and monitoring are considered current at the time of contract procurement.

61. A Project Implementation Units (PIUs) has been established at the KCC, staffed by KCC and supported by local LGED and MDSC staff. An Environmental Officer has been appointed within the PIU to insure an understanding among bidders of the environmental components in procurement documents, and to monitor mitigation measures during construction and operation. Environmental specialists assisting the MDSC will provide capacity building, training and other forms of support to the PIU.

62. The PIU will hire Construction Contractors (CC) to build elements of the infrastructure. Environmental Specialists within the MDSC will assist the PMCU and PIUs to ensure that the construction packages comply with environmental safeguards and the Environmental Monitoring Plan contained in the IEE. Inspection of progress in construction will be undertaken locally by the PIU, supported by the PMCU and MDSC.

63. During implementation the contractor will submit monthly progress reports to the PIUs, which includes a section on EMP implementation. The PIUs will submit reports to the PMCU for review. The PMCU will review progress reports to ensure that the all mitigation measures are properly implemented. The PMCU will consolidate monthly reports and submit semi-annual reports to ADB for review.

C. Environmental Monitoring Plan

64. Mitigation activities fall into three stages: pre-construction (location, planning and design), construction and operations. Mitigation of pre-construction impacts are the responsibility of the PMCU and MDSC working with the PIUs to prepare the subproject according to good engineering practice. Mitigation of impacts during construction is the responsibility of the Construction Contractors (CC), which will be monitored by the PIUs. Responsibility for the relevant measures will be assigned to the Contractors via the contracts through which they are appointed (prepared by the MDSC during the detailed design stage), so they will be legally required to take the necessary action.

D. Grievance Redress Mechanism

65. The Grievance Redress Mechanism, as described in Sec. VI, involves a three tiered process for registering and resolving complaints raised by project affected persons through intervention by the PIU (first level), the local Grievance Redress Committee (second level) of the LGU, or the PMCU (third level). The construction contractor has a role to deliberate along with the PIU and representatives of the PMCU (through the DSCM) solutions to complaints raised by individuals and groups, and to act promptly (within a period appropriate to the nature of the complaint) on executing agreed upon solutions to specific problems, then reporting back to both the PIU and the affected party on solutions undertaken by the contractor. The GRM serves dual functions to register complaints related to both environmental impacts and resettlement and compensation. The contractor will post notices announcing the grievance redress mechanism in local government offices (the City Corporation office) and in strategic places of the subproject's area of influence.

Table 3: Potential Environmental Impacts and Mitigation Measures

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location
PLANNING, LOCATION & DESIGN					
Detailed design fails to incorporate good engineering design practice	S2	P	Analyze, survey and produce a technically and economically feasible designs	MDS, LGED	PMCU office
Spoils impact and mitigation measures	S2	T	Spoil management plan should be submit for approval from PIU for the disposal sites of excavated materials, spoils, construction debris and garbage prior to start of construction work.	MDS, LGED	PMCU office
CONSTRUCTION					
Awareness of surrounding people	S3	T	Inauguration meeting should be held at site headed by local representative	PIU	Project site
Traffic management plan for during construction period	S3	T	Submit a traffic management plan including but not limited to list of roads to be closed, number of flagmen to be designated along length of drainage per work day, type and number of signs/barricades to be used.	Contractor	Project site
Impact on air quality and noise levels due to construction activity	S2	T	Application of water to suppress dust where needed. Prompt removal of spoil materials	Contractor	All activities
Construction blocks access from failure to backfill trenches and removed materials and construction debris	S2	T	Provide means to bypass construction using detours, bridging trenches and providing pathways. Specific clauses in tender documents to complete construction promptly and remove excavated materials and debris.	Contractor	Project Site
Traffic congestion and blockage of paths of travel	S2	T	Provide signage, flagmen and detours around construction as appropriate; where pedestrian traffic is common, provide paths of travel through construction area.	Contractor	Project Site
Traffic and human movement may be disrupted by materials hauling	S3	T	Plan routes to avoid congested areas and narrow roads. Schedule transportation to avoid peak traffic	Contractor	Project Site
Quarters for workers in the proximity of worksites, and equipment/material yards	S3	T	Minimize need for workers quarters, equipment yard and onsite repair facility in work area; provide potable water supply and latrines for workers, and solid waste disposal	Contractor	All activities
Dirt, sediments and sludge causes an inconvenience by blocking pedestrian and vehicular access, nuisance to local residents, and impact on public health.	S2	T	Dispose of spoil material at a location agreed to by the PIU and the property owner. Use tarpaulins to cover dry materials during transport Provide walkways and metal sheets where required to maintain access across for people and vehicles Increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals and schools Consult businesses and institutions regarding operating hours and factoring this in work schedules and ensure there is provision of alternate access to	Contractor	Project Site

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location
			businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage;		
			Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.		
			Materials excavated preceding construction of small drains to be removed from the site quickly.		
			Sediments and sludge excavated from drains, khals and rivers allowed to dewater and dry no longer than one week before removal.		
			Clear path of access for three-wheeled vehicles, rickshaws and pedestrians maintained along routes of usual travel.		
			Excavated materials sufficiently dry or loaded into sealed dump trucks that will not leak materials onto roadways		
Lack of planning during construction fails to properly sequence activities and minimize disturbance/cost.	S2	T	Plan construction to accommodate traffic flow; perform work on one road before beginning work on the second; complete construction on one segment before progressing to new location.	Contractor	Project Site
Drains are clogged at end of construction period.	S2	P	Close or cover newly installed drains to prevent entry of dirt; contractor to turn over to LGU installed drain free of dirt or foreign material.	Contractor	Drainage works
Schools, mosques, hospitals, temples may be disturbed by noise, dust and impeded access	S2	T	Increase work force to complete construction quickly in affected areas. Practice good housekeeping to minimize dust / avoid obstruction in the paths of travel of pedestrians and vehicles	Contractor	All activities
Potential for benefit from employment for local people	S2	T	Provide preferential employment for locals in labor force as specified in construction contract tender documents	Contractor	Project Site
Trees may be removed along drainage easements	S2	P	Avoid removing trees where possible	Contractor	Project Site
Potential for accident and injury of construction workers and public in zone of construction	S2	T	Implement a safety and health plan for workers and require personal protective gear suitable to the type of work being performed. Train in safe work procedures. Maintain a record of accidents that are reported to the supervising engineer. Bar the public from construction areas and barricade and mark excavations	Contractor	Project Site
OPERATION & MAINTENANCE					
Drainage channels are not maintained, solid waste builds up in drains, drains no longer function properly.	S2	P	Prevent deposit of foreign materials (oil, grease, solid waste, plastics) into drains, inspect, repair and clean drain periodically.	GCC	All drains
Appearance and environment will deteriorate if material from drain cleaning piled on adjacent land	S2	T	Dispose of material from blocked drain in location away from roadway and drain	GCC	All drains

Sig = Significance of Impact (S3 = Not Significant, negligible impacts; S2 = Moderate, reversible impacts which are site specific and simple to contain and mitigate; S1 = Significant, potentially irreversible impacts requiring complex mitigation); Dur = Duration of Impact (T = Temporary; P = Permanent); Dur = Duration of Impact (T = Temporary; P = Permanent)

66. A program of monitoring will be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. This will be conducted by the Environmental Officer within the PIU supported by the PMCU Environmental Coordinator and the Environmental Specialists on the MDSC Team. The Environmental Officer will be responsible for monitoring implementation of mitigation measures and reporting to the PMCU, and will recommend remedial action if measures are not being provided or are not protecting the environment effectively. Post-construction monitoring will be conducted by the KCC.

67. Most of the mitigation measures undertaken during construction are meant to minimize disturbance from the construction in urban areas by maintaining access, planning work to avoid sensitive times, reducing dust and noise pollution and dealing effectively with excavated materials. Experienced Contractors should be familiar with the requirements. Monitoring of such measures normally involves making observations in the course of site visits, although some require review of records and surveys of residents.

68. Table 4 shows the proposed Environmental Monitoring Plan for these subprojects, which specifies the various monitoring activities to be conducted during all phases. The table describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility (for both mitigation and monitoring). It does not show specific parameters to be measured because as indicated above, most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers. Costs related to monitoring are included in the costs for loan project implementation.

69. LGED should conduct monitoring during the operational period to confirm the long-term benefits of the scheme. This will involve monitoring condition of drains in relation to breakage and removal of built up sediments, and limits on discharge of oil and grease to drains.

Table 4- Environmental Monitoring Requirements

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Monitoring Responsibility
PLANNING, LOCATION AND DESIGN					
Analyze, survey and produce a technically and economically feasible design	PMCU office	MDS, LGED	Critical evaluation of design outputs	Continuous	Team Leader & Project Director
Plan the sequence of construction to minimize disruptions	PMCU office	MDS, LGED	Critical evaluation of tender and construction pre-planning	Prior to tender award	Team Leader & Project Director
Incorporate good engineering practice into design	PMCU office	MDS, LGED	Review of design outputs	Before design approval	Team Leader & Project Director
Spoil management plan should be submitted for approval from PIU for the disposal sites of excavated materials, spoils, construction debris and garbage prior to start of construction work.	PMCU office	MDS, LGED	Include environmental clauses; critically evaluate environmental / safety aspect of implementation	Before approval of tender document	Team Leader & Project Director
Environment, Health and safety part of contract documents	PMCU office	MDS, LGED	Include environmental clauses; critically evaluate environmental / safety aspect of implementation	Before approval of tender document	Team Leader & Project Director
CONSTRUCTION					
Inauguration meeting should be held at site headed by local representative	Project site	PIU	CC records	Once before commencement	PIU
Traffic management plan including but not limited to list of roads to be closed, number of flagmen to be designated along length of drainage per work day, type and number of signs/barricades to be used.	Project site	Contractor	Site Visits; CC records	Weekly	MDS, PIU
Application of water to suppress dust where needed. Prompt removal of spoil materials	Construction zone	Contractor	Site Visits; CC records	Weekly	MDS, PIU
Provision of means to bypass construction where necessary using detours, bridging trenches and providing pathways.	Distribution	Contractor	Site visit; resident survey	Weekly	MDS, PIU
Provide flagmen and traffic detours when necessary	Distribution	Contractor	Site visits; CC records	Weekly	MDS, PIU
Plan truck routes to avoid congested areas, narrow roads and peak traffic	All sites	Contractor	Observations off site; CC record	Monthly	MDS, PIU
Dispose of spoil material at a location agreed to by the PIU and the property owner. Use tarpaulins to cover dry materials during transport	Construction zone	Contractor	Site Visits; CC records	Monthly	MDS, PIU

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Monitoring Responsibility
Materials excavated preceding construction of small drains to be removed from the site quickly.	Construction zone	Contractor	Site visits	Weekly	MDS,PIU
Excavated materials sufficiently dry or loaded into sealed dump trucks that will not leak materials onto roadways	Haul routes	Contractor	Observations on and off site	Weekly	MDS,PIU
Cover or damp down fill material, soil and sand stockpiled on site	Construction zone	Contractor	Site visits	Weekly	MDS,PIU
Only bring construction material to site when needed.	Inhabited areas	Contractor	Site visits; CC records	Weekly	MDS,PIU
Sediments and sludge excavated from drains, khals and rivers allowed to dewater and dry no longer than one week before removal.	Construction zone	Contractor	Site visits; CC records	Weekly	MDS,PIU
Land acquisition / compensation in accord Resettlement Framework*	Where required	GCC	Landowner surveys; LGED record	As needed	MDS,PIU
Clear path of access for three-wheeled vehicles, rickshaws and pedestrians maintained along routes of usual travel.	Construction zone	Contractor	Site visits, CC records	Weekly	MDS,PIU
Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals and schools	Distribution	Contractor	Site visits; CC records	Monthly	MDS,PIU
Consult businesses and institutions regarding operating hours and factoring this in work schedules and ensure there is provision of alternate access to businesses and institutions during construction activities, so that there is no closure of these shops or any loss of clientage	Distribution	GCC	Resident surveys; CC records	Monthly	MDS,PIU
Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions.	Distribution	MDS/GCC	Site visit; design reports	Monthly	MDS,PIU
Plan work with town authorities – work when traffic is light	Distribution	Contractor	Site visits; CC records	Monthly	MDS,PIU
Plan construction to accommodate traffic flow; perform work on one road before beginning work on the second; complete construction on one segment before progressing to new location.	Construction zone	Contractor	Site visits, CC records	Monthly	MDS,PIU
Develop and apply archaeological protocol to protect chance finds	All sites	MDS and CC	MDS and CC records; Site visits	Weekly	MDS,PIU
Provide walkways and metal sheets where required to maintain access across for people and vehicles	Where needed	Contractor	Design reports; resident surveys	Monthly	MDS,PIU

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Monitoring Responsibility
Minimize need for workers quarters, equipment yard and onsite repair facility in work area; provide potable water supply and latrines for workers, and solid waste disposal	All sites	Contractor	Site visits; CC records	Monthly	MDS,PIU
Exclude public from the site with barricades; provide pedestrian path of travel through work area	All sites	Contractor	Site visits; CC records	Monthly	MDS,PIU
Ensure that workers wear Personal Protective Equipment	All sites	Contractor	Site visits; CC records	Monthly	MDS,PIU
Provide Health and Safety training for all personnel	All sites	Contractor	CC records; worker interviews	Monthly	MDS,PIU
Keep accident reports and records	All sites	Contractor	CC records	Monthly	MDS,PIU
Employ workforce from communities near sites	All sites	Contractor	CC records; worker interviews	Monthly	MDS,PIU
Close or cover newly installed drains to prevent entry of dirt; contractor to turn over to LGU installed drain free of dirt or foreign material.	Construction zone	Contractor	Site visits	Monthly	MDS,PIU
OPERATION AND MAINTENANCE					
Prevent deposit of foreign materials (oil, grease, solid waste, plastics) into drains, inspect, repair and clean drain periodically; dispose of materials removed from drains	KCC's Office	OM contractor	Site observations	Monthly	KCC Office
Dispose of material from blocked drain in location away from roadway and drain	KCC's Office	OM contractor	Site observations	Monthly	KCC Office

VIII. FINDINGS AND RECOMMENDATIONS

A. Findings

70. The Initial Environmental Examination for this subproject has proceeded through description of the proposed infrastructure works, description of the greater environment in which the infrastructure improvements will take place, and analysis of impacts due to location, planning and design; constructions; and operations, with consideration for timing, scale and intensity of impact.

71. Drainage and flood protection are important infrastructure improvements for Khulna City. Analysis has shown that significant negative impacts are unlikely to occur due to improvement of their drainage facilities. The main impact is expected to be beneficial: the overall improvement of drainage infrastructure within the City. The relative magnitude of this improvement is best assessed through post-project monitoring and evaluation, either by the Government or by ADB.

72. Recommendations have been made to improve the environmental performance of the subproject. Many are concerned with pre-planning for the proposed drainage improvements, in order to identify actual improvements needed to existing systems. This planning work was conducted under a previous technical assistance, and by the local government, and is found to be accurate and well informed. Environmental criteria for construction are recommended to mitigate construction impacts. Finally, recommendations are made for maintaining the completed components to be carried out by the City.

73. Specific environmental impacts and their associated mitigation measures have been identified in the subproject IEE. Parties responsible for implementation of mitigation measures, and for monitoring implementation, have been identified and the general features of an institutional mechanism have been described. Those features include assignment of tasks and responsibilities for environmental review within the PMCU and PIU, provision of staff to support the environmental function through the MDSC, and a formal capacity building plan to be undertaken during subproject implementation.

74. Public consultation is shown to be an integral feature of project preparation, and indeed the subproject originates among a broad cross-section of stakeholders; hence its acceptability is screened from the outset. In addition, public consultation has been conducted to make clear to the directly affected communities the potential social and environmental impacts as identified by the environmental and social reviews. Informal public consultations were held along the alignments of the proposed improvements to obtain the views of local people. No significant issues were raised during these meetings that have not been addressed in the IEE, nor were there issues that pose a significant constraint on implementation of the proposed subproject. A proposal has been described for continuing the process of public consultation during construction that includes a mechanism for redress of grievances that arise during the construction phase.

B. Recommendations

75. The primary means for environmental management is through mitigation of construction impacts by means of environmental requirements placed on the construction contractor, and through maintaining and operating the completed system to guarantee long term performance.

76. Mitigation measures to be undertaken during construction include special means for minimizing interference with access to residences and businesses, especially as regards the handling, transport and disposal of excavated materials, means for reducing odors and noise

along drainage alignments and haul routes, means for reducing traffic congestion in the construction areas and along haul routes, provision of alternative means of access to homes and businesses, and requirements for minimizing worker safety and health risk through use of protective gear and training.

77. Mitigation measures for implementation during operations of the system include repair and cleaning of the drainage system, and limiting the amounts of oil and grease discharged to drains.

IX. CONCLUSIONS

78. The environmental impacts of the proposed improvements in drainage and flood protection infrastructure for Khulna City have been assessed by the environmental assessment process reported in this document, conducted according to ADB guidelines. Issues related to involuntary resettlement were assessed by a parallel process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework for the program.

79. The overall conclusion of both processes is that providing the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental impact as a result of location, planning, design, construction and operation of the project. There are benefits stemming from recommended mitigation and enhancement measures, and major improvements in quality of life and individual and public health once the project is in operation.

Appendix 1: Environmental Clearance Certificate from Department of Environment

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

Memo No: DOE/Clearance/5194/2013/180 Date: 21/07/2013

Subject: Environmental Clearance for City Region Development Project.

Ref: Your application on 13/06/2013.

With reference to the above, the Department of Environment (DOE) hereby accords Environmental Clearance to above project excluding the construction of Water Treatment Plant, Water Distribution Pipeline Laying, Sanitary Landfill, Bus and Truck Terminal sub-components.

A copy of the said Environmental Clearance Certificate is attached herewith for your necessary action.

21.07.2013

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
and
Member Secretary
Environmental Clearance Committee
Phone # 8181778

Mr. Md. Wahidur Rahman
Chief Engineer
Local Government Engineering Department
LGED Bhaban, Agargaon, Dhaka.

Copy Forwarded to :

1) PS to Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Dhaka Regional Office, Dhaka.
3) Director, Department of Environment, Khulna Division, Khulna.
4) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Appendix 2: Environmental Specifications for Construction Contractor

General

1. The contractor shall review and comply with the environmental management plan (EMP) prepared for the subproject, and will note and implement any particular requirements therein, in addition to those found in this general specification. At the start of construction, the contractor will provide a Construction Environmental Management Plan for compliance with these specifications, including development of the construction zone, worker camps, equipment yards, haul roads and borrow/quarry areas. The contractor's implementation of mitigation measures will be monitored during the course of the work and reported to the ADB.

2. The contractor will post a public notice regarding the nature, extent and cost of the project at the start of the construction zone; and post notices announcing the grievance redress mechanism in local government offices and in strategic places of the subproject's area of influence. For projects with multiple sites, a single notice may be posted at the pourashava, upazilla or municipal office.

3. The Contractor's Project Manager or other technical staff shall serve as focal person for EMP implementation and for responsibilities under the Grievance Redress Mechanism (GRM). The Contractor's Project Manager or other technical staff is required to obtain construction environmental management training and orientation to be provided by an LGED specialist at the start of construction. Costs for implementing requirements set out herein are considered to be incorporated into the unit bid price for quantities unless indicated as paid for through provisional sums.

Worker Provisions

4. GOB criteria for minimum age, wage and living provisions, benefits, hours of work, overtime arrangements and overtime compensation, and leave for illness, maternity, vacation or holiday should be met for all workers. The Contractor will conform to national law in relation to hiring and employment; and will comply with the principle of equal opportunity, fair treatment, and nondiscrimination with respect to the employment relationship. Hiring of project-affected persons, women, residents of project-affected administrative units and disadvantaged groups is encouraged.

5. The contractor shall implement a safety and accident prevention program involving provision, training and use of safety equipment; minimum skills qualifications for operators and drivers; and record keeping related to accidents.

6. The Contractor will provide Personal Protective Equipment (PPE) to workers that offer adequate protection to the worker without incurring unnecessary inconvenience in its use[1]. Proper maintenance of PPE, including cleaning when dirty and replacement when damaged or worn out; and proper use of PPE should be part of training programs, as appropriate.

7. The contractor will maintain first aid kits onsite along with instructions for use, and personnel trained in basic first aid emergency response measures. In case of injury, the

[1] Depending on the application PPE may include safety glasses with or without side-shields, and protective shades; plastic helmets with top and side impact protection; hearing protectors (ear plugs or ear muffs); safety shoes and boots for protection against moving & falling objects, liquids and chemicals; gloves made of rubber or synthetic materials; facemasks with appropriate filters for dust removal and air purification; single or multi-gas personal monitors; portable or supplied air; on-site rescue equipment, and insulating clothing, body suits and aprons of appropriate materials.

contractor shall arrange treatment of the injured worker(s) and bear the cost of treatment.

8. Laborers and others resident at the site will be provided with lodging in a camp setting, potable water supply, food service facilities and adequate means for maintaining personal hygiene and solid/liquid waste disposal.

9. Safe drinking water will provided at the worksite with sufficient numbers of access points to assure availability for workers. Water will be periodically tested for and assured safe from bacteriological contamination.

10. HIV/AIDS awareness should be incorporated into the contractor's policy and outreach toward workers.

Gender Equity

11. The contractor shall provide equal wage payment for work of equal value for women, as required by the Government of Bangladesh. Separate sanitation and bathing facilities shall be provided for women at work camps and at the construction site.

12. The contractor is encouraged to engage women laborers, project affected women and destitute persons on works suitable for them, and shall follow ILO conventions and relevant protocols. The contractor shall consult with the Women's Ward Councilor and others on the availability of women workers including indigenous women workers in the area to engage them in work suitable to their skills.

Use of Land for Construction Purposes

13. The worksite and ancillary sites shall be surveyed and pegged prior to construction to ensure correct lines and grades for alignments, earth fill, side slopes, flow lines and trees to be removed or preserved in accordance with the design. Final verification of affected persons and assets shall be undertaken prior to the commencement of the works.

14. The contractor will obtain approval from landowners for temporary use of land for ancillary sites such as labor camps and construction yards. Local authorities will be consulted on locations, which will in no case be within 100 m of sensitive receptors such as hospitals, schools,residential communities or identified archaeological, religious or cultural sites. The contractor shall obtain approval and permits from the concerned District Collector for sand mining in rivers. An ancillary site shall be above flood level, at least 10m away from watercourses, and its size kept to a minimum to reduce vegetation clearance and ground disturbance.

15. The contractor will not encroach upon vacant land, or damage forests, wildlife or fisheries in the project area. The Contractor will execute a plan for preventing firewood gathering in the project area and prohibit among workers possession of instruments or poisonous substances for killing or capturing fish or wildlife.

16. Vegetation clearance shall be confined to the minimum area required for construction. Trees within the boundaries of ancillary sites shall be retained wherever possible.

17. Cutting trees is prohibited except inside the construction zone, on upper and lower slopes requiring stabilization, and in quarry areas. Trees to be removed must be specified in the Project plans and specifications. Pits resulting from removal of trees and stumps shall be backfilled and compacted. The contractor shall dispose of removed vegetation at locations approved by the Engineer.

18. No fuel, oil, or parts cleaning fluids shall be spilled, wasted or disposed of at the project site. Secondary containment (earth or concrete berm with bottom and sides sealed with plastic sheeting) at least equal to the capacity of the fuel storage tank shall be provided at fueling stations. Hazardous materials shall be stored above flood level and at least 20m away from any water course.

19. After completion of occupancy, all affected areas within the general project boundary shall be graded to their original elevation or to a continuous sloping grade that allows positive drainage. Machinery, equipment, structures, contaminated earth, plant matter and waste or unused materials shall be removed and disposed of at locations approved by the Engineer.

Sediment Controls and Spoil Materials

20. Areas to be cleared and excavated are limited to areas where construction will take place. The areas will be protected from flowing water including sheet runoff. The contractor will limit sediment loss from exposed surfaces. Existing drainage patterns should be maintained during construction to the extent possible.

21. Discharge of wastewater into water bodies is prohibited as is the discharge of wash water from concrete trucks to waterways. . Land clearing activity will be suspended during rains to limit sediment loss.

22. Topsoil shall be removed from areas of fill or sub-surface excavation and stockpiled at designated locations for reuse in covering embankment slopes, berms, and other disturbed areas.

23. Unsuitable and spoil materials shall be disposed promptly and properly from the site at locations approved by the Engineer.

Community Values

24. Vehicles transporting dirt, sand and construction materials capable of producing dust will be covered when traveling through community areas or along roadways in use by the public. Vehicles will operate within the legal speed limits in populated areas. The operation of moving equipment in locations accessible to the public will be done in a manner so as to prevent the occurrence of incidents and accidents.

25. The Contractor should use available means to prevent accidents by emphasizing safety aspects among drivers; assuring sufficient driving skills and requiring licensing of drivers; adopting limits for trip duration and arranging driver rosters to avoid overtiredness; specifying and obtaining approval from the PIU in advance, and adhering to, haul routes between borrow areas and the project site; avoiding dangerous routes and times of day to reduce the risk of accidents; use of speed control devices (governors) on trucks, and remote monitoring of driver actions.

26. The contractor is responsible for regular spraying of roadway surfaces in use as haul routes and of sites under construction as well as temporary detours where these locations are accessed by the public. The contractor will remove excess debris during construction and after completion of the item of work.

27. The contractor will locate aggregate crushing and batch mix plants at sufficient distance (at least one km) from populated areas, houses, schools and hospitals so as to reduce air pollution and noise. The contractor shall protect, conserve and maintain access to social and cultural properties in the project area including schools, mosques, hospitals,

temples, shrines, graveyards, tourism sites and other public places. The contractor may increase the workforce to minimize the duration of construction in such areas.

28. The Contractor will post flagmen at intersections of transit paths for construction vehicles and local traffic, and along traffic lanes where work is in progress. Traffic detours will be clearly marked.

29. The contractor will provide a path for transit of pedestrians and vehicular traffic through or around the construction area; and barricade open excavations to prevent injury to the public.

30. The contractor shall ensure that working hours do not extend beyond 7.00 a.m. to 7.00 p.m. to avoid undue disturbance of the local people.

31. The contractor shall avoid trenching near to buildings, walls and existing buried pipelines. If unavoidable, the contractor shall provide adequate protective measures to prevent damage.

32. The contractor will avoid blocking access to land, homes and businesses; where unavoidable, the contractor will provide temporary access to affected properties and reinstate permanent access on completion of work; minimize the area under construction at any one time and the duration of works at any one location; and minimize impacts on infrastructure, access and services. Backfill and sealing of construction trenches shall be done promptly.

33. The contractor will install signs and lighting, where there is nighttime traffic, in the vicinity of works on public roads, and restrict access to the construction site by the public.

34. All construction machinery and vehicles to be used in works shall be of proven efficiency and shall conform to GOB standards for emissions and noise levels. The contractor shall regularly maintain the construction machinery and vehicles so that emissions, vibrations and noise levels conform to GOB's relevant standards. The Contractor shall prohibit the use of air horns in settlement areas.

35. The contractor shall promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction activities, and shall maintain or provide temporary services that are interrupted by construction. The Engineer shall inspect and certify the adequacy of all reinstated services and facilities.

<u>Site Conditions, Quarries and Haul Routes</u>

36. At the start of construction, the contractor will provide a Site Environmental Management Plan for development of the construction zone, worker camps, equipment yards, haul roads and quarry areas.

37. Haul routes will minimize interference with ongoing activity in the area. Routes shall be approved by the PIU. Haul roads and transport/equipment routes shall be kept within the construction zone, unless authorized by the PIU.

38. Selection of borrow pits, quarry sites and haul routes shall minimize noise and air pollution in the site vicinity, visual impacts in inhabited areas, impacts on land use, air and noise emissions along haul routes, and congestion in populated areas.

39. Quarry and borrow pit locations will be permitted for use by the local authority, and shall be pre-existing sites, e.g. already in use prior to the start of the construction. Newly opened quarry locations require approval of the PIU.

40. The contractor shall select borrow pits that are free from organic materials. The use of dredged materials from rivers is permitted if the materials are sandy and free from organic matter. Topsoil from farmland should not be used as fill.

41. The contractor shall stockpile construction materials in such a way as to prevent any loss of materials to watercourses. Stockpiling of backfill shall be done outside the right of way and not on the side slopes of roads.

42. Borrow pits shall be restricted to areas within the construction zone as defined by right-of-ways for roads, embankments and irrigation canals. Borrow pits along linear alignments will be interconnected; smoothly excavated; of uniform depth, width and slope; and graded to drain after use.

Archeological and Cultural Relics

43. The Contractor will stop construction on discovery of objects of archeological origin; and notify the PIU, who will contact the Department of Archaeology, Ministry of Cultural Affairs to investigate and, if desirable, undertake recovery. Work must remain halted at the specific location until investigation is complete.